January 1987 Vol. XII No. 1

ENDANGERED SPECIES

Technical Bulletin

Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Two Animals Proposed for Listing

During December 1986, the Fish and Wildlife Service (FWS) proposed to add two animals—a bird and a toad—to the U.S. list of Endangered and Threatened species. If the proposals are later made final, protection under the Endangered Species Act will be extended to these taxa:

Black-capped Vireo (*Vireo atricapillus*)

Once a widely distributed bird, the black-capped vireo bred from north-central Kansas through Oklahoma and Texas to central Coahuila, Mexico (with an outlying, possibly temporary, colony in Nuevo Leon, Mexico). Its wintering range was from Sonora to Oaxaca, with most activity in Sinaloa and Nayarit. Unfortunately, however, this small but attractive songbird is disappearing. Habitat loss and the spread of a competing bird species have eliminated the black-capped vireo from most of its breeding territories in the U.S., and it likely faces similar problems in Mexico. In an effort to prevent its extinction, the FWS has proposed to list this species as Endangered (F.R. 12/12/86).

Black-capped vireos require a specific type of habitat consisting of a few small trees scattered among separated clumps of many shrubs or bushes. The clumps of bushes are in the open, surrounded by bare ground, rocks, grasses, or wildflowers. Bushes with low-reaching foliage are particularly important for breeding because the nests are usually only 18 to 40 inches (0.5 to 1.0 meter) above ground and need to be screened from view.

These specific habitat characteristics have proved to be highly vulnerable to damage or destruction from certain land use practices. Urbanization has completely eliminated many former vireo breeding areas. Elsewhere, grazing sheep, goats, and other exotic herbivores remove the vegetation cover near ground level that is necessary for vireo nesting. Range management also can be a factor when it involves the removal of low, broad-leaved bushes. On the other hand, natural vegetational succession can overwhelm the clumped habitat needed by the vireo. In the past, overgrown areas periodically would be opened by such events as wildfires; now, however, the amount of available habitat has been drastically reduced.

Competition is another big problem for the black-capped vireo. The extensive human-related changes in the landscape and land-use patterns—in particular, the opening up of forested areas and the spread of cattle and grain fields in North America over the past 150 years—appear to have favored the spread of the brown-headed cowbird (*Molothrus ater*). This more adaptable bird seems to be increasing in numbers as well as in range. (It threatens not only the black-capped vireo but also a related subspecies in California, the Endangered least Bell's vireo, *Vireo bellii pusillus*.) Cowbirds parasitize vireo nests, laying their eggs before the vireo clutches are completed. The cowbirds eggs hatch 2 to 4 days before the vireos and, by the time the vireos do hatch, the cowbird nestlings outweigh them tenfold. A 1961 study found that in all places where a cowbird nestling occupied the nest, no black-capped vireo chicks survived.

Based on extensive field surveys over the past decade, the FWS believes that the black-capped vireo is a candidate for extinction. Trends in all parts of the species' range are downward; the vireo has disappeared from Kansas, is gravely endangered in Oklahoma, and no longer occurs in several parts of its former range in Texas. Its current breeding range is from central Oklahoma (Blaine County) south through Texas (Dallas, the Edwards Plateau, and Big Bend National Park), to at least the Sierra Madera in central Coahuila, Mexico. The largest remaining breeding population, which occurs near Austin, Texas, could lose its breeding habitat as a result of proposed development and road construction projects. The city of Austin, which endorses listing the vireo, is considering ways to protect this habitat.

A proposed designation of Critical Habitat was not included in the listing proposal for the black-capped vireo because this bird occurs in scattered, small areas that can vary over time due to vegetational suc-

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photo by Roger Clapp

Adult male black-capped vireos are olive green on the upper surface and white underneath, with faintly yellowish-green flanks. Their crown and the upper half of the head is black with a partial white eye ring and lores. Adult females are duller in color, with a slate gray crown and underparts washed in greenish-yellow.

Regional News

Endangered Species Program regional staff members have reported the following activities for the month of December:

Region 1—The Regional Director announced on December 4, 1986, that an agreement was signed for the purchase of the 11,360-acre Hudson Ranch by the Fish and Wildlife Service (FWS). Hudson Ranch is considered one of the most important California condor (*Gymnogyps californianus*) use areas in the species' current range. Along with several other smaller parcels, the ranch will make up the Bitter Creek National Wildlife Refuge, which is being established for this highly Endangered bird.

On December 13, 1986, a male condor, one of the last three wild birds, was captured with a cannon net on Hudson Ranch by biologists from the Condor Research Center. It was subsequently transported to the San Diego Wild Animal Park to join the 11 other condors there as part of the captive breeding program. Trapping operations will continue in an effort to bring the two remaining wild male condors into captivity for propagation.

The California Condor Recovery Team has recommended a limited experimental release of Andean condors (*Vultur gryphus*) in California to test the suitability of release sites and methods for future releases of California condors, and to train a team in effective release techniques. The proposed experiment would involve 10-15 fledgling Andean condors of the same sex from various captive flocks. They would be released at two sites and monitoring would be conducted for 1-2 years. These experimental releases of Andean condors will ensure that future releases of California condors are accomplished as smoothly as possible.

At the conclusion of the experiment, all of the released Andean condors will be captured and returned to captivity. Because all of the Andean condors to be used will be young birds of a single sex and will be radio-tagged to facilitate close monitoring, no problems of escape and/or expansion of the released group are expected. No overlapping release of California condors is planned.

For a current breakdown on the condor population, see table on page 3.

Region 2—A prolonged period of bad weather prevented an aerial survey of whooping cranes (*Grus americana*) at Aransas National Wildlife Refuge (Texas) in late December. However, subsequent surveys have identified 107 birds on the refuge (as of January 7, 1987). Birds that had not yet been seen include one of the oldest pairs and six color-marked subadults.

The wintering flock exceeded the 100-bird mark for the first time since early this century, in time for the 50th anniversary (1987) of Aransas National Wildlife Refuge. This good news was tempered by the death of Frank Johnson, manager of the refuge since 1973. Frank died in his sleep, apparently from a heart attack.

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(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Marvin E. Moriarty, *Chief, Office of Endangered Species*
(703-235-2771)
Earl B. Baysinger, *Chief, Federal Wildlife Permit Office*
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TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

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San Diego Wild Animal Park	**Los Angeles Zoo**
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5 immature females	6 immature females
1 nestling (male)	

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Captured wild birds (1981-1986)	7
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The reestablishment of the thick-billed parrot is being conducted cooperatively by the Arizona Game and Fish Department, the U.S. Forest Service (USFS), the San Diego Zoo, and the FWS.

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The southeast Atlantic shrimping fleet will experience a similar phase-in. In the Canaveral area (east coast of Florida), TED's will be required year-round. From Cape Hatteras, North Carolina, to north Florida, shrimpers will have to use TED's from May through August.

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Despite its common name, this plant is not a thistle but an herb in the parsley family (Apiaceae). It occurs only on the bed of a 7-acre vernal lake in southern Lake County, California. Potential dredging and filling of this seasonal wetland are the main threats to the survival of *E. constancei*, and the species was proposed March 26, 1986, for listing as Endangered (see story in BULLETIN Vol. XI No. 4). The final listing rule was published in the December 23 *Federal Register*.

Ringed Sawback Turtle (*Graptemys oculifera*)

This small basking turtle is found only in the Pearl River system of Mississippi and Louisiana. It apparently needs riverine habitat with a moderate current, numerous logs for basking, and high sand and gravel bars for nesting. Some of its former habitat has been modified by reservoir construction and flood control projects, while other areas are now marginal habitat due to water quality degradation and a corresponding reduction in the turtle's molluscan food supply. Because of these threats, the FWS proposed on January 21, 1986, to list the ringed sawback turtle as a Threatened species (see BULLETIN Vol. XI No. 2). The final listing rule was published in the December 23 *Federal Register*.

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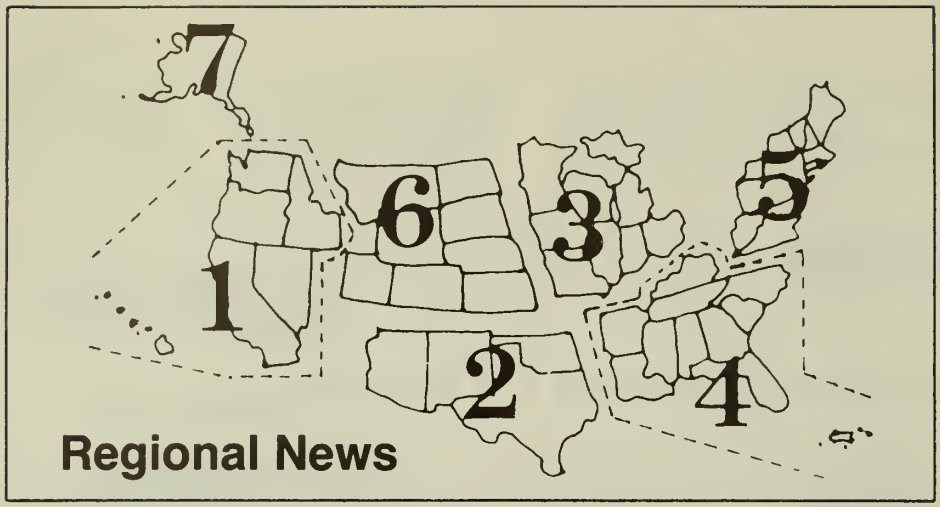

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Creation of Artificial Foraging Habitat for Wood Storks

Nora A. Murdock
Asheville, North Carolina,
Endangered Species Field Office

The southeastern U.S. population of the wood stork (*Mycteria americana*) was listed as Endangered after several decades of steady decline had reduced the population from approximately 60,000 individuals in the early 1930's to 10,000 breeding birds in 1984. The principal cause of this decline was the loss or deterioration of the wetlands that, with their naturally fluctuating water levels, provided the required foraging habitat for the storks. Although many of the large traditional rookery sites in south Florida have remained essentially undisturbed, nesting attempts by the species in those areas have met with repeated failures in recent decades due to inadequate foraging habitat.

The first formal interagency consultation under Section 7 of the Endangered Species Act involving the wood stork began after the bird was officially added to the Endangered Species List in February 1984. This consultation, which was between the Fish and Wildlife Service and the Department of Energy (DOE), involved restarting an old nuclear reactor at the DOE's Savannah River Plant in South Carolina. Downstream of the reactor, and in the path of its thermal effluent, was the rich Steel Creek delta area, which served as one of the most important foraging sites for a nearby colony of wood storks. The colony, appropriately located near the community of Birdsville, Georgia, had been formed only recently; however, nesting success at this rookery, measured in terms of young fledged per nest, ranked consistently higher than most of the other known wood stork rookeries. In addition, this rookery, being the farthest north and farthest inland ever recorded for the species, was believed by some biologists to represent a response by the birds to repeated nesting failures in the traditional south Florida habitat. In essence, this rookery was extremely important to survival and recovery of the species because it represented a potential "pioneering" adaptation.

Work on the Savannah River Plant's "L-Reactor" was already proceeding when the wood stork was listed as Endangered. The DOE had been advised a year earlier of the intent to list the stork and of the potential conflict with the reactor. Eventually, the DOE abandoned its original plan for discharging hot effluent directly into a tributary of the Savannah River and constructed a 1,000-acre cooling reservoir instead. (These decisions were based on issues other than endangered species concerns.) Despite the elimination of thermal impacts on the stork foraging habitat, the increased water levels produced by reactor operations would have increased the depth of water in the foraging habitat to the point that it could not be used for feeding by storks. After evaluating several alternatives, the DOE agreed to attempt the construction of artificial stork foraging habitat to replace that habitat lost due to reactor operation. Such a habitat creation experiment had been carried out several years earlier by the National Audubon Society (NAS) at its Corkscrew Swamp Sanctuary in Florida, where one of the last large stork rookeries was experiencing repeated nesting failure. The NAS effort indicated that the idea was feasible, but work was discontinued due to lack of funds.

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photo by Sue Jewell

photo by Lisa Huff

dry bed of old Kathwood Lake at the Silverbluff Sanctuary before (above) and after (below) the creation of wood stork foraging habitat

photo by Larry Bryan

wood storks at newly created foraging habitat at the Silverbluff Sanctuary, South Carolina

Captive 'Alala Moved to New Breeding Facilities

Peter A. Stine
Honolulu, Hawaii, Field Office

Efforts to breed the critically Endangered 'alala or Hawaiian crow (*Corvus hawaiiensis*) in captivity were given a major boost recently when the nine birds existing in captivity were moved to a new home. The anxiously awaited transfer of these birds from an old facility on the island of Hawai'i to the State's new captive breeding facilities on the island of Maui took place on November 20, 1986. It is hoped that these new facilities and their surroundings will provide a favorable environment for successful reproduction in this captive flock.

The production of birds from the captive flock for eventual reintroduction into the wild is currently the top priority of the 'alala recovery program. There are probably fewer than 10 individuals of this critically Endangered and unique relative of the common crow (*C. brachyrhynchos*) surviving in their native habitat. The few remaining birds are located in remnants of native forest on the island of Hawai'i's Kona coast. Habitat loss, avian diseases, predation by mongoose and feral cats, and a lack of the necessary social stimuli in the relict population all have been implicated to some extent in the decline of this species. Because of its extremely precarious status, captive propagation and reintroduction into protected, managed habitat is the only hope for preventing the extinction of the 'alala.

photo by Ernest Kosaka

new Olinda captive breeding facility for Hawaiian birds on the island of Maui

There currently are nine Hawiian crows in captivity, and it is hoped that additional birds can be brought into captivity from the remnant wild population. Unfortunately, there has been no reproduction in the captive flock in the last 5 years. This captive breeding program has been housed at several different locations, but since 1976 it was located in modified goose breeding pens at the Pohakuloa Endangered Species Breeding Facility. This facility, located on the upper slopes of Mauna Kea on the island of Hawai'i, was originally developed 37 years ago to breed the Endangered nene or Hawaiian goose (*Nesochen sandvicensis*) and was never well suited for the 'alala. It is not clear why the captive 'alala have not bred successfully there, but the dry, higher elevation environment (which differs considerably from the normal 'alala habitat) and the diverse, high-intensity military training activities on the U.S. Army's adjacent Pohakuloa Training Area likely had a significant negative impact on these sensitive birds. Despite the efforts of the Army to limit the disruptive impact of its training, it was clear that these activities were affecting the captive 'alala flock. For these reasons, it became necessary to move the captive 'alalas to a better facility.

Providing the proper environment and facilities for captive 'alala was no easy task. However, a major commitment of funds and effort from the State of Hawaii's Department of Land and Natural Resources (DLNR), the U.S. Fish and Wildlife Service (FWS), and the invaluable assistance of the U.S. Army-Western Command made it possible. The State dedicated the abandoned Olinda minimum security prison, located in a fairly secluded area on the mid-elevation slopes of east Maui, for developing a captive breeding facility for

photo by Peter Stine

native 'alala habitat on the slopes of Hualalai, a volcano on the island of Hawai'i

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'Alala

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Endangered Hawaiian birds. The 45-acre site had all the basic requirements needed for such a program, but the buildings and grounds needed major renovation and additional construction before they would be suitable. Entirely new buildings were designed specifically to house the 'alala. The FWS provided some of the needed funds under Section 6 of the Endangered Species Act to assist in this renovation. Technical support from the FWS Patuxent Wildlife Research Center was provided to DLNR engineers regarding the design of the cages and support facilities needed.

The Army, recognizing the conflict at Pohakuloa and the need to relocate the birds as soon as possible, stepped in and provided manpower from B Company of the 84th Engineer Battalion to do much of the construction and renovation work. Their tireless effort resulted in the construction of two large, house-sized cages, each containing four interconnecting pens, within four months. Each pen is intended to hold one breeding 'alala pair and its offspring. The two cages thus can accommodate a maximum of eight adult pairs plus young offspring.

These buildings were carefully designed to accommodate the species' needs, including the need to have social contact with neighboring birds. The pens were completed in July 1986, and the State DLNR has since taken care of the lengthy list of small details necessary to make them and the support facilities fully operational.

Transport of the nine birds to the new breeding facility was accomplished on November 20, 1986, without any significant problems. The birds appeared to have adapted very well to their new surroundings, and there is renewed hope for the next breeding season (spring 1987).

Under the guidance of Dr. Fern Duvall and the veterinary care of Dr. Renate Gassman-Duvall, the 'alala captive breeding program now holds new promise. The Olinda Captive Breeding Center will continue to be upgraded with the anticipation that eventually it will become a fully equipped, first-rate facility housing captive breeding flocks of a number of Hawaii's Endangered birds, including the nene and some endemic forest birds.

Although the new captive breeding facility is a significant recovery action, much more needs to be done. The first priority is to add more birds to the captive flock, if at all possible. The vitality of the existing nine birds as future breeders is uncertain and cannot be depended upon. Also, the limited genetic diversity of the "founder" (captive) population must be enhanced. Other vital recovery actions include protection and management of remnant native forest habitats to provide suitable areas for eventual reintroduction of captive offspring into the wild. The 'alala is a fascinating and unique component of Hawai'i's natural heritage. Hopefully, it is not too late to prevent the loss of this species.

photo by Winston E. Banko

The 'alala is an important part of the native Hawaiian heritage. According to legend, these birds are spirits that were protected by the ancient Hawaiians. 'Alala were quite common before the turn of this century, but today they are on the verge of extinction.

Florida Panther Recovery Program

David J. Wesley
Field Supervisor
Jacksonville, Florida,
Endangered Species Field Office

An active, well coordinated effort to recover the Endangered Florida panther (*Felis concolor coryi*), Florida's official State mammal, is under way.

In May 1986, the Fish and Wildlife Service (FWS), National Park Service, Florida Game and Fresh Water Fish Commission, and Florida Department of Natural Resources entered into a Memorandum of Agreement to establish a Florida Panther Interagency Committee. The long-term goal of the committee is to promote a coordinated effort to restore the Florida panther to a secure status in the wild. Initial committee objectives are to:

1. provide a forum for exchange of information among the agencies on their continuing conservation efforts;
2. minimize duplication of efforts;
3. review and evaluate new conservation alternatives and their likely effects on the panther and other resources; and
4. coordinate decisions about which recovery measures should be implemented by each agency.

The impetus behind the establishment of this committee was to bring together the directors and administrators of those agencies most responsible for activities affecting the panther in Florida. As other agencies are identified, they will be asked to participate on an *ad hoc* basis. Mr. James W. Pulliam, Jr., Regional Director of the FWS Southeast Region, is serving as committee chairman.

One of the first tasks of the committee has been to revise the existing recovery plan. A technical subcommittee worked diligently for months, completely rewriting the existing plan, and a draft revision was released on October 31, 1986, for comment. This document represents a cooperative effort of many agencies, and incorporates all of the new information that has become available during the past few years of panther research.

The draft recovery plan revision emphasizes interagency coordination and public participation, and is divided into three major sections. Part one is an introduction describing the basic biology of the panther (its distribution, taxonomy, food and habitat needs, movements, reproduction, health status, etc.), reasons for its decline, and current threats to the species. The purpose of this section is to present a more complete biological picture of the panther.

Part two states the recovery goals and identifies, in an outline format, the necessary steps to be taken. This outline is followed by a narrative providing details and

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photo by Wendell Metzer

Florida panther

Florida Panther

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describing the projects and studies listed in the outline. Agencies responsible for each action also are identified. The revised Florida panther plan establishes a recovery goal of three viable, self-sustaining populations within the historic range of the panther, which extends from Arkansas south to Louisiana and east to South Carolina and into Florida. Major objectives of the plan include: (1) identifying, protecting, and enhancing existing populations of Florida panthers and protecting and managing their habitat; (2) establishing positive public support for the management of the Florida panther; and (3) reintroducing panthers into areas of suitable habitat.

Part three of the recovery plan is the implementation schedule. This section identifies tasks described in the recovery section as research, management, or administrative in nature and assigns specific responsibilities. It also establishes priorities for specific actions and identifies an estimated cost and duration for each action. Cost figures are not included in the revised draft, but will be added by the agencies during the review process for inclusion in the final revision.

Copies of the draft revised Florida Panther Recovery Plan are available by writing to the Public Affairs Office, U.S. Fish and Wildlife Service, 75 Spring Street, SW, Atlanta, Georgia 30303.

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In addition to the progress being made on the recovery plan, other critical tasks necessary for panther recovery are under way. Research on the panther has been conducted for a number of years. In November 1986, the National Park Service began efforts to capture and radio tag panthers in Everglades National Park, with the assistance of the Florida Game and Fresh Water Fish Commission. In January 1987, the Game Commission will resume its panther capture and radio telemetry work in the Big Cypress National Preserve. Research on deer also will be conducted in both places. Plans are to expand research and management actions in all State and Federal lands and to study panthers on private lands.

Progress on captive breeding efforts also has been made. A male panther that was struck and injured by an automobile in 1984 has been obtained by the Game Commission. This animal was rehabilitated at the University of Florida Veterinary School and will become part of a captive breeding program, since it has been determined that he could not survive if returned to the wild. A captive breeding facility has been developed by the Gilman Paper Company, and the company has generously offered to finance the captive breeding program. Two female panthers from Texas have been brought to the captive breeding facility to be used in evaluating the fertility of the male and the effectiveness of introducing captive-bred cats to the wild, although these hybrid cats would be sterilized and therefore would not become part of the permanent Florida panther population.

In the area of land acquisition, the FWS is in the process of completing purchase agreements for 15,000 acres of the proposed 32,000-acre Fakahatchee Strand National Wildlife Refuge (NWR). The refuge will be located immediately to the north and west of the intersection of SR-29 and Alligator Alley in south Florida. Mr. Steve Gard, currently assistant manager of the Merritt Island NWR, has been selected as the first manager for the new refuge. Mr. Gard will be establishing a temporary office in the Naples area to administer the new refuge. His first efforts will be to develop a comprehensive management plan for the refuge lands and facilities. The FWS is hopeful of completing the acquisition process by the end of 1987.

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be an important step toward the protection of endangered sea turtles. TED's are expected to substantially reduce trawl-related mortality of sea turtles, estimated at over 11,000 turtle deaths per year.

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On December 23, 1986, a jeopardy biological opinion on the Stacy Dam was signed by the Regional Director. The Colorado River Metropolitan Water District (CRMWD) has proposed to build the Stacy Dam, which would impound the Colorado and Concho Rivers in west-central Texas. The dam will impact 26 percent of the Threatened Concho water snake's (*Nerodia harteri paucimaculata*) proposed Critical Habitat. Section 7 of the Endangered Species Act (ESA) was involved when the U.S. Army Corps of Engineers received an application from the CRMWD for permits under Sections 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

Reasonable and prudent alternatives will remove the jeopardy by reviving over 30 miles of the Colorado River above Stacy Reservoir and creating up to 49 miles of new Concho water snake habitat downstream from the Stacy Dam. The upstream habitat was lost when another dam, Robert Lee, was built in 1968 without provisions for minimum or channel-forming flows. Reaches below Stacy lack sufficient riffle habitat to sustain large numbers of snakes. Minimum and channel-forming (flushing) flows from Robert Lee and Stacy Dams, and the addition and maintenance of rocky shoals, will provide the habitat the juvenile snakes need to survive. Although there will be some loss of habitat, newly created habitat will approximately equal the amount of habitat loss. In addition, tributary habitats known to support Concho water snakes will be protected, rocky areas within Stacy Reservoir will be created, numerous monitoring and research efforts will be initiated, and snakes will be transferred above and below Stacy Dam to maintain genetic heterogeneity of the isolated populations.

Juvenile Concho water snakes need shallow shoals (riffles) where they hunt for fish, and sun-warmed rocky flats near the water edge for thermoregulation and cover. Adults are more wide-ranging and occupy pools as well as shoals. Concho water snakes do not occupy reservoirs in either the Concho or the Colorado River, but the Brazos water snake (*N. h. harteri*) has been found in reservoirs on the Brazos River. Reservoirs inundate preferred Concho water snake habitat, and the reduced stream flows cause downstream habitats to become clogged with silt and vegetation.

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The Texas Nature Conservancy and the FWS have entered into a cooperative

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agreement for the recovery of the Texas poppy-mallow (*Callirhoe scabriuscula*), a rare plant restricted to Runnels County. The agreement will promote landowner awareness and involvement, an essential aspect for the species' recovery because the poppy-mallow occurs exclusively on private land.

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A proposed road into the Gila National Forest of New Mexico prompted concern over the possible impact the road would have on two snail species that are candidates for future Federal listing: the Gila spring snail and the New Mexico hot spring snail, both undescribed species of the genus *Fontelicella*. These two snails, which have been petitioned for listing, were previously known from two springs along the East Fork of the Gila River and from a third spring on the main Gila River near its confluence with the East Fork. A brief survey of the road impact area was conducted by personnel from the FWS, USFS, and New Mexico Department of Game and Fish. The snail species were found in four springs along 1.5 miles of the East Fork. Three of the springs may be threatened by the road because of expected increased recreational or vehicular use. Restrictions and requirements on road construction, maintenance, and use, along with rigorous enforcement of the restrictions, may alleviate some of the threats to the snails' survival.

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Region 4—The Memphis, Tennessee, District of the U.S. Army Corps of Engineers contracted with the Tennessee Valley Authority (TVA) to survey certain reaches of the St. Francis River drainage for the presence of an Endangered clam, the fat pocketbook (*Potamilus capax*). This survey is one provision of a conservation plan contained in a biological opinion issued by the Jackson, Mississippi, Endangered Species Field Office. The search included intermittent 5-mile reaches from the mouth of the St. Francis River up to Wappapello Lake and in several tributaries and ditches. Information indicates that the fat pocketbook occurs in two ditches in Straight Slough; ditches within Oak Donnick Floodway up to the St. Francis Sunk Lands; Iron Mines Creek at Marked Tree siphon, and the St. Francis River below Marked Tree siphon. The clam also occurs at the mouth of the St. Francis River.

The TVA survey expands the known range of the species from 43.2 miles to over 80 miles of the St. Francis floodway, up to 30 miles of drainage west of the floodway, and a short reach of the St. Francis River near Marked Tree, Arkansas. Quantitative estimates for an assessment of the density of these additional populations were made but are not yet available. The species was found in gravel, sand, and mud where there was flowing water. Many of the tributaries and ditches were very small. The TVA survey was designed to expand the area that was surveyed in 1985. The Memphis Office of the Corps of Engineers and the FWS Jackson, Mississippi, Endangered Species Field Office will continue to implement the conservation plan over the next few years.

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The 1986 annual Gopher Tortoise Council meeting was held at Wekiwa Springs State Park in Apopka, Florida, on November 7-9, 1986. At this meeting, talks were given by three biologists on the Bolson tortoise (*Gopherus flavomarginatus*), an Endangered resident of the highlands of northern Mexico. This animal digs lengthy burrows that serve as homes to dozens of other small creatures and is the nearest living relative of the southeastern gopher tortoise (*G. polyphemus*). The focus of the meeting was non-sandhill habitats in which gopher tortoises are found and the management techniques used to maintain these habitats.

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Citrus groves and housing developments are rapidly displacing the remaining tracts of sand pine-evergreen oak vegetation in Polk and Highlands Counties of central Florida. This vegetation has a large endemic flora, and one of the endemics, the scrub mint (*Dicerandra frutescens*), is already listed as Endangered. Nine other scrub plants in the two counties are currently listed or proposed for listing as Endangered or Threatened.

Fragmentation of the remaining tracts of scrub is so great that only a very few large tracts are available for acquisition. One is an 800-acre tract at Saddle Blanket Lakes, where The Nature Conservancy (TNC) recently bought 77 acres. The State is planning to purchase the rest under its Conservation and Recreation Lands Program.

A landowner adjoining TNC's preserve recently proposed a zoning change to allow development of a large recreational vehicle park. The county zoning board approved the change, but TNC, acting as an adversely affected landowner, appealed to the Polk County Commission. TNC maintained that the proposed development would make prescribed burning in the preserve impossible, and that it would probably lead to further residential development in the area, making the proposed State land purchase impossible. The FWS, State agencies, the Regional Planning Council, and local private organizations, including Bok Tower Gardens and Archbold Biological Station, submitted comments supporting TNC. The county commission voted to deny the proposed zoning change.

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The Jacksonville, Florida, Endangered Species Field Station convened a meeting in December for Federal agencies that manage lands on Cape Canaveral to review and discuss sea turtle conservation programs. Forty-two miles of Cape Canaveral beaches are jointly managed by the National Park Service (Canaveral National Seashore), FWS (Merritt Island National Wildlife Refuge), and U.S. Air Force (Canaveral Air Force Station). Over 6,000 sea turtle nests were made there in 1986, most by loggerheads (*Caretta caretta*), but there also were 37 green (*Chelonia mydas*) and 5 leatherback (*Dermochelys coriacea*) nests.

Overall nesting success was 55 percent. This represents a dramatic increase in successful nests compared to two or three years ago when at least 85-90 percent of all nests were destroyed by predators. The increase is due to nest screen efforts at the National Seashore and raccoon and hog removal on refuge and Air Force beaches. In spite of these efforts, hogs destroyed 646 nests at the Air Force Station, while raccoons destroyed over 95 percent of all unscreened nests (1,857) at the National Seashore. Efforts to further increase nesting success are planned for next year.

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Recovery plans for two Florida plants, the Florida torreya (*Torreya taxifolia*) and Key tree-cactus (*Cereus robinii*), have been issued. The Florida Torreya Recovery Plan is unusually complex because the decline of the tree in its native habitat is poorly understood. The trees are killed by stem and needle blight, cankers, and perhaps other diseases that are probably caused by opportunistic infections by common fungi.

Attempts to keep cultivated torreya trees healthy in the Tallahassee, Florida, area have failed, but cultivated trees in the southern Appalachians and the Pacific Northwest are thriving. Gene pool conservation may be possible by establishing garden collections from cuttings taken from the wild. For persons wishing to see the Florida torreya, the best group of specimens is at Biltmore House and Gardens in Asheville, North Carolina.

The recovery plan for the Key tree-cactus focuses on conservation of its habitat, tropical hardwood hammocks in the lower Florida Keys. These hammocks can appropriately be called thorn scrub or thorn forest because of their low (15 to 25 feet tall) tree canopies and abundant cacti.

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Region 5— The FWS regional endangered species office recently completed a 2-year project with the eastern regional office of TNC to determine the status of 32 plant candidates that are under review for possible Federal listing. Using the expertise in the eastern States' Natural Heritage Programs, intensive field surveys were conducted throughout the species' range. The heritage program network provided the opportunity to assess the status of several wide-ranging plants in a systematic and cost effective manner. The FWS/TNC/State project was particularly beneficial

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photo by Paul Gertler

Puerto Rican crested toads are yellowish-olive to blackish-brown in color, with prominent crests above the eyes and a long, upturned snout.

Proposed Listings

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cession. Further, pinpointing the breeding areas with the detailed habitat descriptions and maps required for a Critical Habitat designation could expose the bird to more harassment. Nevertheless, if the vireo is listed, this bird and its habitat will receive protection from jeopardy that might result from Federal actions. Federal agencies with lands from which the bird has been reported recently include the National Park Service (Big Bend National Park, Texas), the U.S. Army (Fort Hood, Texas), and the FWS (Wichita Mountains National Wildlife Refuge, Oklahoma). Fort Hood officials already have expressed interest in protecting the species, and therefore few adverse Federal impacts are expected. No Federal activities are known to occur on the State and private lands that contain black-capped vireos.

Comments on the listing proposal are welcome, and should be sent to the Regional Director, Region 2 (address on page 2 of the BULLETIN), by March 12, 1987.

Puerto Rican Crested Toad (*Peltophryne lemur*)

Historically, this amphibian was known from only two islands, and it may already be extirpated from one. No *P. lemur* have been seen on Virgin Gorda (one of the British Virgin Islands) for at least 20 years. It evidently is now restricted to a few coastal lowland areas in northern and southern Puerto Rico. One sizeable breeding population is known to remain, and its largest breeding site is threatened by development. To help prevent the extinction of the Puerto Rican crested toad, the FWS has proposed to list it as a Threatened species (F.R. 12/23/86).

P. lemur occurs at low elevations where there is exposed limestone or porous, well-drained soil offering an abundance of fissures and cavities. Like most bufonids (true toads), adults of this species spend most of their time in burrows, surfacing mainly to feed and breed. They are widely dispersed except at breeding time, when the adults concentrate. Although not completely understood, *P. lemur* breeding appears to be sporadic and highly dependent on occasional heavy rains. The species shows a high fidelity to breeding sites.

Many breeding sites are known to have been eliminated as wet areas were filled or drained for construction, cultivation, and mosquito control. The only known remaining breeding sites are within Guanica Commonwealth Forest on the southwestern coast of Puerto Rico. The largest of these sites is being used as an unimproved parking lot. There have been proposals to pave it over, which would eliminate its value as a breeding site for the toad. A large resort development proposed for construction on private land adjacent to the site would likely add to the pressure on the breeding habitat. Discussions among Federal and Commonwealth of Puerto Rico agencies have begun in an effort to find acceptable alternatives that will avoid destruction of the critical breeding site.

Critical Habitat was not proposed for the Puerto Rican crested toad because such a designation would make the species more vulnerable to collectors, especially when the toads congregate for breeding. Overcollection of other Puerto Rican herptofauna has been documented. However, the toad will, if listed, receive protection under other provisions of the Endangered Species Act.

Comments on the proposed listing of the Puerto Rican crested toad as a Threatened species are welcome, and should be sent to the Field Supervisor, Caribbean Field Office, U.S. Fish and Wildlife Service, P.O. Box 491, Boqueron, Puerto Rico 00622, by February 23, 1987.

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Available Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act as Threatened or Endangered is approved are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the FWS to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the FWS. (Oklahoma and the Commonwealth of Puerto Rico have such agreements.) Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "*confer*" with the FWS, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals, except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own laws against take of listed plants.

LIST OF APPROVED RECOVERY PLANS

Restoring Endangered or Threatened animals and plants to the point where they are again secure, self-sustaining members of their ecosystems is one of the main goals of the Endangered Species Program. To help guide the recovery effort, the Fish and Wildlife Service is working to develop plans for all listed species native to the United States. As of December 31, 1986, 209 recovery plans for 243 species were completed and approved. Many others are in various stages of development. Recovery plans also may be revised, if and when appropriate; the dates given below are for the original plans.

The amount of available funding and personnel resources affects the speed at which recovery plans can be implemented. Guidelines for setting priorities in preparing and carrying-out recovery plans were published in the September 21, 1983, *Federal Register*. (See story in BULLETIN Vol. VIII No. 10.)

Copies of recovery plans are available for purchase from the Fish and Wildlife Reference Service about 6 months after they are approved. Inquiries should be addressed to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852, or call toll-free 800/582-3421 (in Maryland call 301/770-3000). Ask for any revisions.

Endangered and Threatened Species With Approved Recovery Plans

Common Name	Scientific Name	Date Plan Approved
MAMMALS 23 species		
Big-eared bats		05/08/84
Ozark big-eared bat	*Plecotus townsendii ingens*	
Virginia big-eared bat	*Plecotus townsendii virginianus*	
Black-footed ferret	*Mustela nigripes*	06/25/78
Columbian white-tailed deer	*Odocoileus virginianus leucurus*	10/21/76
Delmarva Peninsula fox squirrel	*Sciurus niger cinereus*	11/06/79
Eastern cougar	*Felis concolor couguar*	08/02/82
Eastern timber wolf	*Canis lupus lycaon*	06/05/78
Florida panther	*Felis concolor coryi*	12/16/81
Gray bat	*Myotis grisescens*	07/08/82
Grizzly bear	*Ursus arctos horribilis*	01/29/82
Hawaiian monk seal	*Monachus schauinslandi*	04/01/83
Indiana bat	*Myotis sodalis*	06/01/76
Key deer	*Odocoileus virginianus clavium*	06/10/80
Mexican wolf	*Canis lupus baileyi*	08/09/82
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	08/18/82
Northern Rocky Mountain wolf	*Canis lupus irremotus*	05/28/80
Red wolf	*Canis rufus*	07/12/82
Salt marsh harvest mouse	*Reithrodontomys raviventris*	11/16/84
San Joaquin kit fox	*Vulpes macrotis mutica*	01/31/83
Sonoran pronghorn	*Antilocapra americana sonoriensis*	12/30/82
Southern sea otter	*Enhydra lutris nereis*	02/03/82
West Indian manatee	*Trichechus manatus*	
Mainland U.S. Population Plan		04/15/80
Puerto Rico Population Plan		12/24/86
Woodland caribou	*Rangifer tarandus caribou*	04/12/85
BIRDS 55 species		
Aleutian Canada goose	*Branta canadensis leucopareia*	03/07/79
Attwater's greater prairie chicken	*Tympanuchus cupido attwateri*	12/16/83
Bald eagle	*Haliaeetus leucocephalus*	
Chesapeake Bay Region Plan		05/19/82
Southwestern Population Plan		09/08/82
Pacific States Population Plan		08/25/86
Northern States Plan		07/29/83
Southeastern States Plan		08/03/84
California brown pelican	*Pelecanus occidentalis californicus*	02/03/83
California clapper rail	*Rallus longirostris obsoletus*	11/16/84
California condor	*Gymnogyps californianus*	04/09/75
California least tern	*Sterna antillarum browni*	04/02/80
Cape Sable seaside sparrow	*Ammospiza maritima mirabilis*	04/06/83
Channel Islands species		01/26/84
San Clemente loggerhead shrike	*Lanius ludovicianus mearnsi*	
San Clemente sage sparrow	*Amphispiza belli clementeae*	
Dusky seaside sparrow	*Ammospiza maritima nigrescens*	04/26/79

Common Name	Scientific Name	Date Plan Approved
Eastern brown pelican	*Pelecanus occidentalis carolinensis*	
Mainland U.S. Population Plan		07/19/79
Puerto Rico and Virgin Islands Population Plan		12/24/86
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	03/11/83
Hawaiian crow or 'alala	*Corvus hawaiiensis*	10/28/82
Hawaiian forest birds		02/03/83
'Akiapola'au	*Hemignathus munroi*	
Hawai'i 'akepa	*Loxops coccineus coccineus*	
Hawai'i creeper	*Oreomystis mana*	
'O'u	*Psittirostra psittacea*	
Hawaiian hawk	*Buteo solitarius*	05/09/84
Hawaiian seabirds		04/25/83
Hawaiian dark-rumped petrel	*Pterodroma phaeopygia sandwichensis*	
Newell's Townsend's shearwater	*Puffinus auricularis newelli*	
Hawaiian waterbirds		06/19/78
Hawaiian coot	*Fulica americana alai*	
Hawaiian duck or koloa	*Anas wyvilliana*	
Hawaiian gallinule	*Gallinula chloropus sandvicensis*	
Hawaiian stilt	*Himantopus himantopus knudseni*	
Kaua'i forest birds		07/29/83
Kaua'i 'akialoa	*Hemignathus procerus*	
Kaua'i 'o'o	*Moho braccatus*	
Large Kaua'i thrush	*Phaeornis obscurus myadestina*	
Nuku-pu'u	*Hemignathus lucidus*	
'O'u	*Psittirostra psittacea*	
Small Kaua'i thrush	*Phaeornis palmeri*	
Kirtland's warbler	*Dendroica kirtlandii*	10/22/76
Laysan duck	*Anas laysanensis*	12/17/82
Light-footed clapper rail	*Rallus longirostris levipes*	07/03/79
Masked bobwhite	*Colinus virginianus ridgwayi*	02/15/78
Maui-Moloka'i forest birds		05/30/84
Crested honeycreeper	*Palmeria dolei*	
Maui 'akepa	*Loxops coccineus ochraceus*	
Maui parrotbill	*Pseudonestor xanthophrys*	
Moloka'i creeper	*Oreomystis flammea*	
Moloka'i thrush	*Phaeornis obscurus rutha*	
Nuku-pu'u	*Hemignathus lucidus*	
Po'ouli	*Melamprosops phaeosoma*	
Mississippi sandhill crane	*Grus canadensis pulla*	10/24/79
Nene or Hawaiian goose	*Nesochen sandvicensis*	02/14/83
Northwestern Hawaiian Islands passerine birds		10/04/84
Laysan finch	*Telespyza cantans*	
Nihoa finch	*Telespyza ultima*	
Nihoa millerbird	*Acrocephalus familiaris kingi*	
Palila	*Loxioides bailleui*	01/23/78
Peregrine falcon	*Falco peregrinus*	
Rocky Mountain/Southwest Plan		08/03/77
Eastern Plan		08/20/79
Alaska Population Plan		10/04/82
Pacific Plan		10/12/82
Puerto Rican plain pigeon	*Columba inornata wetmorei*	10/14/82
Puerto Rican parrot	*Amazona vittata*	11/30/82
Puerto Rican whip-poor-will	*Caprimulgus noctitherus*	04/19/84
Red-cockaded woodpecker	*Picoides borealis*	08/24/79
Whooping crane	*Grus americana*	01/23/83
Wood stork	*Mycteria americana*	09/09/86
Yellow-shouldered blackbird	*Agelaius xanthomus*	05/25/83
Yuma clapper rail	*Rallus longirostris yumanensis*	02/04/83
REPTILES 21 species		
American crocodile	*Crocodylus acutus*	02/13/79
Blunt-nosed leopard lizard	*Gambelia silus*	04/18/80
Culebra Island giant anole	*Anolis roosevelti*	01/28/83
Coachella Valley fringe-toed lizard	*Uma inornata*	9/11/85
Eastern indigo snake	*Drymarchon corais couperi*	04/22/82
Island night lizard (Channel Islands Plan)	*Xantusia riversiana*	01/26/84
Leatherback sea turtle	*Dermochelys coriacea*	10/23/81

Common Name	Scientific Name	Date Plan Approved
Marine turtles		09/19/84
Green sea turtle	*Chelonia mydas*	
Hawskbill sea turtle	*Eretmochelys imbricata*	
Kemp's Ridley sea turtle	*Lepidochelys kempii*	
Leatherback sea turtle	*Dermochelys coriacea*	
Loggerhead sea turtle	*Caretta caretta*	
Olive Ridley sea turtle	*Lepidochelys olivacea*	
Mona boa	*Epicrates monensis monensis*	04/19/84
Mona ground iguana	*Cyclura stejnegeri*	04/19/84
Monito gecko	*Sphaerodactylus micropithecus*	03/27/86
New Mexico ridge-nosed rattlesnake	*Crotalus willardi obscurus*	03/22/85
Plymouth red-bellied turtle	*Pseudemys rubriventris bangsi*	03/26/81
Puerto Rico boa	*Epicrates inornatus*	03/27/86
St. Croix ground lizard	*Ameiva polops*	03/29/84
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	09/11/85
Virgin Islands tree boa	*Epicrates monensis granti*	03/27/86
AMPHIBIANS 6 species		
Desert slender salamander	*Batrachoseps aridus*	08/12/82
Golden coqui	*Eleutherodactylus jasperi*	04/19/84
Houston toad	*Bufo houstonensis*	09/17/84
Red Hills salamander	*Phaeognathus hubrichti*	11/23/83
San Marcos salamander (San Marcos River Plan)	*Eurycea nana*	12/03/84
Santa Cruz long-toed salamander	*Ambystoma macrodactylum croceum*	09/28/77
FISHES 43 species		
Alabama cavefish	*Speoplatyrhinus poulsoni*	09/17/82
Amber darter	*Percina antesella*	06/20/86
Arizona trout	*Salmo apache*	08/20/79
Bayou darter	*Etheostoma rubrum*	09/08/83
Big Bend gambusia	*Gambusia gaigei*	09/19/84
Blue pike*	*Stizostedion vitreum glaucum*	06/29/76
Bonytail chub	*Gila elegans*	05/16/84
Chihuahua chub	*Gila nigrescens*	04/14/86
Clear Creek gambusia	*Gambusia heterochir*	01/14/82
Colorado River squawfish	*Ptychocheilus lucius*	03/16/78
Comanche Springs pupfish	*Cyprinodon elegans*	09/02/81
Conasauga logperch	*Percina jenkinsi*	06/20/86
Cui-ui	*Chasmistes cujus*	01/23/78
Devils Hole pupfish	*Cyprinodon diabolis*	07/15/80
Gila trout	*Salmo gilae*	01/02/79
Greenback cutthroat trout	*Salmo clarki stomias*	11/11/77
Humpback chub	*Gila cypha*	08/22/79
Kendall Warm Springs dace	*Rhinichthys osculus thermalis*	07/12/82
Leon Springs pupfish	*Cyprinodon bovinus*	08/14/85
Leopard darter	*Percina pantherina*	09/20/84
Maryland darter	*Etheostoma sellare*	02/02/82
Moapa dace	*Moapa coriacea*	02/14/83
Mohave tui chub	*Gila bicolor mohavensis*	09/12/84
Okaloosa darter	*Etheostoma okaloosae*	10/23/81
Owens River pupfish	*Cyprinodon radiosus*	09/17/84
Pahranagat roundtail chub	*Gila robusta jordani*	03/28/86
Pahrump killifish	*Empetrichthys latos*	03/17/80
Paiute cutthroat trout	*Salmo clarki seleniris*	01/25/85
Pecos gambusia	*Gambusia nobilis*	05/09/83
San Marcos River species		12/03/84
Fountain darter	*Etheostoma fonticola*	
San Marcos gambusia	*Gambusia georgei*	
Slackwater darter	*Etheostoma boschungi*	03/08/84
Slender chub	*Hybopsis cahni*	07/29/83
Smoky madtom	*Noturus baileyi*	08/09/85
Snail darter	*Percina tanasi*	05/05/83
Spotfin chub	*Hybopsis monacha*	11/21/83
Topminnows		03/15/84
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	12/27/77
Warm Springs pupfish	*Cyprinodon nevadensis pectoralis*	11/10/76

Common Name	Scientific Name	Date Plan Approved
Watercress darter	*Etheostoma nuchale*	06/25/80
Woundfin	*Plagopterus argentissimus*	07/09/79
Yellowfin madtom	*Noturus flavipinnis*	06/23/83
SNAILS 7 species		
Chittenango ovate amber snail	*Succinea chittenangoensis*	03/24/83
Flat-spired three-toothed snail	*Triodopsis platysayoides*	05/09/83
Iowa Pleistocene snail	*Discus macclintocki*	03/22/84
Noonday snail	*Mesodon clarki nantahala*	09/07/84
Painted snake coiled forest snail	*Anguispira picta*	10/14/82
Stock Island tree snail	*Orthalicus reses*	03/08/83
Virginia fringed mountain snail	*Polygyriscus virginianus*	05/09/83
CLAMS 21 species		
Alabama lamp pearly mussel	*Lampsilis virescens*	07/02/85
Appalachian monkeyface pearly mussel	*Quadrula sparsa*	07/09/84
Birdwing pearly mussel	*Conradilla caelata*	07/09/84
Cumberland bean pearly mussel	*Villosa trabalis*	08/22/84
Cumberland monkeyface pearly mussel	*Quadrula intermedia*	07/09/84
Curtis' pearly mussel	*Epioblasma florentina curtisi*	02/04/86
Dromedary pearly mussel	*Dromus dromas*	07/09/84
Fat pocketbook pearly mussel	*Potamilus capax*	10/04/85
Fine-rayed pigtoe pearly mussel	*Fusconaia cuneolus*	09/19/84
Green-blossom pearly mussel	*Epioblasma torulosa gubernaculum*	07/09/84
Higgins' eye pearly mussel	*Lampsilis higginsi*	07/29/83
Orange-footed pearly mussel	*Plethobasus cooperianus*	08/30/84
Pale lilliput pearly mussel	*Toxolasma cylindrella*	08/22/84
Rough pigtoe pearly mussel	*Pleurobema plenum*	08/06/84
Shiny pigtoe pearly mussel	*Fusconaia edgariana*	07/09/84
Tan riffle shell mussel	*Epioblasma walkeri*	10/22/84
Tubercled-blossom pearly mussel	*Epioblasma torulosa torulosa*	01/25/85
Turgid-blossom pearly mussel	*Epioblasma turgidula*	01/25/85
White wartyback pearly mussel	*Plethobasus cicatricosus*	09/19/84
Yellow-blossom pearly mussel	*Epioblasma florentina florentina*	01/25/85
CRUSTACEANS 1 species		
Soccoro isopod	*Thermosphaeroma thermophilus*	02/17/82
INSECTS 12 species		
California butterflies		10/10/84
San Bruno elfin butterfly	*Callophrys mossii bayensis*	
Mission blue butterfly	*Icaricia icarioides missionensis*	
Delta green ground beetle	*Elaphrus viridis*	09/11/85
El Segundo blue butterfly	*Euphilotes battoides allyni*	01/22/86
Kern primrose sphinx moth	*Euproserpinus euterpe*	02/08/84
Lange's metalmark butterfly (Antioch Dunes Plan)	*Apodemia mormo langei*	03/21/80
Lotis blue butterfly	*Lycaeides argyrognomon lotis*	12/26/85
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	09/22/82
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	01/19/84
Schaus swallowtail butterfly	*Papilio aristodemus ponceanus*	11/17/82
Smith's blue butterfly	*Euphilotes enoptes smithi*	11/09/84
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	08/01/84
PLANTS 54 species		
Antioch Dunes plants		03/21/80
Contra Costa wallflower	*Erysimum capitatum* var. *angustatum*	
Antioch Dunes evening primrose	*Oenothera deltoides* ssp. *howellii*	
Brady pincushion cactus	*Pediocactus bradyi*	03/28/85
Bunched arrowhead	*Sagittaria fasciculata*	09/08/82
Channel Islands species		01/26/84
San Clemente Island broom	*Lotus dendroideus* ssp. *traskiae*	
San Clemente Island bush-mallow	*Malacothamnus clementinus*	
San Clemente Island Indian paintbrush	*Castilleja grisea*	
San Clemente Island larkspur	*Delphinium kinkiense*	
Chapman rhododendron	*Rhododendron chapmanii*	09/08/83
Clay phacelia	*Phacelia argillacea*	04/12/82
Davis' green pitaya	*Echinocereus viridiflorus* var. *davisii*	09/20/84
Dwarf bear-poppy	*Arctomecon humilis*	12/31/85

Common Name	Scientific Name	Date Plan Approved
Eureka Valley Dunes plants		12/13/82
Eureka Valley dunegrass	*Swallenia alexandrae*	
Eureka Valley evening-primrose	*Oenothera avita* ssp. *eurekensis*	
Florida torreya	*Torreya taxifolia*	09/09/86
Furbish lousewort	*Pedicularis furbishiae*	06/30/83
Green pitcher plant	*Sarracenia oreophila*	05/11/83
Gypsum wild buckwheat	*Eriogonum gypsophilum*	03/30/84
Hairy rattleweed	*Baptisia arachnifera*	03/19/84
Harper's beauty	*Harperocallis flava*	09/13/83
Hawaiian vetch	*Vicia menziesii*	05/18/84
Key tree-cactus	*Cereus robinii*	09/09/86
Knowlton cactus	*Pediocactus knowltonii*	03/29/85
Kuenzler hedgehog cactus	*Echinocereus fendleri* var. *kuenzleri*	03/28/85
Lee pincushion cactus	*Coryphantha sneedii* var. *leei*	03/21/86
MacFarlane's four-o'clock	*Mirabilis macfarlanei*	03/28/85
McDonald's rock-cress	*Arabis mcdonaldiana*	02/28/84
McKittrick pennyroyal	*Hedeoma apiculatum*	04/12/85
Mesa Verde cactus	*Sclerocactus mesae-verdae*	03/30/84
Mountain golden heather	*Hudsonia montana*	09/14/83
Navasota ladies'-tresses	*Spiranthes parksii*	09/21/84
Nellie cory cactus	*Coryphantha minima*	09/20/84
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	04/14/86
North Park phacelia	*Phacelia formosula*	03/21/86
Northern monkshood	*Aconitum noveboracense*	09/23/83
Peebles Navajo cactus	*Pediocactus peeblesianus* var. *peeblesianus*	03/30/84
Persistent trillium	*Trillium persistens*	03/27/84
Raven's manzanita	*Arctostaphylos pungens* var. *ravenii*	07/10/84
Robbins' cinquefoil	*Potentilla robbinsiana*	07/22/83
Salt marsh bird's-beak	*Cordylanthus maritimus* ssp. *maritimus*	12/06/85
San Diego mesa mint	*Pogogyne abramsii*	07/10/84
Santa Barbara Island liveforever	*Dudleya traskiae*	06/27/85
Siler pincushion cactus	*Pediocactus sileri*	04/14/86
Small whorled pogonia	*Isotria medeoloides*	01/16/85
Sneed pincushion cactus	*Coryphantha sneedii* var. *sneedii*	03/21/86
Solano grass	*Tuctoria mucronata*	09/11/85
Spineless hedgehog cactus	*Echinocereus triglochidiatus* var. *inermis*	04/02/86
Tennessee purple coneflower	*Echinacea tennesseensis*	02/14/82
Texas poppy mallow	*Callirhoe scabriuscula*	03/29/85
Texas wild-rice (San Marcos River Plan)	*Zizania texana*	12/03/84
Todsen's pennyroyal	*Hedeoma todsenii*	03/22/85
Truckee barberry	*Mahonia sonnei*	06/20/84
Virginia round-leaf birch	*Betula uber*	03/03/82
Wright fishhook cactus	*Sclerocactus wrightiae*	12/24/85

(More than one species are covered by some plans, and some species have several plans covering different parts of their ranges.)

* Recovery efforts did not come in time to save this fish; it was recognized by the FWS as extinct on September 2, 1983.

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since it provided to the FWS the necessary information to proceed with listing qualified candidate plants and aided TNC in establishing its land protection priorities. Fourteen of the 32 species have been recommended for Federal listing.

* * *

On December 10, a meeting was held at Wye Mills, Maryland, to discuss the Maryland Forest, Park, and Wildlife Service's nongame and endangered species program and the first draft of the revised Chesapeake Bay Bald Eagle Recovery Plan. Representing Maryland was Glenn Therres, who was recently hired as the head of the State's nongame and endangered species program.

* * *

Region 6—The new black-footed ferret (*Mustela nigripes*) captive breeding facility at the Sybille Wildlife Research Unit near Wheatland, Wyoming, has been completed. The final inspection was made on December 16, 1986. Dr. Donald Kwiatkowski, Wyoming Game and Fish Department, started work at the facility on December 1. He will be responsible for the day-to-day care and maintenance of the captive ferrets.

Captive black-footed ferrets currently being held in Laramie, Wyoming, will be transferred to Sybille in their current cages, which will then be connected to new, larger cages using a pipe tunnel. The ferrets will be allowed to move into their new cages gradually, softening any trauma associated with being transported to their new building. With a total of 17 black-footed ferrets now being held in captivity, all involved are hoping for a successful captive breeding effort within the next few months.

* * *

The Upper Basin Colorado River Coordinating Committee, which has been involved in a 3-year process to resolve conflicts between water developers and conservation of Endangered fishes, met in the FWS Denver Regional Office on December 8 to discuss the final changes to the draft Endangered Species Recovery Implementation Plan for the Upper Colorado River Basin. A task group established under the Coordinating Committee has been developing the plan for the past year and a half.

As a result of the meeting, the Coordinating Committee agreed to three final changes and directed the task group to complete this last revision of the implementation plan for acceptance and signa-

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ture by committee members in January 1987. The task group met on December 15 to make these final revisions, and a consensus was reached on most issues. Efforts will continue on the remaining issues to keep the plan on track, with the implementation of the cooperative agreement among the States of Colorado, Utah, and Wyoming and the Department of the Interior scheduled for February. If completed, this plan will initiate a 15-year effort at recovering the listed fishes in the upper Colorado River basin.

* * *

The Interagency Grizzly Bear Committee (IGBC) held its fall meeting in the FWS Denver Regional Office on December 2-3. Attendees included members of the IGBC (top level managers of the USFS; FWS; National Park Service; Bureau of Land Management; and the States of Wyoming, Montana, Idaho, and Washington), agency grizzly bear experts, Canadian biologists, representatives from environmental organizations, the press, and private citizens. Some of the key highlights of the meeting follow:

Revision of the Grizzly Bear Recovery Plan is under way. However, a partial interim revision is being prepared to provide updated information on grizzly bear recovery zones and recovery target levels for all grizzly bear ecosystems. The target date for completion of the interim draft is February 1987.

In 1986, six grizzlies were captured as nuisance bears in the Northern Continental Divide Ecosystem in Montana, and 33 were captured as nuisance animals in the Yellowstone Ecosystem. More than 60 percent of the bear/human conflicts in the Yellowstone Ecosystem occurred on the 1 percent of habitat that is in private ownership. Many problems occurred in towns bordering the park that resulted from incorrect garbage disposal and storage, which attracted the bears.

Results from the first year of a study on aversive conditioning of grizzly bears using rubber bullets are somewhat optimistic. Only a few bears were actually "tested" in 1986. However, preliminary indications show that although bears "shot" once at a specific location did not avoid all areas with humans, after three hits they did begin to avoid areas associated with humans for up to a 1-month period. A report on this study, which is being conducted by the Wyoming Game and Fish Department, should be available soon.

A state-of-the-art compendium on the grizzly bear has been completed by the National Wildlife Federation. The 830-page document includes a list and abstract of all available information on the biology, research, and management of the grizzly bear in North America.

A special task force report was submitted to the IGBC on the availability and distribution of foods for grizzly bears in the Yellowstone Ecosystem. It provides details on the amounts of carrion and fish available to bears, the distribution and annual abundance of these food sources, and the known feeding ecology of grizzly bears in relation to the foods available in this ecosystem. The report notes that significant amounts of carrion are available to bears in both spring and fall. The majority is available within Yellowstone National Park in the spring, while in the fall most is available outside the park as a result of big game sport hunting. Available data on grizzly bear foods and the population in the Yellowstone area indicate that sufficient foods are available to maintain a viable population in this ecosystem. Thus, concerns about the need to artificially feed grizzly bears are not supported by the available data.

Current data for the Yellowstone Ecosystem indicate that management efforts are resulting in fewer bear mortalities and, as a result, higher reproduction. Twenty-three adult females were seen with cubs in the Yellowstone Ecosystem in 1986. Although two of these bears are now dead due to human/bear conflicts, this is the highest number of unduplicated adult female sightings ever reported in the ecosystem. In comparison, the highest number of adult females with cubs counted from 1959 to 1967, when the garbage dumps in the park were open, was 19. It is important to note that approximately 2 million acres or 40 percent of the Yellowstone ecosystem have yet to be adequately censused for adult females with cubs due to logistics and limitations on access. Thus, the number of sightings in 1986 represents a *minimum* number known to be alive. At least one adult female at 4 years of age was known to have cubs in 1986. This first documentation of breeding at such a young age in Yellowstone is a positive indication that grizzly bears are able to obtain sufficient foods.

There also has been a reduction in the average number of human-induced bear mortalities, from 18.8 per year for the period 1959-1967 to 10.1 per year for the period 1981-1986. These data support a cautiously optimistic attitude about the future of the Yellowstone grizzly bear population. Continuing efforts to minimize human-induced mortality and reduce human-related food sources will promote achievement of recovery goals for this important grizzly bear population.

Members of the press also attended the meeting. At the end of the meeting, an opportunity was provided for them to interview key participants. Several local television stations carried a brief story on the event during their evening newscast. At the end of the meeting, Earth First!, an environmental organization, staged a mock funeral for the Yellowstone grizzly bear to protest government bear management policies.

* * *

Region 7—With the advent of autumn, Aleutian Canada geese (*Branta canadensis leucopareia*) migrate from their Alaska breeding islands to the more favorable environs of Oregon and California. They began arriving in the Crescent City, California, area in mid-October. Since Aleutian geese commonly mix with other Canada geese that are similar in appearance, a precise count of their numbers is difficult. However, preliminary estimates of the flock in California indicate a new population high for the Aleutian subspecies (4,500 - 5,000 birds).

Another interesting report from the wintering grounds is that all ten Aleutian birds banded from a population breeding in the Semidi Islands, Alaska, in 1980 and 1981 have again been observed in the Pacific City, Oregon, area where this population winters. Such a high survival rate is remarkable.

* * *

BULLETIN Available by Subscription

Although we would like to send the BULLETIN to everyone interested in endangered species, budgetary constraints make it necessary for us to limit general distribution to Federal and State agencies and official contacts of the Endangered Species Program. However, the BULLETIN is being reprinted and distributed to all others, on a non-profit subscription basis, by the University of Michigan. To subscribe, write to the *Endangered Species Technical Bulletin Reprint,* School of Natural Resources, University of Michigan, Ann Arbor, Michigan 48109-1115, or telephone 313/763-1312. The price for 12 monthly issues is $15.00 (in Canada, $18 US).

Reference Note

All Fish and Wildlife Service notices and proposed and final rules are published in the *Federal Register* in full detail. The parenthetical references given in the BULLETIN—for example: (F.R. 9/3/85)—identify the month, day, and year on which the relevant notice or rule appeared in the *Federal Register.*

Wood Stork

(continued from page 4)

Several sites were considered for construction of the new artificial foraging habitat, with the final selection being Kathwood Lake at the NAS Silverbluff Plantation Sanctuary near Jackson, South Carolina. This site, approximately the same distance and direction from the rookery as the Steel Creek delta area on the Savannah River Plant, consisted of an old lakebed of approximately 35 acres that had been drained several years earlier when its dam collapsed. Through the cooperative efforts of the FWS, NAS, Soil Conservation Service, Auburn University, DOE, Savannah River Ecology Lab (University of Georgia), and E.I. du Pont de Nemours and Company (major contractor for the DOE at the Savannah River Plant), a design for creating foraging habitat was developed, a management plan was drawn up, and construction began.

Orangeburg National Fish Hatchery provided fish for stocking the ponds initially, and on July 30, 1986, the first four storks from the Birdsville rookery discovered the artificial habitat. One week later, 72 wood storks were actively foraging in the ponds. The birds placed their stamp of approval on the design and concept by continuing to return to the ponds in large numbers until late September, when they began to move south for the winter.

Part of the idea behind this project was to develop a detailed construction and management design that eventually would provide fish for the storks on a self-sustaining basis, eliminating the need for continued fish stocking. The first year's results indicate that the fish population in Kathwood Lake potentially may be self-sustaining by the second year of operation. The DOE, in addition to funding the construction and maintenance of this habitat, has provided funds to researchers at the University of Georgia's Savannah River Ecology Lab to conduct detailed and intensive studies of the storks that occupy the Birdsville rookery and use the Savannah River Plant's wetlands for feeding. This ongoing research already has produced information on the breeding, foraging, and migratory habits of the stork, which will materially assist in recovery efforts for the species.

Requests have been received by the FWS from private landowners and public land managers for directions on how to reproduce the design and management scheme used at Kathwood. Several National Wildlife Refuges also are evaluating these techniques for possible use in managing their own resident storks. The successful results of this first consultation on the species have already provided, and should continue to yield, invaluable knowledge and techniques for ensuring the survival of the Birdsville colony as well as struggling wood stork rookeries in other areas of the Southeast.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	25	20	242	5	0	22	314	23
Birds	61	16	141	3	2	0	223	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	21	6	0	81	43
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	21
Crustaceans	4	0	0	1	0	0	5	1
Insects	8	0	0	5	0	0	13	12
Plants	107	6	1	24	3	2	143	54
TOTAL	283	52	466	77	15	37	930	243**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 209
Number of species currently proposed for listing: 26 animals
38 plants

Number of Species with Critical Habitats determined: 96
Number of Cooperative Agreements signed with States: 47 fish & wildlife
26 plants

December 31, 1986

January 1987 Vol. XII No. 1

ENDANGERED SPECIES

Technical Bulletin Department of Interior, U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

February 1987 Vol. XII No. 2

ENDANGERED SPECIES

Technical Bulletin

Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Listing Protection Proposed for Two Plants and Three Animals

Five taxa were proposed by the Fish and Wildlife Service during January 1987 for listing as Threatened or Endangered. If final listings are approved, protection under the Endangered Species Act will be available to the following:

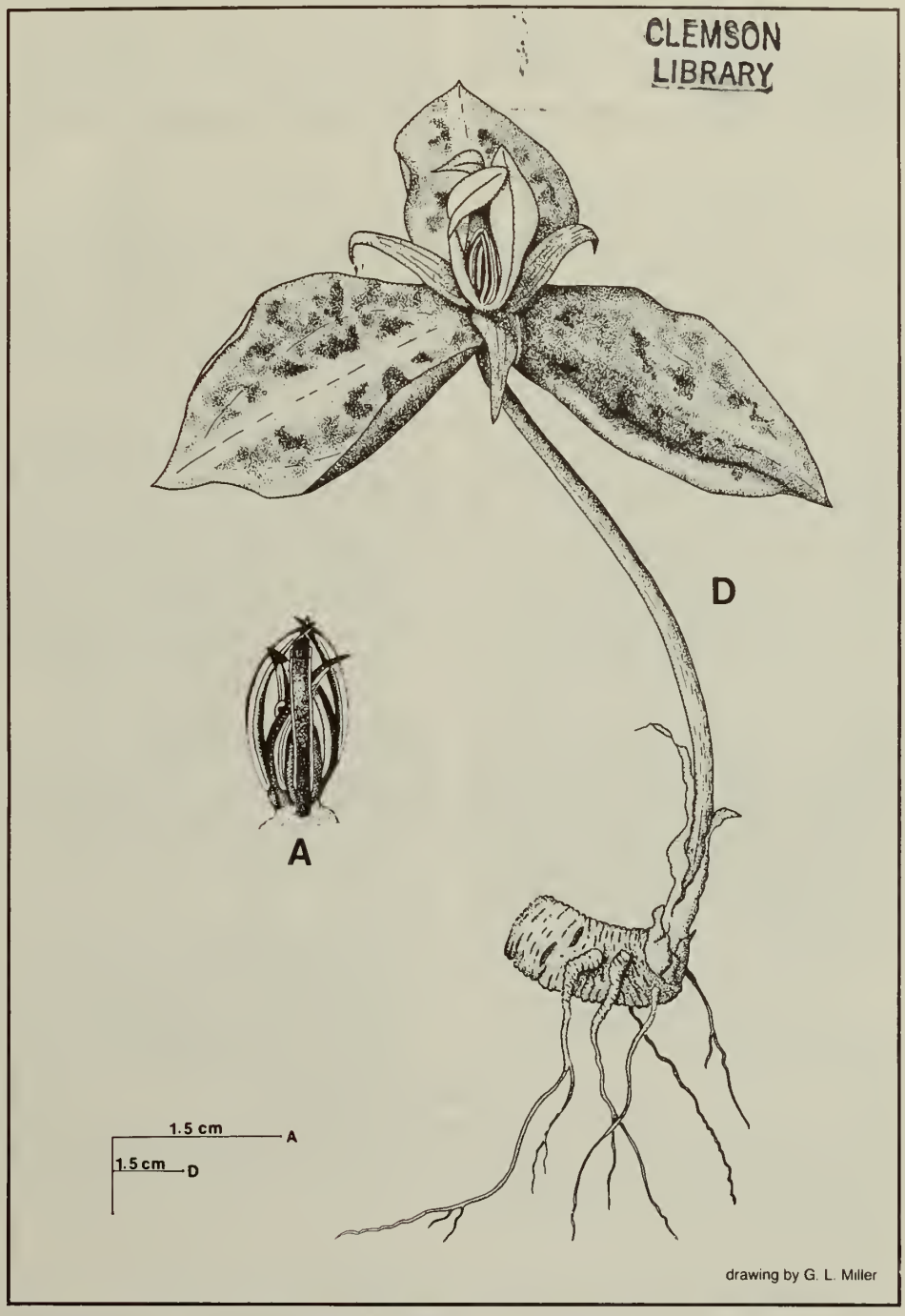
Relict Trillium (*Trillium reliquum*)

The relict trillium, a rare herbaceous member of the lily family (Liliaceae), can be distinguished from other trillium species by its decumbent (s-curved) stems, distinctively shaped anthers, and the color and shape of its leaves. Its flowers, which appear in early spring, are greenish to brownish-purple (or occasionally pure yellow) in color. A perennial, it dies back to a tuberous rhizome after the fruit matures. *T. reliquum* is found only in moist hardwood forests that have experienced little or no disturbance within the recent past.

There currently are nine known *T. reliquum* populations: two in Alabama (Henry and Lee Counties); four in Georgia (Clay, Columbia, and Early Counties); and three in South Carolina (Aiken and Edgefield Counties). The Henry County population, which consists of approximately 150 plants on one-third of an acre, is on land managed by the U.S. Army Corps of Engineers (COE) as a recreation area. Part of the largest population, located in Aiken and Edgefield Counties, has been purchased by the South Carolina Department of Marine Resources for protection as a nature preserve, and another small segment is within a State highway right-of-way owned by South Carolina. The remainder of this population is privately owned, as are the six populations.

Because most relict trillium populations are adjacent to rapidly expanding urban areas, the most serious threat to the species' survival is the loss of habitat resulting from residential development. Logging of lands occupied by the trillium, clearing of native habitat for agricultural purposes, and fires are other significant threats. All *T. reliquum* populations have been damaged

(continued on page 5)



Relict trillium showing distinctive anthers (A) and mature flowering plant (D)

Regional News

Endangered Species Program regional staff members have reported the following activities for the month of January:

Region 2—In December 1986, 71 caves were surveyed for Ozark big-eared bats (*Plecotus townsendii ingens*). Of the 71 caves, only five (four in Oklahoma and one in Arkansas) contained these bats. A total of 258 Ozark big-eared bats were found in the five caves. Most of the bats occurred in one cave in Oklahoma, where the count increased from 216 bats in 1985 to 242 bats in 1986.

* * *

In January, a radio-collared ocelot (*Felis pardalis*) was killed when struck by a vehicle on a road south of Laguna Atascosa National Wildlife Refuge in southern Texas. The cat was an adult male that was originally collared in February 1984. The remains were found by a passerby and were turned over to the State game warden.

The Sonoran pronghorn (*Antilocapra americana sonoriensis*) recovery team met in January. The major topics of discussion included the Draft Final Report on Sonoran Pronghorn Status in Arizona, future research needs and recovery actions, and the Draft Master Plan for Buenos Aires National Wildlife Refuge. One of the objectives in the latter document is the reintroduction of pronghorn on the refuge. The subspecies to be used in such a reintroduction is undecided. It is not entirely clear which pronghorn subspecies is native to the refuge; the area may be within the historical range of *A. a. mexicana*, a non-endangered subspecies.

* * *

Region 3—Gene Gardner, of the Illinois Natural History Survey, has submitted the following note that corrects and slightly expands upon a Regional News item in BULLETIN Vol. XI No. 10-11:

Radio-tracking equipment and techniques were successfully applied to a juvenile female Indiana bat (*Myotis sodalis*) captured over a permanent stream in Pike County, Illinois. This juvenile was only one of 16 Indiana bats captured within the same 1.75 kilometer segment of the creek. The juvenile, weighing 8.05 grams, exhibited some abnormal behavior during the first night of a four-night tracking period. The bat was tracked on four mornings to a dead cottonwood in a small area of bottomland woods bordering the stream. The juvenile, along with nine other bats (undoubtedly Indiana bats), emerged from beneath the same small area of loose bark on the tree during one night of observation. Preliminary data for the second, third, and fourth nights indicate movements over a larger range than previously reported for the species. In addition to foraging over the creek, the juvenile foraged in the canopy of mature trees in an upland, intermittent side hollow of the permanent stream. The bat flew across the corner of a nearby soybean field, apparently to reach the upland foraging area. Although she foraged along the edges of the soybean field and a nearby cornfield, she did not forage over the open fields themselves. A long-term cooperative research project among the Illinois Natural History Survey, Illinois De-

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Marvin E. Moriarty, *Chief, Office of Endangered Species*
(703-235-2771)
Earl B. Baysinger, *Chief, Federal Wildlife Permit Office*
(703-235-1937)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Stephen W. Parry, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Director;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

The ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

Listings Approved for 12 Plants and One Animal

During January 1987, the Fish and Wildlife Service (FWS) added the following taxa to the U.S. list of Endangered and Threatened plants and animals:

Seven Florida Scrub Plants

The sand pine/evergreen oak scrub ecosystem occupying the central Florida sand ridge includes a number of plants and animals that are found nowhere else. These endemic species are imperiled by conversion of native habitat to citrus groves, residential developments, and other uses. (See the story in this BULLETIN on the recent proposal to list two Florida lizards.) As part of a continuing effort to conserve these species and their habitat, the FWS proposed April 10, 1986, to give listing protection to seven Florida scrub plants. (See story in BULLETIN Vol. XI No. 5.) The January 21, 1987, final rule listed six scrub plants as Endangered—***Eryngium cuneifolium* (snake root), *Chionanthus pygmaeus* (pygmy fringe tree), *Hypericum cumulicola* (highlands scrub hypericum), *Polygonella basiramia* (wire weed), *Prunus geniculata* (scrub plum),** and ***Warea carteri* (Carter's mustard)**—and one as Threatened, ***Paronychia chartacea* (papery whitlow-wort)**.

Two Puerto Rico Plants

Peperomia wheeleri* (Wheeler's peperomia)** is an evergreen herb found on the slopes of Monte Resaca on Culebra Island. Deforestation and feral livestock have eliminated the plant from most of its former range. Most of the remaining population occurs within Culebra National Wildlife Refuge; however, until the continuing feral livestock problem is solved, the species will remain vulnerable. ***Banara vanderbiltii (known locally as Palo de Ramon), is an evergreen shrub or small tree that apparently survives at a single site in the karst region of northern Puerto Rico. Only six individuals of this species currently are known. Some historical populations were lost to urbanization, and the remaining habitat is subject to continued development. Both species were proposed April 10, 1986, for listing as Endangered (see summary in BULLETIN Vol. XI No. 5), and the final rule was published in the January 14, 1987, *Federal Register*.

Lesquerella filiformis (Missouri Bladderpod)

This annual, endemic to the unglaciated prairie region of southwestern Missouri, is

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Regional News

(continued from page 2)

partment of Conservation, and Illinois Department of Transportation will include the use of 0.82-g superminiature transmitters in a telemetry study of an Indiana bat maternity colony in this area during 1987.

* * *

Region 4—Two Endangered plant species have been found on a protected site in Miami, Florida. *Euphorbia deltoidea* ssp. *deltoidea* (deltoid spurge) and *Polygala smalli* (tiny polygala) were located on the Deering Estate, a 300-acre tract recently acquired by Florida's Conservation and Recreation Lands Program and the Metropolitan Dade County Park and Recreation Department. The Deering Estate includes about 75 acres of pine rockland, a habitat type to which both species are restricted. Only one plant of *E. d.* ssp. *deltoidea* and four plants of *P. smalli* were found; however, if controlled burning (a habitat management technique to remedy overvegetation) can be implemented, it is likely that the populations of both species will increase.

* * *

Three male and three female (two pregnant) Perdido Key beach mice (*Peromyscus polionotus trissyllepsis*) have been trapped at Gulf State Park in Baldwin County, Alabama, and translocated approximately 10 miles east to an enclosure on Gulf Islands National Seashore in Escambia County, Florida. The enclosure is designed to exclude mammalian and avian predators and to initially confine the beach mice to a selected dune. Construction of the enclosure consisted of sheet aluminum 4 feet wide and in lengths of 35-50 feet buried 18 inches in the sand encircling a dune. Poultry mesh was attached to the top of each aluminum sheet, resulting in an enclosure wall extending approximately 5 feet above ground. Plastic bird mesh was used to construct a roof over the enclosure.

Future recovery actions include periodic monitoring of the translocated beach mice and release of additional mice as necessary. This recovery action is a cooperative effort among the FWS, the National Park Service and the States of Alabama and Florida to reestablish the Perdido Key beach mouse to an area from which it was extirpated following Hurricane Frederick in 1979. A captive breeding colony also will be established at Auburn University.

* * *

The automobile, the primary "predator" of the Florida panther (*Felis concolor coryi*), has claimed another victim. A female panther was killed on Alligator Alley (State Route 84) in Collier County at mile marker 16. This is the same location where two other panthers have been killed. As a result of an Endangered Species Act (ESA) Section 7 consultation with the Federal Highway Administration on upgrading Alligator Alley to Interstate 75, a number of underpasses will be constructed at mile marker 16. This area has been documented to be heavily used by panthers and is a primary travel corridor for these animals when crossing Alligator Alley. Since 1973, eleven panthers have been killed and two injured on south Florida roads.

* * *

In 1986, FWS personnel with the Jackson, Mississippi, and Annapolis, Maryland, field offices, in conjunction with State fish and game agencies, concluded a 4-year bat population survey at 12 maternity colonies, 3 of the Endangered Ozark big-eared bat and 9 of the Virginia big-eared bat (*Plecotus townsendii virginianus*).

Over the study period, the Ozark big-eared bat population declined by 13.8 percent at the three study caves in Oklahoma and Arkansas. This loss is accounted for by the dramatic decline (79.8 percent) at the only known maternity colony site of this bat in Arkansas. On the other hand, the two study colonies in Oklahoma actually had substantial increases of 73.3 percent and 19.4 percent. The total 1986 maternity colony population, including the study colonies and additional colonies located since the survey began, was 459. (In previous years of the study, the counts were 1983—311; 1984—386; 1985—332).

The Virginia big-eared bat population has increased by 24.3 percent over 4 years at the eight study colonies in West Virginia and at the only study colony in Virginia. The total 1986 Virginia big-eared bat maternity colony population in West Virginia, Virginia, and Kentucky, including the study colonies and additional colonies located since the survey began, was 5,084 (1983—3,505; 1984—3,866; 1985—4,565).

* * *

The Florida Game and Fresh Water Fish Commission has completed its annual winter snail kite (*Rostrhamus sociabilis plumbeus*) survey. The survey spans territory from the central lakes region of Florida, past Lake Okeechobee, to the Everglades. The total number of kites observed in this year's survey was 563, representing an increase of 38.3 percent over last year. This year's total is greater than the average annual count of 383 kites for the 5-year period from 1981 to 1985.

(continued on next page)

Most of the kites were found in Everglades Conservation Area 3A. This area has always been one of the kite's major strongholds; however, during drought years (such as 1985), kites are forced to move northward into the central lakes region. The snail kite is dependent on drought-related habitats, and development pressures in these areas may prove detrimental to the species' survival.

* * *

Region 5—Representatives from The Nature Conservancy, natural resource agencies of New Jersey, Maryland, and West Virginia, and the FWS Annapolis, Maryland, Endangered Species Field Office met in the regional office on January 28 to develop procedures for an interagency volunteer effort to assist the FWS in listing vulnerable plants. This experimental project could prove to be of tremendous assistance to the FWS and greatly expedite the listing of qualified candidate species.

* * *

A meeting of the New Hampshire Audubon Society, U.S. Forest Service, New Hampshire Fish and Game Department, and the FWS regional office and Concord, New Hampshire, field office staffs was held January 23 to discuss the 1987 peregrine falcon (*Falco peregrinus*) project field season. The highly successful use of trained volunteers at active and historic nesting sites was discussed, as was the subject of establishing contacts with the Appalachian Mountain Club, rockclimbers, State park personnel, and the public.

* * *

Region 6—All captive black-footed ferrets (*Mustela nigripes*), 6 males and 11 females, are now adapting to their new 6,912-square-foot holding facility at the Wyoming Game and Fish Department's Sybille Wildlife Research Unit near Wheatland, Wyoming. The facility, a pole barn construction with metal siding and roof, has been erected and enclosed, and about one-half of the interior has been finished. The building is divided into several rooms, including rooms for isolating ferrets, food production and preparation, ferret holding pens, and office activities.

Of the 17 ferrets being held at the facility, 13 are kept separately in 4- by 8-foot woven wire cages. In addition, there are four large 8- by 16-foot cages built on the floor. The floor of each cage is covered with 4 inches of soil. In the center of each floor cage, a large square section has been framed and filled with an additional 12 inches of soil. Ferrets in each type of cage are offered a choice of two nest boxes for security. Each nest box consists of an outer compartment and an inner nest compartment similar to what a ferret might experience in a prairie dog burrow. The captive ferrets are fed a ration of prairie dogs, hamsters, mice, and prepared moist cat food. All of the animals are currently doing well and are adapting well to this new environment.

An attempt to breed the ferrets is planned for the current breeding period, February through March 1987. The Wyoming Game and Fish Department is being assisted in the captive breeding effort by the Captive Breeding Specialist Group of the International Union for the Conservation of Nature and Natural Resources. This group, led by Dr. Ulysses Seal, was requested by the Wyoming Game and Fish Department (WGDF) and the FWS to serve as a technical advisory group for the captive breeding aspects of the ferret recovery program. Mr. Mike DonCarlos of the Minneapolis Zoological Garden is a member of the group and will work with the WGFD in its efforts to breed ferrets this spring. Success in breeding this species in captivity may be necessary to prevent its extinction, and it will provide an opportunity to develop a captive population from which ferrets can be reintroduced back into the wild. Ferrets in captivity also provide an opportunity to further the knowledge of this species. Research in the fields of black-footed ferret genetics, physiology, and behavior are currently planned for the captive animals.

Successful captive breeding is very important for recovery of this species and it is equally important that other populations of wild ferrets be found. To help locate another wild population, the State of Montana is currently offering a reward for evidence of the species' presence in that State. Any person who sees a black-footed ferret is asked to report the sighting to the local game and fish department or to the FWS.

* * *

During January, the Grand Island Field Office distributed an update to the report titled, "Potential Present Range of the Black-footed Ferret as of January 1, 1981," and subsequent 1981-1986 updates. This update includes all probable and confirmed ferret sightings reported to the Grand Island office during January 1, 1986, through January 1, 1987. States reporting confirmed or probable sightings during the period were Colorado, Utah, and Wyoming.

* * *

Competition for Platte River water is high among interests in Colorado, Wyoming, and Nebraska. An interagency effort made up of biologists representing State, Federal, and private agencies is developing habitat models for three listed species that use the Platte River in Nebraska. Habitat Suitability Index (HSI) models are being developed for piping plover and interior least tern nesting habitat and for riverine roosting habitat of migrating whooping cranes. The habitat models will be linked with a hydraulic model of the central Platte River that has been developed through Instream Flow Incremental Methodology. The goal of the project is to develop habitat versus instream flow relationships that can be used in assessment of project effects, development of reasonable and prudent alternatives to jeopardy actions, reservoir operations studies, and the enhancement of riverine habitat, all as part of ESA Section 7 interagency consultation. Model development is being led by the Grand Island Field Office and the Bureau of Reclamation's Kansas-Nebraska Projects Office.

* * *

Region 7—Approximately 20 Endangered Aleutian Canada geese (*Branta canadensis leucopareia*) succumbed to an outbreak of avian cholera in Modesto, California, during January. The Modesto oxidation ponds are a traditional roosting area for ducks and geese in the San Joaquin Valley. Although Aleutian geese have died previously from cholera at these ponds, mortality has never been as high. David L. Hunter, DVM, of the California Department of Fish and Game's Wildlife Investigations Lab in Rancho Cordova, is cooperating with the FWS in examining the birds. Proceedures to haze the flock to discourage their continued use of the area are being implemented.

* * *

Region 8—Several FWS Cooperative Research Units are engaged in endangered species research projects in Puerto Rico. The Iowa unit recently completed a report on ecological studies of the brown pelican (*Pelecanus occidentalis*), which suggested that food may be a limiting factor, but that environmental contaminants, disease, climate, habitat, and nesting success did not seem to be limiting.

The Louisiana unit is involved in the recovery program for the Puerto Rican parrot (*Amazona vittata*). The objective of the Louisiana study is to determine what impact exotic rats have on parrot production.

A 2-year study by the Florida unit in the Culebra Archipelago (between Puerto Rico and the Virgin Islands) will provide baseline data on populations and habitat assessment for four Endangered sea turtles. Data collected on the hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and green (*Chelonia mydas*) sea turtles will assist the FWS in developing management strategies to improve nesting success and manage habitat for these turtles on the Archipelago.

The Georgia unit also is investigating sea turtles in Puerto Rico. Objectives of a current study are to investigate stock assessment methodology and provide a population estimate for numbers of nesting female sea turtles; calculate nesting success and document reasons for nesting failure; and calculate estimates of numbers of foraging turtles on Mona Island.

* * *

Proposed Listings

(continued from page 1)

to some extent by one or more of these factors and all remain, at least in part, vulnerable to them. Accordingly, the FWS has proposed the relict trillium for listing as Endangered (F.R. 1/14/87).

The listing proposal did not include a proposal for designating Critical Habitat because the publication of maps and precise location data required for such a designation would make the trillium more vulnerable to taking. *T. reliquum* already is subject to this problem; in the spring of 1986, several hundred plants of the largest population were cut while in bloom by vandals or uninformed wildflower enthusiasts. However, even without a Critical Habitat designation, the species will receive protection under Section 7 of the Endangered Species Act if it is listed.

Comments on the listing proposal should be sent to the Field Supervisor, Asheville Endangered Species Field Office, U.S. Fish and Wildlife Service, Room 224, 100 Otis Street, Asheville, North Carolina 28801 by March 16, 1987.

Crescentia portoricensis

With fewer than 30 individuals known to exist, *C. portoricensis* is one of Puerto Rico's rarest plant species. The survival of this evergreen shrub or small tree is seriously threatened by the direct and indirect impacts of deforestation, and the FWS has proposed to list it as Endangered (F.R. 1/14/87).

C. portoricensis, also known as Higuero de Sierra, is endemic to montane mixed evergreen and deciduous forests of the lower Cordillera of southwestern Puerto Rico. The only two known *C. portoricensis* populations are in the Susua and Maricao Commonwealth Forests. The Susua unit had largely been cleared by the beginning of the twentieth century and, although the forest is recovering, both it and the Maricao unit are experiencing the indirect effects of the deforestation that is occurring on adjacent lands. Associated increases in erosion, landslides, and flash flooding are believed responsible for the disappearance of two previously known populations. Because *C. portoricensis* is restricted to sites along permanent or intermittent watercourses, it remains particularly vulnerable to these problems.

Flood control projects that include large reservoirs in the Maricao area are under long-term consideration for possible construction by the COE. If constructed as originally planned, the impoundments could extend into drainages where *C. portoricensis* occurs. Various alternatives are being evaluated, and the FWS will work with the COE to develop plans that meet project objectives while allowing for conservation of the plant. Because these discussions are beginning early in the project planning process, no conflicts are expected.

Comments on the proposal to list *C. portoricensis* as an Endangered species should be sent to the Field Supervisor, Caribbean Field Office, U.S. Fish and Wildlife Service, P.O. Box 491, Boquerón, Puerto Rico 00622, by March 16, 1987.

***

Hualapai Vole (*Microtus mexicanus hualpaiensis*)

The Hualapai vole is an extremely rare, mouse-sized mammal thought to be restricted to the Hualapai Mountains of northwestern Arizona. Only 15 confirmed specimens have ever been captured. Biologists conducting an intensive survey in 1984 were able to locate the vole or its sign at three sites totalling less than one acre in size. The small patches of remaining suitable habitat are threatened by livestock grazing, recreational activity, and a potential water development. To help prevent the extinction of the Hualapai vole, the FWS has proposed to list it as Endangered (F.R. 1/5/87).

The Mexican vole (*Microtus mexicanus*) occurs in parts of Mexico and the southwestern United States. There are 12 *M. mexicanus* subspecies, 3 of which are found in Arizona. In addition to *M. m. hualpaiensis*, the subject of the listing proposal, there are *M. m. mogollonensis* to the east and *M. m. navaho* to the northeast.

Six vole specimens that might possibly be *M. m. hualpaiensis* have been collected from outside the Hualapai Mountains. Four came from the Music Mountains, about 50 miles (80 kilometers) north of Hualapai Peak. That population is small, isolated, and subject to the same kinds of habitat degradation that has occurred in the Hualapai Mountains. The other two specimens were collected in Prospect Valley, about 90 miles (145 km) northeast of the Hualapais. These two specimens, which instead may represent *M. m. navaho*, were taken more than 73 years ago and no others have been reported from Prospect Valley since that time.

In the Hualapai Mountains, the vole has been found between 5,397 and 8,400 feet (1,645 and 2,560 meters) in elevation, and is primarily associated with conifer forests. Within such woodlands, the vole occurs in moist sites with good grass cover along permanent or semipermanent waters (e.g., springs and seeps). Populations of *Microtus* in the Hualapai and the Music Mountains are disjunct relicts from Pleistocene times. When the North American glaciers retreated and the southwest's climate became warmer and drier, mountaintop "islands" of moist, grassy meadow and forest habitat were isolated by the increasingly arid lowlands.

Most of the sites in the Hualapais where *M. m. hualpaiensis* or its sign have been found are public lands administered by the Bureau of Land Management (BLM). Others are owned by the Mohave County Parks Department, the Santa Fe Pacific Railroad, and private citizens. Except for the parkland, these areas are managed by the BLM as part of larger grazing allotments. *Microtus* sites in the Music Mountains also are on BLM lands.

Certain land use practices in the past damaged most of the Hualapai vole's historical habitat, especially when exacerbated by the effects of periodic droughts. The remaining habitat (approximately three-fourths of an acre) in the Hualapai Mountains also appears to be threatened. Livestock concentrates in moist areas around open water and seeps, and could reduce or eliminate the vole's ground cover plants by grazing and trampling.

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photo by David Densmore

Crescentia portoricensis *is an evergreen, vine-like shrub or small tree reaching up to 20 feet (6 meters) in height. Its leaves are dark-green and leathery, usually clustered at the nodes, and the yellow-white flowers are irregularly bell-shaped.*

drawing by Pinauu, courtesy of the Arizona Game and Fish Department

Hualapai vole

Campers and off-road vehicle enthusiasts also are attracted to spring areas, causing further damage. In addition, the Mohave County Parks Department is exploring the possibility of developing a 3-acre lake within historical vole habitat.

Because most of the Hualapai vole habitat is on BLM lands, the cooperation of that agency will be critical to the survival of the Hualapai vole. The BLM is aware of the situation and is giving consideration to the vole's welfare. It is attempting to acquire one of the key sites in the Hualapai Mountains that is currently privately owned. (*Microtus* sites in the Music Mountains already are administered by the BLM.) If the Hualapai vole is listed as Endangered, the BLM will be required to ensure that its activities, including its involvements in grazing leases and water developments, are not likely to jeopardize the species' survival.

Comments on the proposal to list the Hualapai vole as Endangered should be sent to the FWS Regional Director, Region 2 (address on page 2 of this BULLETIN), by March 16, 1987.

Two Florida Lizards

Two lizards endemic to central Florida, the **sand skink (*Neosops reynoldsi*)** and the **blue-tailed mole skink (*Eumeces egregius lividus*)**, were proposed for listing as Threatened (F.R. 1/21/87). Both depend on scrub and longleaf pine/turkey oak vegetation with associated sandy soils, a distinctive type of habitat that is disappearing as agriculture and urbanization spread.

The sand skink, which has adapted to a mostly fossorial (underground) existence, is the only North American skink completely specialized for "swimming" through loose, sandy soils. Its streamlined features include a wedge-shaped head, a partially countersunk lower jaw, a reduction in the number of digits (one toe on the forelimbs and two on the hindlimbs), and tiny forelegs that can be folded into grooves in the body. *N. reynoldsi* burrows to a depth of up to 10 inches (25 centimeters) and feeds on a variety of small, mostly fossorial arthropods (e.g., beetle larvae, termites). The species is known only from the high sandy ridges of Lake, Marion, Orange, Polk, and Highlands Counties.

The blue-tailed mole skink, more restricted in range, is known only from Polk and Highlands Counties. This subspecies forages on the surface or up to 2 inches (5 cm) underground, but it is not as specialized as the sand skink for living in the subsurface substrate. Blue-tailed mole skinks do not compete with sand skinks for food, consuming instead primarily surface-dwelling arthropods (e.g., roaches, spiders, crickets).

Neither of the skinks regularly inhabit substrates where the sand is dry and porous. They apparently depend on certain moisture conditions that maintain body temperatures within a preferred range, provide a microclimate favorable for egg incubation, and support an abundant supply of small invertebrates for food. Although both skinks are sometimes found together under surface vegetational litter, they appear to occupy different microhabitats most of the time. Blue-tailed mole skinks are not evenly dispersed throughout seemingly suitable habitat; rather, they occur in localized pockets, most often under surface litter. Because this litter can provide necessary soil moisture, the uneven distribution of blue-tailed mole skinks could be a function of the uneven distribution of litter. Sand skinks are not as dependent on surface litter and occur over a wider area, possibly due to their ability to burrow deeper for soil moisture.

The sand pine scrub and sandhill areas in which the sand skink and blue-tailed mole skink occur are threatened by a number of factors. These relatively high, well drained sites are in demand for citrus groves, improved pasture, cultivation, and various forms of development (commercial, residential, and recreational). Conversion of native habitat to other uses has

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photo by Robert S. Simmons

Sand skinks measure up to 5 inches (13 cm) in total length and are gray to tan in color.

Proposed Listings

(continued from previous page)

caused the ranges of many endemic Florida plants and animals to become greatly reduced and fragmented. Over the past several years, the FWS has listed, or has proposed to list, 13 plants and 4 animals that are endemic to Florida scrub habitat. (See story in this BULLETIN on final listings for seven scrub plants.) Numerous other plants and animals of the region are candidates for future listing proposals.

Fragments of the remaining skink habitat receive protection on Lake Louisa and Wekiwa Springs State Parks, Tiger Creek and Saddle Blanket Lakes Preserves (owned by The Nature Conservancy), Archbold Biological Station (a private research institution), and Ocala National Forest. These conservation areas, however, are not enough to ensure the survival of the skinks.

Listing these two skinks as Threatened would supplement and reinforce the protection they now receive. The State of Florida, which already lists both skinks under its own legislation as threatened, prohibits their direct take without a State permit. Such permits are available only for approved conservation purposes. Given this fact, and the fact that habitat loss rather than take is the primary threat to the skinks, the FWS included with its listing proposal a provision to allow continued take when in full accordance with applicable State laws and regulations.

Comments on the proposal to list the sand skink and blue-tailed mole skink as Threatened should be sent to the Field Supervisor, Endangered Species Field Station, U.S. Fish and Wildlife Service, 2747 Art Museum Drive, Jacksonville, Florida 32207, by March 23, 1987.

Available Conservation Measures

Among the conservation benefits provided by a listing as Threatened or Endangered under the Endangered Species Act are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the FWS to develop and implement recovery plans; the possibility of Federal aid to State and Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the FWS; and the authorization to seek land purchases or exchanges for important habitat. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, various organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species or adversely modify its designated Critical Habitat. If any agency finds that one of its activities may affect a listed species, it is required to consult with the FWS on ways to avoid jeopardy or adverse modification. For species that are *proposed* for listing and for which jeopardy or adverse modification is found, Federal agencies are required to "confer" with the FWS, although the results of such a conference are non-binding. Potential conflicts almost always are avoided by planning early and using the Section 7 process.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals, except by permit for certain conservation purposes. For listed plants, the rule is different; the trafficking restrictions apply, but collecting of listed plants without a permit is prohibited only on lands under Federal jurisdiction. Some States, however, have their own laws protecting listed plants and animals that may be more restrictive.

photo by Robert S. Simmons

Blue-tailed mole skinks can reach up to 6 inches (15 cm) in total length. The tail, which makes up somewhat less than half of the length, is blue in young lizards, but it may become pinkish with age or if it is regenerated.

Approved Listings

(continued from page 3)

known to survive at only nine sites in three counties. It apparently has been extirpated from two other counties. Although two of the current sites are on the Wilson's Creek National Battlefield, the species is in danger of extinction because of its low numbers, limited distribution, and potential habitat disturbance. *L. filiformis* was proposed April 7, 1986, for listing as Endangered (see BULLETIN Vol. XI No. 5), and the final rule was published January 8, 1987.

Lespedeza leptostachya (Prairie Bush-clover)

L. leptostachya is endemic to the midwestern U.S., inhabiting dry to mesic native prairies. Although it was never common, this perennial now occurs in only a fraction of its historical range. Twenty-six remaining sites are known, distributed over northern Illinois, northern and south-central Iowa, southern Minnesota, and western Wisconsin. Only 14 of these sites receive some degree of official protection. Plants at the other sites face threats from urbanization, agricultural expansion, and construction activities. *L. leptostachya* was proposed December 6, 1985, for listing as a Threatened species (see BULLETIN Vol. XI No. 1), and the classification was made final on January 8, 1987.

Cupressus abramsiana (Santa Cruz Cypress)

Five small populations of this densely branched tree are known from the Santa Cruz Mountains of Santa Cruz and San Mateo Counties, California. Except for part of one population that extends onto Pescadero Creek County Park, all of the groves are on privately owned land. They are vulnerable to a number of threats, including residential development; agricultural ex-

(continued on next page)

Approved Listings

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pansion; logging; genetic contamination from introduced, exotic cypress species; and disruptions in the frequency of the naturally occurring wildfires upon which the Santa Cruz cypress depends. An additional threat to one population at Butano Ridge may arise from oil and gas drilling. The proposal to list the Santa Cruz cypress as Endangered was issued September 12, 1985 (see summary in BULLETIN Vol. X No. 10), and the final rule was published January 8, 1987.

Giant Kangaroo Rat (*Dipodomys ingens*)

Kangaroo rats, despite their name, are not true rats but small mammals specialized for rapid hopping on their elongated hind legs. They inhabit parts of the relatively dry, open country of western North America. One rare species, the giant kangaroo rat, is found only in south-central California. Its preferred habitat is native annual grassland with sparse vegetation, good drainage, and fine sandy-loam soils. Estimates of the species' historical range vary between 1,300,000 and 2,500,000 acres (527,600 and 1,000,000 hectares). By 1980, extensive conversion of native grasslands to cropland had reduced the species' range to a total area of less than 76,800 acres (31,000 ha). Subsequent surveys indicate that at least half of the habitat remaining in 1980 was lost by 1985, and the problem continues. On August 13, 1985, the FWS proposed to list the giant kangaroo rat as Endangered (see summary in BULLETIN Vol. X No. 9), and the final rule was published January 5, 1987. Because some of the populations are on lands administered by the BLM and Department of Energy, these agencies will be required to consult with the FWS on their activities that may affect the giant kangaroo rat. Such activities include, but are not limited to, issuance of permits for grazing, rodentcide application, and oil or natural gas exploration or development; however, no major conflicts are expected.

* * *

These listed animals and plants are now protected under the Endangered Species Act, the terms of which are summarized in this BULLETIN at the end of the story on species newly proposed for listing.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	26	20	242	5	0	22	315	23
Birds	61	16	141	3	2	0	223	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	21	6	0	81	43
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	21
Crustaceans	4	0	0	1	0	0	5	1
Insects	8	0	0	5	0	0	13	12
Plants	117	6	1	26	3	2	155	54
TOTAL	294	52	466	79	15	37	943	243**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 209
Number of species currently proposed for listing: 28 animals
28 plants

Number of Species with Critical Habitats determined: 96
Number of Cooperative Agreements signed with States: 47 fish & wildlife
26 plants

January 31, 1987

February 1987 Vol. XII No. 2

ENDANGERED SPECIES

Technical Bulletin Department of Interior U S Fish and Wildlife Service
Endangered Species Program, Washington, D C 20240

March 1987 Vol. XII No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Four Southeastern Plants Proposed for Listing

During February 1987, the following four species of plants endemic to small areas of the southeastern United States were proposed by the Fish and Wildlife Service (FWS) for listing as Endangered or Threatened:

Liatris helleri (Heller's Blazing Star)

A small perennial herb, *L. helleri* is a member of the aster family (Asteraceae). The species is found only on a few scattered summits in the northern Blue Ridge Mountains of North Carolina, where it grows in shallow, acidic soils on high ledges of outcrops that are exposed to full sunlight.

Of the nine historically known *L. helleri* populations, two are considered extirpated; a site in Watauga County was converted to a residential development and another in Mitchell County was subjected to intensive recreational use. Only three of the seven surviving populations receive some protection from human-induced habitat alteration. The other four are on lands that have been, or are being, developed for commercial recreational use. In an effort to prevent the species' extinction, the FWS has proposed to list it as Threatened (F.R. 2/19/87).

The seven surviving *L. helleri* populations occur in Caldwell, Avery, Ashe, and Burke Counties. Three of them occur on privately owned land, and are threatened by the construction of roads, parking lots, buildings, and other tourist support facilities or by trampling. A fourth site is being developed into a ski resort. Only the site owned by The Nature Conservancy receives full protection. The other two *L. helleri* sites are on public lands, Pisgah National Forest and the Blue Ridge Parkway, but these also are scenic areas that are subject to heavy recreational use. Soil compaction and erosion, trampling, and the potential construction of new hiking trails are significant threats to the species' survival.

L. helleri already is listed as threatened by the State of North Carolina, which prohibits intrastate trade in the species without a permit and collecting of the plants without both a State permit and written permission of the landowner. This protection will be reinforced and supplemented by the Federal Endangered Species Act if the FWS listing proposal is made final. An important addition would be the protection of habitat from potentially adverse Federal activities. Such activities could include further construction of recreational facilities, use of aerially-applied chemicals to fight fires, road construction, and permits for mineral exploration if carried out without the species' needs being considered. The FWS will work with the U.S. Forest Service and National Park Service to ensure the conservation of *L. helleri* on Federal lands while accommodating agency objectives to the extent possible. Both agencies have expressed interest in cooperating with the FWS to develop management and recovery plans.

photo by Nora Murdock

Liatris helleri *(Heller's blazing star) is a perennial with one or more arching stems reaching up to 16 inches (40 centimeters) from a tuft of narrow, pale green leaves.*

Comments on the proposal to list *L. helleri* as Threatened are welcome, and should be sent to the Field Supervisor, Endangered Species Field Office, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801, by April 20, 1987.

Three Granite Outcrop Plants

The FWS has proposed listing ***Isoetes melanospora* (black-spored quillwort)** and ***Isoetes tegetiformans* (mat-forming quillwort)** as Endangered species, and ***Amphianthus pusillus* (little amphianthus)** as Threatened (F.R. 2/19/87). All three of these plants are restricted to small pools on granite outcrops in the southeastern U.S.

I. melanospora, a low-growing plant in the quillwort family (Isoetaceae) can be distinguished by its complete velum coverage, dark tuberculate megaspores, and short spiral leaves. *I. tegetiformans* is similar in appearance, but has a mat-forming growth habit of plants interconnected by rhizomes. *A. pusillus* is a monotypic genus of uncertain membership in the snapdragon family (Scrophulariaceae). This diminutive, fibrous-rooted annual has both floating and submerged leaves of different shapes and tiny white flowers. *A. pusillus* is ephemeral, usually completing its entire life cycle within a 3- to 4-week period.

The granite outcrops supporting populations of these plants occur as large, isolated domes or as gently rolling "flatrocks" in the Piedmont physiographic region of the southeast. Because of their scattered distribution and harsh environmental conditions (high light intensities, extreme wet/dry periods), these rock exposures are active sites for plant speciation, as shown by their high degree of endemism. Of the plants endemic to granite outcrops, the three recently proposed species are the most restricted. They grow in shallow, flat-bottomed temporary or vernal pools that are found on the crest and flattened slopes of some unquarried outcrops. Such pools retain water for several weeks following heavy rains and completely dry out in summer droughts. The vast majority of these pools are small, only 0.5 to 1.0 meters

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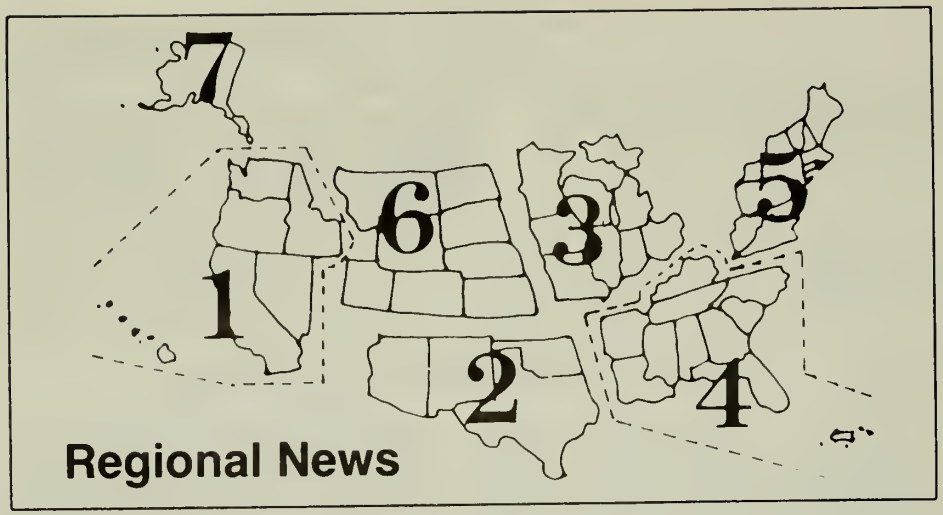

Regional News

Endangered species program regional staff members have reported the following activities for the month of February:

Region 1 — Wintering bald eagles (*Haliaeetus leucocephalus*) seem to be taking more of a liking to an area around Pend Oreille Lake in northern Idaho this season. This year's high count was 429 bald eagles near the southern part of the lake where kokanee (salmon) were spawning. Last winter, the high count was 274, and the birds favored the northern half of Pend Oreille.

* * *

The Fish and Wildlife Service (FWS), U.S. Forest Service, Washington Department of Game, National Park Service, The Nature Conservancy, and numerous volunteers surveyed bald eagle night roosting sites in Skagit County, Washington. Winter concentrations of these birds along the Skagit River corridor are among the highest in the nation. Traditionally, the bald eagle population often exceeds 400 on the Skagit during winter months when the eagles feed on salmon carcasses washed up on sand and gravel bars after spawning.

* * *

On January 5, 1987, the FWS closed on its purchase of the 11,360-acre Hudson Ranch in Kern County, California, for $3.5 million. The ranch was incorporated into the Bitter Creek National Wildlife Refuge, which was established for the Endangered California condor (*Gymnogyps californianus*). This newly acquired acreage will be added to 873 acres already owned by the FWS. The adjacent 1,304-acre Hoag Ranch is also in the process of being acquired by the FWS and should complete most of the planned acquisitions for the refuge.

* * *

In the final report of a 3-year study on the San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*), the shrike population was estimated to be between 19 and 30 adults. In the 1986 breeding season, there were only 24 adults. The population is limited by heavy predation on young and a lack of suitable nest sites. The report recommends removing remaining feral goats, relocating suitable nesting species, and controlling feral cat predation.

* * *

The locally initiated effort to develop a habitat conservation plan for the Marina Dunes ecosystem (Monterey County, California) advanced another step with the selection of a consultant to prepare the plan and associated environmental documents. The plan will address the conservation needs of the Endangered Smith's blue butterfly (*Euphilotes enoptes smithi*) and four species that are candidates for future listing: the black legless lizard (*Anniella pulchra nigra*), Menzies' wallflower (*Erysimum menziesii*), Monterey spineflower (*Chorizanthe pungens* var. *pungens*), and Monterey slender-flowered gilia (*Gilia tenuiflora* var. *arenaria*). In late 1986, the California State Coastal Conservancy approved a matching grant to the city of Marina that will fund up to $50,000 of the costs associated with this planning effort. Local landowners have made a commitment to pay the remainder of the planning costs.

* * *

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Marvin E. Moriarty, *Chief, Office of Endangered Species*
(703-235-2771)
Earl B. Baysinger, *Chief, Federal Wildlife Permit Office*
(703-235-1937)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Stephen W. Parry, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Director;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7:** Alaska **Region 8:** Research and Development nationwide

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NMFS News

Under the Endangered Species Act, the Fish and Wildlife Service shares responsibility for conserving listed species with the National Marine Fisheries Service (NMFS), a separate agency that takes the lead on most sea-dwelling animals. NMFS recently published several notices relating to the Act, and they are summarized below:

A notice of review was initiated February 6 on the status of the Chinese River dolphin (*Lipotes vexillfer*). This aquatic mammal is found primarily in the lower and middle Chang Jiang (Yangzte) River in east-central mainland China. Information contained in a petition from the Center for Environmental Education indicates that this dolphin may qualify for listing under the Endangered Species Act. Further information is requested on this species' status and threats to its survival, and should be sent to the Assistant Administrator for Fisheries, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, Washington, DC 20235, by April 17. NMFS has indicated that it intends shortly to initiate status reviews on all other species of river dolphins worldwide.

In a February 27 notice, NMFS published its determination that listing the winter run of the chinook salmon (*Oncorhynchus tshawytscha*) in California's Sacramento River is not warranted at this time. A listing petition had been submitted by the American Fisheries Society. People wanting a copy of the determination can write to the above address or call 202/673-5348.

Listings Approved for Two Species

During February 1987, final listing rules were published for the following species, a tree and a fish:

Serianthes nelsonii

This large tree is endemic to two of the Mariana Islands in the western Pacific Ocean. A single mature specimen is known to survive on Andersen Air Force Base in the Territory of Guam, where the species is known locally as *hayun lagu*. Approximately 64 are known on the island of Rota, Commonwealth of the Northern Mariana Islands, where the local name is *tronkon guafi*. The future of *S. nelsonii* is imperiled by habitat degradation or destruction, typhoons and other natural or human-related disasters, insect damage, and the cropping of seedlings by introduced deer and pigs. It was proposed for listing as an Endangered species on October 25, 1986 (summary in BULLETIN Vol. XI No. 11), and the final rule appeared in the February 18, 1987, *Federal Register*. The governments of Guam and the Commonwealth of the Northern Mariana Islands, along with Air Force officials, have expressed interest in conserving the species.

Pecos Bluntnose Shiner (*Notropis simus pecosensis*)

Notropis simus historically occurred in the Rio Grande from El Paso, Texas, north through New Mexico to near the site of the Abiquiu Reservoir on the Chama River, and in the Pecos River in New Mexico from the upper reaches of Avalon Reservoir north to above the town of Santa Rosa. Because of habitat loss resulting from water diversion, irrigation, and impoundment, the Rio Grande subspecies, *N. s. simus*, is now extinct, and the Pecos subspecies, *N. s. pecosensis*, has severely declined in numbers. Water demand in the region is increasing, and may cause further reduction in range and population. To help prevent the extinction of the Pecos subspecies, the Fish and Wildlife Service proposed May 11, 1984, to list *N. s. pecosensis* as Threatened and to designate Critical Habitat for it. (See summary in BULLETIN Vol. IX No. 6.)

After extensive review of the comments on the listing proposal, the FWS published the final rule in the February 19, 1987, *Federal Register*. The Critical Habitat areas were reduced from the amounts proposed, and revised maps were printed with the final rule. Current Federal activities affecting the Pecos River are not expected to be incompatible with the Critical Habitat designation.

The State of New Mexico already prohibits take of the Pecos bluntnose shiner except under scientific collecting permit for conservation purposes. Because of this protection, and because habitat loss rather than take is the primary threat to the fish, the final listing rule included a special provision allowing for take without a Federal permit if a State collection permit is obtained and all applicable State laws and regulations are followed.

* * *

These listed species now are protected under the Endangered Species Act, the terms of which are summarized in this BULLETIN at the end of the story on species newly proposed for listing.

Regional News

(continued from page 2)

Staff from the Sacramento Endangered Species Office and the San Francisco Bay National Wildlife Refuge examined two land parcels that are the subject of a proposed land exchange involving the Antioch Dunes National Wildlife Refuge. The proposed exchange would increase the amount of habitat available for the Contra Costa wallflower (*Erysimum capitatum var. angustatum*), Antioch dunes evening primrose (*Oenothera deltoides* ssp. *howellii*), and the Lange's metalmark butterfly (*Apodemia mormo langei*). A number of vertebrates that are candidates for listing proposals (mostly insects) also would benefit from the proposed exchange.

* * *

Region 2 — Razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*) fingerlings were stocked in ponds at the Buenos Aires National Wildlife Refuge in Arizona last fall as part of the recovery effort for these species. Recent measurements of these fish have documented excellent growth. Similar growth was shown for razorback sucker fingerlings stocked on the Imperial National Wildlife Refuge, also in Arizona. The encouraging results highlight the potential for using refuge waters as supplemental sites for raising Endangered fishes prior to eventual reintroduction into native waters.

* * *

A project is under way to establish two new populations of Texas snowbells (*Styrax texana*) in the hilly Edwards Plateau, west of San Antonio. If successful, the project will more than triple the currently known 39 plants and place Texas snowbells well on the road to recovery. The San Antonio Botanical Garden will coordinate the effort with help from the FWS, the State of Texas, and private landowners. Seedlings raised at the botanical garden will be planted at sites to be selected this spring.

Seedling production at the garden has been very successful; over 85 percent of the seed produced seedlings after receiving 4 to 6 weeks cold treatment. Various regimes will be used to determine the most successful planting techniques. The new populations will be monitored for 5 years.

* * *

At the end of January, the presence of a juvenile whooping crane (*Grus americana*) with several thousand sandhill cranes (*G. canadensis*) was confirmed in western Oklahoma. In mid-February, the bird moved north to Quivira National Wildlife Refuge in Kansas. On February 20, it was again in western Oklahoma with about 10,000 sandhill cranes.

This was the smallest fledgling-age bird color-banded in Canada in August. It apparently became separated from its parents during migration. Both parents arrived at Aransas National Wildlife Refuge in December. Discovery of the chick means all 21 chicks present in Canada in August have survived into winter. Average chick survival from August to December is typically about 70 percent.

* * *

(continued on page 7)

Endangered Gray Bat Benefits from Protection

by Merlin D. Tuttle
President, Bat Conservation International

The Endangered gray bat (*Myotis grisescens*) was once one of the most abundant mammals of the southeastern U.S. People in at least five States, especially Alabama, Tennessee and Missouri, viewed hundreds of thousands passing over in great columns each summer evening. These bats also played an important role in the checks and balances of nature as the primary controllers of night-flying aquatic insects, including mosquitos. Single colonies consumed literally tons nightly.

Until the arrival of man, caves remained the secure bastions of this dominant species. Problems apparently began when aboriginal tribes first camped or lived in the entrances of large caves. Some gray bats likely perished through suffocation when smoke from fires penetrated their previously safe living quarters, while others apparently ended up in Indian stew pots. Nevertheless, the majority remained out of reach in deep, dark caves.

It was modern man that made the real difference. During the Civil War, guano for gun powder was extracted from nearly every substantial gray bat cave in the South. Large guano accumulations in these caves undoubtedly prolonged the war by providing a reliable source of saltpeter long after importation had been cut off. Without a doubt, gray bat colonies suffered some of the biggest losses of the Civil War.

Following the war, the gray bat, a highly resilient species, once again was able to prosper, as evidenced by the conspicuous replacement of large guano deposits in most formerly occupied caves. Modern man had arrived, but he, for the most part, still feared and avoided the dark inner reaches of caves.

Early Studies

My personal introduction to gray bats occurred when my family moved to Knoxville, Tennessee, and lived near Baloney Cave. I soon joined high school friends in exploring this and other caves, quite unaware of the potential harm that could result to bats from our often poorly timed trips. I was particularly fascinated by the spring and fall appearance of several thousand gray bats that would mysteriously disappear in only a few days.

My fascination quickly grew, eventually leading me to search out and visit 120 gray bat caves in six States, while banding 40,182 of these bats in a study that spanned 20 years.[1] I learned that they are highly selective and require unique cave types, using 0.1 percent of available caves in winter and 2.4 percent in summer.[2] At least 95 percent of the entire known species population hibernates each winter in just nine highly vulnerable caves, with more than half in a single cave.[3]

Undisturbed colonies typically contain tens of thousands of individuals, sometimes hundreds of thousands.[2] More than any other American mammal, they require caves year-round. For their size, they are among the world's slowest reproducing mammals. Mothers usually do not produce their first offspring until they are two years old and require five years to leave just two that survive.[3] Furthermore, large numbers, often many thousands, are required in order to share the cost of heating a roost. When numbers fall too low, growth of young bats slows unacceptably, and the remaining colony dies out, leading to a threshold phenomenon sometimes referred to as the "passenger pigeon effect."[3,4]

By the late 1950's, the popularity of cave exploration was rapidly increasing. Unfortunately, one of my earliest observations was that the frequency of human visitation of caves was highly correlated with the disappearance of gray bat colonies. In the early 1960's I often found vast quantities of guano in caves that obviously had not been occupied by bats for several years. At first, I, like others who explored caves, believed that the bats had simply moved to other caves.

However, given their highly specific roost needs, few colonies have suitable options. Caves not already occupied are too warm or too cold, located too far from feeding areas, lack appropriate roost surfaces, are too vulnerable to predation, or are too disturbed by people. In fact, my banding studies documented that evicted colonies seldom survive.[2]

For example, when Hambrick Cave, near Guntersville, Alabama, became heavily disturbed by people, its large gray bat nursery colony disappeared within a year. A high proportion of these bats were banded, enabling me to trace their survival. Through banding studies, I already had established their seasonal movement patterns and also had documented loyalty for life to whichever hibernating cave was selected in their first winter. After losing their nursery cave, these bats disappeared from their traditional hibernating caves, demonstrating that they had not survived by merely moving to another summer cave.[5]

Decline Documented

Seeing such dramatic losses, and realizing how needless most were, I became alarmed and determined to do something. First, I needed clear documentation of the extent and causes of decline. In 1976, I revisited each of the 22 colonies (from the original 120) that I believed would be least likely to have declined since my last census in 1970. Even these colonies had declined by an average of 54 percent in just six years![2] If all 120 colonies had been censused, I likely would have found that most had disappeared entirely, as shown in a similar survey in Kentucky.[6] The few that had escaped human disturbance remained stable, while hundreds of thousands had disappeared from the most heavily disturbed sites. The relationship between human disturbance and colony decline was undeniable.[2]

I sampled guano from these caves and sent it to Dr. Don Clark at the Patuxent Wildlife Research Center for pesticide residue analysis. Several colonies showed potentially dangerous levels of toxins, ranging from organochlorine pesticides to polychlorinated biphenyls (PCB's) and lead, but the influence of human disturbance completely overshadowed our ability to assess any measurable impact from toxins.[2] By this time we knew that pesticides were killing some gray bats,[7] but probably not as many as had died from roost disturbance by people.[2,8]

Protection Provided

Regardless of why, it was clear that gray bats were seriously endangered. At my request, the U.S. Fish and Wildlife Service officially listed them in 1976. Although most conservation organizations were not yet ready to help anything as unpopular as bats, the Tennessee Valley Authority responded to my requests for assistance and played a leading role in saving these bats. Within two years, they had funded a major study of foraging habitat and had provided excellent protection for such vitally important sites as Hambrick and Nickajack Caves, where past nursery colonies likely totaled at least a half million or more.

The Fish and Wildlife Service soon acquired and protected Blowing Wind and Cave Springs Caves, where past nursery populations exceeded a total of half a million gray bats, and New Fern Cave, site of the world's largest known hibernating bat population which alone sheltered an estimated 1.5 million gray bats as recently as 1969. The Nature Conservancy, with Bat Conservation International's (BCI) assistance, acquired and protected Judges Cave, housing the most important remaining nursery colony in Florida, and Hubbards Cave in Tennessee (See *BATS*, December 1985). Hubbards is one of the species' three most important hibernation sites. State non-game wildlife programs

also played important roles in gray bat protection, especially in Florida, Missouri, Arkansas and Tennessee.

Success

It has been argued that remnant populations of Endangered bats likely could not reestablish themselves, even if provided adequate protection from human disturbance. Therefore, it is exciting to report enormous success over the first nine years of protective efforts for the gray bat. For example, of the four protected summer caves (Hambrick, Nickajack, Cave Springs, and Blowing Wind), three had entirely lost their nursery colonies by 1976, and Blowing Wind had been reduced to bachelor use by approximately 128,000 bats, only a fraction of former numbers. With protection, all four caves are now occupied by large nursery colonies that totaled 692,000 in 1985.[9] Without protection, it is unlikely that any of these bats would exist today, yet they alone consume nearly a million pounds of insects over Alabama and Tennessee reservoirs each summer. (Hubbards and New Fern Caves are extremely difficult to census accurately, hence their omission from regular censusing.)

Increasing cooperation from organized caving groups is encouraging. For example, the Tennessee Cave Survey now includes identification of sensitive bat caves and dates when they can and cannot be visited without harm to bats. Education of the public and cooperation between professional cavers and management agencies also is on the increase.

In most cases, gray bats apparently can be reestablished even where pesticides have been implicated as especially problematic, as was well demonstrated at Cave Springs Cave. Guano samples from this site contained the most pesticides and other pollutants of any examined,[11] yet simple protection from disturbance permitted colony reestablishment. Thousands of these bats apparently died of poisoning this summer, so it cannot be said that toxins are no threat, just that they are not yet an insurmountable obstacle.[9]

A remaining concern is that gates to prevent untimely human intrusion into caves can cause more harm than good, when improperly designed. We now know that gates must allow adequate fly-over space to be tolerated by gray bat nursery colonies.[2,10] Some early gates must be removed, as they are excluding bats from formerly important roosts. Fences generally have been effective only where adequate patrolling, signs, and law enforcement were provided, though signs alone have helped in some cases, especially where there are cooperative landowner agreements. Gray bat intolerance of full gates at nursery caves continues to be a major obstacle, though properly designed gates at hibernating sites, such as the one at Hubbards Cave, seem to be working well. (*Editor's note: see BULLETIN Vol. X No. 12.*)

Photo by Merlin D. Tuttle

hibernating gray bats on the ceiling of Hubbard's Cave

Unfortunately, many gray bat nursery caves and some important hibernation sites remain unprotected. In many of these, colonies already are gone or continue to decline rapidly. Much remains to be accomplished before the gray bat and others are truly safe.

Note: BCI members, Bob Currie and Fred Bagley of the U.S. Fish and Wildlife Service, and Ralph Jordan (Project Manager, Streams, Trails and Natural Heritage, Tennessee Valley Authority), deserve special credit for much of the success in saving gray bats. I thank them and the many other individuals and organizations who have helped.

References

1. Tuttle, M.D. 1976. Population ecology of the gray bat (*Myotis grisescens*): Philopatry, timing and patterns of movement, weight loss during migration and seasonal adaptive strategies. Occ. Pap. Mus. Nat. Hist., Univ. Kans., 54:1-38.
2. Tuttle, M.D. 1979. Status, causes of decline and management of endangered gray bats. J. Wildl. Manage., 43:1-17.
3. Brady, J., T.H. Kunz, M.D. Tuttle and D. Wilson. 1982. Gray bat recovery plan. U.S. Fish & Wildl. Serv., Denver, CO, 17 pp & 5 appendices.
4. Tuttle, M.D. 1975. Population ecology of the gray bat (*M. grisescens*): factors influencing early growth and development. Occ. Pap. Mus. Nat. Hist., Univ. Kans. 36:1-24.
5. Stevenson, D.E., and M.D. Tuttle, 1981. Survivorship of the endangered gray bat (*M. grisescens*). J. Mamm., 62:244-257.
6. Rabinowitz, A., and M.D. Tuttle. 1980. Status of summer colonies of the endangered gray bat in Kentucky. J. Wildl. Manage., 44:955-960.
7. Clark, D.R., Jr., R.V. LaVal and S.M. Swinford. 1978. Dieldrin-induced mortality in an endangered species, the gray bat (*M. grisescens*). Science, 199 (4335): 1357-1359.
8. Clark, D.R. 1981. Bats and environmental contaminants: A review. U.S. Dept. of Interior, Fish & Wildl. Serv., Special Sci. Rept.—Wildlife No. 235, 27 pp.
9. Bagley, F. Unpublished U.S. Fish & Wildlife Service Censuses.
10. Tuttle, M.D. 1977. Gating as a means of protecting cave dwelling bats. Pp. 77-82 *in* Natl. Cave Manage. Sympos. Proceedings, 1976. (T. Aley and D. Rhodes, eds.), Speleobooks, Albuquerque, NM, 146 pp.
11. Clark, D.R. Personal communication.

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$5,000 Reward Paid in Grizzly Bear Case

A Montana man who led Federal and State wildlife agents to an illegally-killed grizzly bear (*Ursus arctos*) and helped them convict the poacher received a $5,000 reward January 2 from the National Fish and Wildlife Foundation and the U.S. Fish and Wildlife Service (FWS). Grizzly bears in the 48 conterminous States currently are listed by the FWS as Threatened, a classification that gives them protection under the Endangered Species Act. The FWS paid $3,000 of the reward and the Foundation contributed $2,000.

Chip Collins, director of the Foundation, said that the Foundation plans to pay more rewards in the future. "Because of the importance of deterring illegal killing of protected species such as grizzly bears, the National Fish and Wildlife Foundation will be establishing a reward fund for people who provide information about wildlife law violations that lead to convictions and enhance the recovery of endangered and threatened species." The non-profit National Fish and Wildlife Foundation is a private, independent organization established by Congress in 1984 to help raise funds to support high-priority fish and wildlife conservation programs.

The investigation began in September 1985, when the recipient overheard that another man had illegally killed an adult male grizzly bear in a portion of the Flathead National Forest, Montana, that is closed to grizzly hunting. He gave the information to officers with the FWS and the Montana Department of Fish, Wildlife, and Parks, and provided information on the location of the bear hide, skull, and skeleton. He later flew into the wilderness area with officers and helped them locate the remains of the illegally-taken bear.

As a result, the poacher, another Montana resident, was charged in U.S. District Court in Helena, Montana, with one count of illegal take of a Threatened species and a second count of possession and transportation of an illegally-taken grizzly bear. Through a plea arrangement, he pleaded guilty to the second count and was fined $8,500 and placed on 2 years' probation. This is the largest fine ever assessed against an individual for transportation and possession of an illegally-taken grizzly bear.

Proposed Listings

(continued from page 1)

square, and they are rare even in the best localities.

All three plants have declined significantly in range due to habitat degradation. Their presence on granite outcrops makes them particularly vulnerable to quarrying; 38 percent of historically known *I. melanospora* populations, for example, have been lost to this activity. Rock outcrops also are popular recreational sites. Many of the pools supporting the proposed plants have been damaged by off-road vehicle (ORV) use, especially as the result of increased erosion, and some of the plants have been crushed or uprooted directly. Other damage to the fragile habitat has resulted from such vandalistic activities as littering and fire building. The mere rearrangement of stones in two pools caused a decline in two populations of *A. pusillus* and *I. melanospora*. Because granite outcrops often are enclosed in pastures, some populations of all three plants also have been damaged by trampling and nutrient overload in the pools.

A. pusillus and *I. melanospora* are listed under Georgia State law as endangered, a classification that prohibits the take of these plants from public lands without a permit and regulates intrastate sale and transport in these species. Georgia law, however, does not provide for protection against habitat destruction, which is the main threat. The existing protection will be strengthened if the FWS listing proposal is made final.

Comments on the proposal to list *Amphianthus pusillus* as Threatened and *Isoetes melanospora* and *I. tegetiformans* as Endangered should be sent to the Endangered Species Field Station, U.S. Fish and Wildlife Service, Jackson Mall Office Center, Suite 316, 300 Woodrow Wilson Avenue, Jackson, Mississippi 39213, by April 20, 1987.

* * *

photo by Cary Norquist

Amphianthus pusillus *and* Isoetes melanospora *occur at this pool (which is much larger than most) in De Kalb County, Georgia, but some plants may have been destroyed when vandals constructed the thin rock "peninsula."*

Available Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act as Threatened or Endangered is approved are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the FWS to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the FWS. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "confer" with the FWS, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own laws against take of listed plants.

Regional News

(continued from page 3)

From the total of 29 thick-billed parrots (*Rhynchopsitta pachyrhyncha*) that were released in the Chiricahua Mountains of southeastern Arizona in September and October, 13 birds remain. The 8 parrots that disappeared in November may have overwintered in Mexico.

* * *

The Bureau of Reclamation's 4-year Arizona Bald Eagle Study, conducted by Biosystems Analysis, Inc., of Santa Cruz, California, is now under way. The study is designed to identify limiting factors to the population and has already yielded new information about the winter foraging ecology of a pair in the Pinal territory. A breeding adult female living at the Pinal territory has been captured and radio-collared. This pair began incubating their eggs on January 26. The research team will soon resume trapping efforts with the goal of attaching radios to a minimum of 12 breeding adults, including members of 8 pairs.

* * *

Region 4 — The Indiana bat (*Myotis sodalis*) population has declined by approximately 50 percent at Stillhouse Cave in Kentucky, according to a survey conducted by the Asheville, North Carolina, Endangered Species Field Office. No reason for the decline was readily apparent during the survey. Stillhouse Cave is a priority Indiana bat hibernaculum.

The Virginia big-eared bat (*Plecotus townsendii virginianus*) population has increased by about 900 individuals since the last survey was conducted 2 years ago, for a current population of approximately 3,600. Twenty-five percent of the known population of this big-eared bat subspecies is located at Stillhouse Cave. Cave Conservation International has agreed to construct gates at Rocky Hollow Cave in southwestern Virginia and at a U.S. Forest Service cave in West Virginia. Rocky Hollow Cave, which will be gated in July, is used as a hibernating site by Indiana bats. The West Virginia cave, scheduled to be gated soon, is an important site for Virginia big-eared bats.

* * *

Biologists from the Florida Department of Natural Resources, Jacksonville Endangered Species Field Office, FWS Sirenia Project, and a grassbed ecologist from the National Marine Fisheries Service's Beaufort Laboratory met at Hobe Sound, Florida, in January to plan the implementation of a 5-year study. Hobe Sound is a major feeding site for many of the 200 to 270 manatees (*Trichechus manatus*) that winter at the Florida Power and Light's power plant in Riviera Beach, approximately 18.5 miles to the south. The study is designed to evaluate the status of the grassbeds and the comments to a proposed no-wake regulation to protect grassbeds. Excessive turbidity caused by hundreds of large boats moving through the area in the fall and spring months is thought to be adversely impacting this critical manatee feeding area.

* * *

Representatives from the FWS Caribbean Field Office attended the January meeting of the Puerto Rican parrot (*Amazona vittata*) working group. Significant issues discussed included budgetary problems relating to proposed funding, delays in the construction of the Rio Abajo aviary, and safety issues related to increasing criminal activity in the Caribbean National Forest. Agreement was reached between FWS Patuxent Wildlife Research Center and National Audubon Society representatives on a volunteer program to conduct essential nest-guarding activities. In addition, there was agreement on a 1-year management policy to maximize the captive breeding stock.

* * *

An in-house team of three taxonomists has been appointed to evaluate data compiled on the silver rice rat (*Oryzomys argentatus*). The FWS postponed action last year to list the silver rice rat as Endangered because questions arose as to whether it was a distinct species or the same animal as the common rice rat that occurs throughout Florida. Based on the team's findings, the FWS will determine whether or not to give the silver rice rat Endangered Species Act protection. A report from the team is expected sometime in late May or early June. The silver rice rat is reported only from the lower Florida Keys.

* * *

Region 5 — On January 13, a meeting was held in Asheville, North Carolina, with representatives of eastern States involved in peregrine falcon (*Falco peregrinus*) recovery activities. Items discussed at the meeting included the 1986 nesting and productivity survey, 1987 release activities, 1987 funding outlook, nest manipulation, captive breeding outlook, and overall coordination of recovery activities in Regions 4 and 5.

* * *

A meeting hosted by the Environmental Protection Agency (EPA) was held on February 5 in Atlanta, Georgia, to discuss FWS pesticide consultation responsibilities under Section 7 of the Endangered Species Act. The EPA demonstrated a willingness to accommodate the endangered species concerns of FWS and outlined how both agencies could work together effectively.

* * *

Region 6 — The Utah Native Plant Society has funded a study on the ecology of the Endangered dwarf bear-poppy (*Arctomecon humilis*) near St. George, Utah. The study will address needs identified in the recently completed Bureau of Land Management's Dwarf Bear-Poppy Management Plan and the FWS' Dwarf Bear-Poppy Recovery Plan. The Bureau of Land Management will provide technical and financial assistance to the project. Utah State Division of Lands and Forestry (which owns and manages over half the species' habitat) and FWS personnel will support the research effort with limited technical and field assistance.

* * *

An informal interdisciplinary Montana Piping Plover Recovery Committee was organized in Montana in the spring of 1986. This group of biologists, ornithologists, and interested lay persons will meet at least once a year to organize searches for piping plovers (*Charadrius melodus*) and select geographic areas of responsibility for members to search.

During the 1986 breeding season, 20 piping plover nests were located in four of seven areas of potential or known habitats searched in northeastern Montana. Ten plover nests were found on Medicine Lake National Wildlife Refuge and the Northeast Montana Wetland Management District, six nests were located on Dry Arm of Fort Peck Reservoir, Charles M. Russell National Wildlife Refuge, and four nests were found at Nelson Reservoir near Malta, Montana. Additional pairs of plovers were noted at Fort Peck Reservoir, but nests were not located.

Data have been compiled and entered into an electronic data base. For a copy of the 1986 survey results in northeastern Montana, contact the U.S. Fish and Wildlife Service, Endangered Species Field Office, Federal Building and U.S. Courthouse, 301 S. Park, P.O. Box 10023, Helena, Montana 59626.

* * *

Region 7 — Last month, the regional office reported that approximately 20 Endangered Aleutian Canada geese (*Branta canadensis leucopareia*) died from avian cholera at the Modesto, California, oxidation ponds, a traditional roosting area for Aleutian geese in the San Joaquin Valley. Although action was taken to haze the geese from the affected area, several more dead Aleutian geese have been recovered. Dr. Nancy Thomas of the FWS National Wildlife Health Lab in Madison, Wisconsin, now reports that a total of 47 Aleutian geese have died from avian cholera in California during January and February of this year. An additional two geese that apparently died of lead poisoning also were recovered.

Although the wintering flock has begun to move northward toward Crescent City, where they stage prior to spring migration, cholera has periodically been reported from this area as well. Numbers of Aleutian geese in the Crescent City area are expected to reach a peak between late March and mid-April. Their movements

(continued on page 8)

Regional News

(continued from page 7)

and health will be closely monitored. The loss of 49 birds amounts to about one percent of the total population in the wild.

* * *

Region 8 (Research) — Two southern FWS cooperative research units are engaged in research projects related to the green pitcher plant (*Sarracenia oreophilia*). The Mississippi Cooperative Fish and Wildlife Research Unit, in a study of pitcher plant colonies, has developed a list of 329 associated plant species (including 282 vascular plants and 47 bryophytes). Baseline information has been collected on all known green pitcher plant colonies in Alabama, Georgia, and a recently discovered location in North Carolina. Communities will be monitored and the list will be refined to designate indicator species as the study continues. Information collected will be incorporated into the Green Pitcher Plant Recovery Plan.

In another study, green pitcher plants were transplanted into suitable sites and monitored during the subsequent growing season. From this effort, the Mississippi Unit reached the conclusion that it is economically feasible to transplant this species. Long-term monitoring is continuing to determine whether or not the plants will reproduce at the new site.

The Alabama Cooperative Fish and Wildlife Research Unit is producing two slide-tape shows on the green pitcher plant and its habitat, based upon information needs identified by the Office of Information Transfer. These modules will stimulate interest in protecting, preserving, and enhancing the remaining pitcher plant bogs in the southeastern United States. One version will be for general audiences, while the other slide-tape will include semi-technical information of interest to resource managers. Currently in review, the final products are expected to be available by summer. Copies will be available for loan; information on how to order these products will be provided when the presentations are completed.

* * *

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	26	20	242	5	0	22	315	23
Birds	61	16	141	3	2	0	223	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	22	6	0	82	43
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	21
Crustaceans	4	0	0	1	0	0	5	1
Insects	8	0	0	5	0	0	13	12
Plants	118	6	1	26	3	2	156	54
TOTAL	295	52	466	80	15	37	945	243**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 209
Number of species currently proposed for listing: 27 animals
31 plants

Number of Species with Critical Habitats determined: 96
Number of Cooperative Agreements signed with States: 47 fish & wildlife
26 plants

February 28, 1987

March 1987 Vol. XII No. 3

ENDANGERED SPECIES

Technical Bulletin Department of Interior U S Fish and Wildlife Service
Endangered Species Program, Washington, D C 20240

April 1987 Vol. XII No. 4

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Texas Fish, Considered Extinct, is Proposed for Delisting

The Amistad gambusia (*Gambusia amistadensis*), a small fish known from a single spring in Val Verde County, Texas, is widely considered to be extinct. Accordingly, the Fish and Wildlife Service (FWS) recently proposed to remove it from the list of Endangered and Threatened wildlife (F.R. 3/11/87).

The original description of *G. amistadensis* was based on specimens collected in 1968 from Goodenough Spring, a tributary of the Rio Grande, just prior to its inundation by the rising Amistad Reservoir. They were not recognized as members of a distinct species until well after construction of Amistad Dam, a U.S. Army Corps of Engineers project, had begun. The impoundment put the spring under more than 70 feet (21 meters) of silty water, changed water temperatures, and eliminated the shoreline aquatic vegetation inhabited by the gambusia from the spring area. By 1973, when the species was formally described, it was already extinct in its native habitat. *G. amistadensis* was listed as an Endangered species in 1980, at which time it occurred only in captivity at the University of Texas in Austin and at Dexter National Fish Hatchery in New Mexico. Since that time, all captive populations have died or have been eliminated through hybridization with, and predation by, the mosquitofish (*Gambusia affinus*).

* * *

Comments on the proposal to remove the Amistad gambusia from its Endangered classification are welcome, and should be sent to the Regional Director, Region 2 (address on page 2 of this BULLETIN), by May 11, 1987.

National Marine Fisheries Service Proposes Shrimp Fishing Industry Use of Turtle Excluder Devices

Gloria Thompson
Office of Protected Species and Habitat Conservation
National Marine Fisheries Service

In the March 2, 1987, *Federal Register*, the National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce proposed rules that would require shrimp trawlers in the Gulf of Mexico and in the Atlantic Ocean off the coast of the southeastern United States to use approved gear in specified locations and at specified times in order to reduce incidental captures of Endangered and Threatened sea turtles in shrimp trawls.

These proposed rules had been jointly recommended to NMFS by representatives of affected shrimpers and several environmental groups as offering the best prospect for reducing incidental sea turtle drownings as near to zero as possible while avoiding, to the greatest extent possible, adverse economic effects on the shrimp fishing industry. They contain criteria and procedures for testing and approving turtle excluder devices (TEDs), specify areas and seasons in which approved TEDs must be used, extend current reporting requirements, extend existing measures for resuscitation and release of captured sea turtles, continue current designations of Critical Habitat, and state the Departmental enforcement policy with respect to violations of the Endangered Species Act (ESA) and these rules.

All five species of sea turtles (loggerhead, Kemp's ridley, green, leatherback, and hawksbill) found in marine waters off the southeastern U.S. and the Gulf of Mexico are protected by the ESA. (NMFS has legal authority over sea turtles in the water and the Fish and Wildlife Service has authority when they are on land.) One threat facing these species is that many are caught in shrimp trawls. Based on observer data, NMFS estimates that annually 47,973 are incidentally caught, and that 11,179 of them die. An estimated 767 Kemp's ridleys alone are killed each year by the off-shore shrimp fleet in the southeastern U.S. This species is in the greatest peril of extinction; its nesting numbers have dwindled from an estimated 40,000 in one day in 1947 to an annual estimate of 572 in 1986 (due to a number of factors).

Stranding Data

Some sea turtles that die in U.S. waters wash toward shore and are found stranded in coastal areas. Because of the protected status of the species, a need to collect information about the species, and interest from the public, NMFS, in cooperation with the States, established a volunteer network in 1979 to patrol coastal U.S. beaches and report on strandings. From January 1980 through December 1986, 8,317 marine turtles (excluding those from the NMFS "headstart" program) were reported as stranded.

Often it is impossible to determine the cause of death of a stranded turtle. Not all of the sea turtles that strand can be attributed to shrimp trawling; however, there often is a correlation between the level of strandings and major shrimping efforts. This correlation has been documented by scientists and Sea Turtle Stranding and Salvage Network personnel from South Carolina to Florida, as well as Louisiana and Texas. Stranding reports tend to corroborate the data from direct capture observations, and together they indicate that shrimp trawling is a significant source of sea turtle mortality.

Gear Research

In 1978, NMFS initiated a research program to develop gear that would reduce the mortality of sea turtles associated with shrimp trawling. Other project goals were to prevent significant shrimp loss and to minimize the economic impacts on

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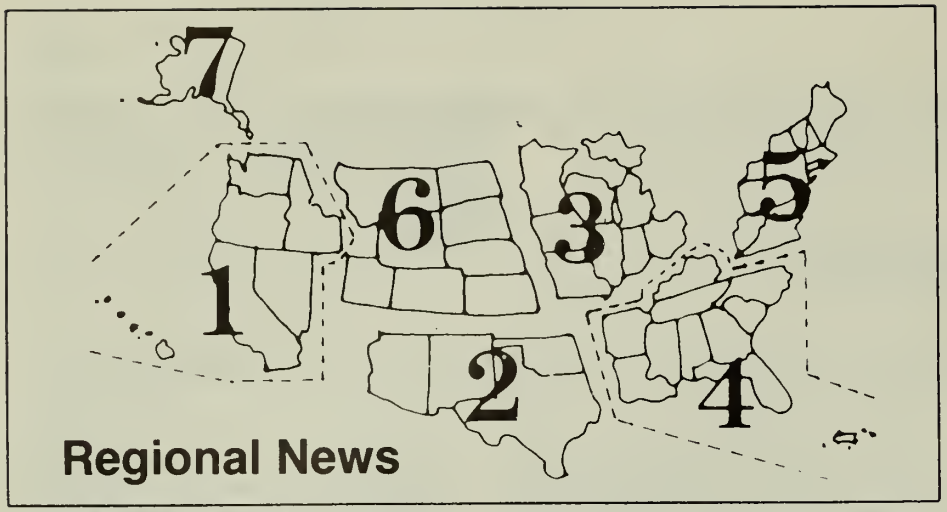


Regional News

Endangered species program regional staff members have reported the following activities for the month of March:

Region 1 — The Fish and Wildlife Service's (FWS) Sacramento Endangered Species Office (SESO) met with representatives of the California Department of Fish and Game, Bureau of Land Management, and Chevron U.S.A. in February regarding a proposed 27-square mile seismic exploration project. The proposed action involves systematically drilling 700-foot test holes and setting off 50-pound charges of dynamite to determine a potential for oil and gas reserves. It may affect three federally-listed Endangered species, the San Joaquin kit fox (*Vulpes macrotis mutica*), blunt- nosed leopard lizard (*Gambelia silus*), and giant kangaroo rat (*Dipodomys ingens*). Chevron U.S.A. will conduct initial searches for occurrence of these species. Possible mitigation includes avoidance of kit fox dens and giant kangaroo rat colony sites; use of a minimum 200-foot buffer to prevent burrow collapse from seismic explosion; implementation of an employee training program; limiting vehicles to existing roads; rehabilitation of disturbed habitats; and construction of barriers, fences, and gates after project actions to minimize future off-road vehicle use.

The Bureau of Land Management and Department of Energy, as the Federal permitting agencies, will be consulting formally with the FWS on this project.

* * *

Sand City, California (Monterey County), has proposed to rezone and redevelop coastal and dune habitats that may contain Endangered Smith's blue butterflies (*Euphilotes enoptes smithi*). Smith's blue butterflies have been collected from sand dune habitats in Sand City as recently as July 1986. The SESO informed the city about the prohibitions in the Endangered Species Act regarding incidental take of listed species and the regulatory process that has been established for issuing permits to authorize such incidental take.

* * *

Pursuant to stipulations on a U.S. Army Corps of Engineers permit and recommendations made through formal consultation for the filling of 180 acres of wetlands at Oakland Airport, the SESO is working with other agencies to develop a management agreement with the Port of Oakland. This agreement will provide for a secure California least tern (*Sterna antillarum browni*) nesting colony. The other involved agencies include the San Francisco Bay Conservation and Development Commission, California Department of Fish and Game, and the Federal Aviation Adminstration.

* * *

SESO and FWS Ecological Services personnel met with the Environmental Protection Agency, California Department of Fish and Game, and San Francisco Water Department to resolve a recent illegal filling and destruction of wetland habitat believed to support the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). The site has been completely bulldozed and drained, eliminating 6 to 10 acres of former wetland habitat. The Water Depart-

(continued on page 2)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
John Christian, *Acting Chief*
Office of Endangered Species
(703-235-2771)
Earl B. Baysinger, *Chief*,
Federal Wildlife Permit Office
(703-235-1937)
Clark R. Bavin, *Chief*,
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director*; David F. Riley, *Assistant Regional Director*; Wayne S. White, *Endangered Species Specialist*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director*; Conrad A. Fjetland, *Assistant Regional Director*; James Johnson, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director*; John S. Popowski, *Assistant Regional Director*; James M. Engel, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; John I. Christian, *Assistant Regional Director*; Marshall P. Jones, *Endangered Species Specialist*.

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director*; Stephen W. Parry, *Assistant Regional Director*; Paul Nickerson, *Endangered Species Specialist*.

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director*; John D. Green, *Assistant Regional Director*; Barry S. Mulder, *Endangered Species Specialist*.

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director*; Jon Nelson, *Assistant Regional Director*, Dennis Money, *Endangered Species Specialist*.

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff*; Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7:** Alaska **Region 8:** Research and Development nationwide

The ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

White Bladderpod Listed as Endangered Plant

The white bladderpod (*Lesquerella pallida*), an annual plant in the mustard family (Brassicaceae), has been listed by the Fish and Wildlife Service (FWS) as Endangered (F.R. 3/11/87). This species currently is known only from three populations in San Augustine County, Texas, where it is restricted to wet, open areas associated with the Weches geological formation. All three populations occur on privately owned pasture lands, although one extends onto a county road right-of-way. *L. pallida* was proposed for listing as an Endangered species on April 9, 1986 (see summary in BULLETIN Vol. XI No. 5), because of the potential threats posed by increased grazing, herbicide application, road maintenance or widening, and encroachment by more aggressive plants.

Among the benefits provided for listed plants by the Endangered Species Act are protection from adverse effects of Federal activities, prohibitions on interstate/international trafficking, the requirement for the FWS to develop and implement a recovery plan, and the authorization to seek land exchanges or purchases to protect important habitat. Listing also lends greater recognition to a species' precarious status, which can encourage additional conservation efforts by State and local agencies, various organizations, and individuals.

Regional News

(continued from page 2)

ment has informally agreed to restore the wetland habitat. In addition, it will propose to secure additional wetland habitat off-site to compensate for the interim loss of habitat.

* * *

The SESO staff and the Bureau of Land Management have prepared a report to Congress on the proposed Carrizo Natural Heritage Reserve. The 180,000- acre reserve would secure habitat in perpetuity for the Endangered San Joaquin kit fox, blunt- nosed leopard lizard, giant kangaroo rat, and California condor (*Gymnogyps californianus*), as well as several Federal candidates and State-listed species. The project would be funded through a combination of Land and Water Conservation Fund allocations, land exchanges, and private contributions. About 25,000 acres currently are in public ownership.

* * *

A multi-agency team, including representatives of the FWS Boise, Idaho, Field Office and the Idaho Department of Fish and Game, has captured 26 caribou (*Rangifer tarandus*) in British Columbia using helicopters and net guns. They were thoroughly checked for any signs of health problems before being transported to the release site northeast of Bonners Ferry, Idaho, to augment the Endangered Selkirk Mountain herd. (Two of the animals died while being held, but the other 24 were released in apparently good health.) All 24 were radio-collared. Once the caribou have settled down in their new location, students at various Idaho elementary schools will be allowed to name and adopt a caribou. The Idaho Department of Fish and Game will issue weekly reports that will enable the students to track the movement of their special animal.

Region 2 — Due to efforts by FWS Williams Creek National Fish Hatchery (NFH) personnel, fingerling Apache trout (*Salmo apache*) will be available for reintroduction this fall. The Apache trout is a Threatened species native to the White Mountains of Arizona. In 1975, the species was reclassified from Endangered to Threatened and special regulations were written that allowed for their limited take. The hatchery project began in 1983, when eggs were taken from wild Apache trout and reared in William Creek NFH. This spring, hatchery-reared trout spawned for the first time, providing 100,000 eggs that will produce about 50,000 fingerlings for reintroduction.

The hatchery culture of the Apache trout has been extremely successful due to the innovative culture techniques employed by the hatchery's Assistant Manager, Bob David. David designed a feeding system that simulated drift feeding, automatically providing fry-sized fish with brine shrimp. As the fish grew, they were gradually weaned from the shrimp with pelleted feed. The fingerlings thus produced will be used this fall to stock reaches of reclaimed streams on the Fort Apache Indian Reservation and Apache-Sitgreaves National Forest. Eventually, Apache trout may replace introduced rainbow trout (*Salmo gairdneri*) as the sport fish throughout much of the former's historical range.

* * *

The Secretary of Fisheries for the Republic of Mexico has initiated an immediate program to institute use of the Turtle Excluder Device (TED) in all shrimp trawls fishing in Mexican waters of the Gulf of Mexico. There will be no exemptions for TED use in waters under Mexican jurisdiction. (A proposal now under consideration for TED use in U.S. waters would allow for several types of exemptions depending on seasons and depths where fishing occurs.) The Tampico shrimp fleet has been designated as the first fleet to be equipped with and to use TEDs. The Campeche fleet will follow upon completion of the Tampico effort.

The Secretary stated that this action is a further step in supporting the President of Mexico's recent designation of 15 sea turtle nesting beaches as sea turtle sanctuaries. This action will further establish Mexico as one of the world's leading nations in the management and conservation of sea turtle resources. The Secretary also stated that he hopes neighboring nations will take similar actions in recognition of the need for international cooperation in the management of sea turtle resources.

* * *

The Whooping Crane Recovery Team met in Albuquerque March 10 and 11 and participated in a tour of the Middle Rio Grande Valley on the 12th. Recovery activities since the March 1985 meeting were reviewed and plans made for team participation in key future events. Dr. James Lewis, FWS Whooping Crane Coordinator, was banquet speaker at the 4th Annual Whooping Crane Festival in Monte Vista, Colorado, and he participated in other festival weekend events.

Ten whooping cranes were still present at Bosque del Apache National Wildlife Refuge on March 8. Whooping cranes have typically left New Mexico and migrated into Colorado by late February. Most whooping cranes had left New Mexico by March 11. The record late northward departure date was believed to be due to late winter storms, abundant foods still available at the Bosque del Apache refuge, and the absence of late February snow goose hunting that had occurred on the refuge in previous years.

A juvenile whooping crane wintering with sandhill cranes in western Oklahoma left the State March 11 and was first seen in Nebraska March 15. It was roosting on the Lilian Annette Rowe National Audubon Sanctuary and feeding on private lands near Gibbon, Nebraska.

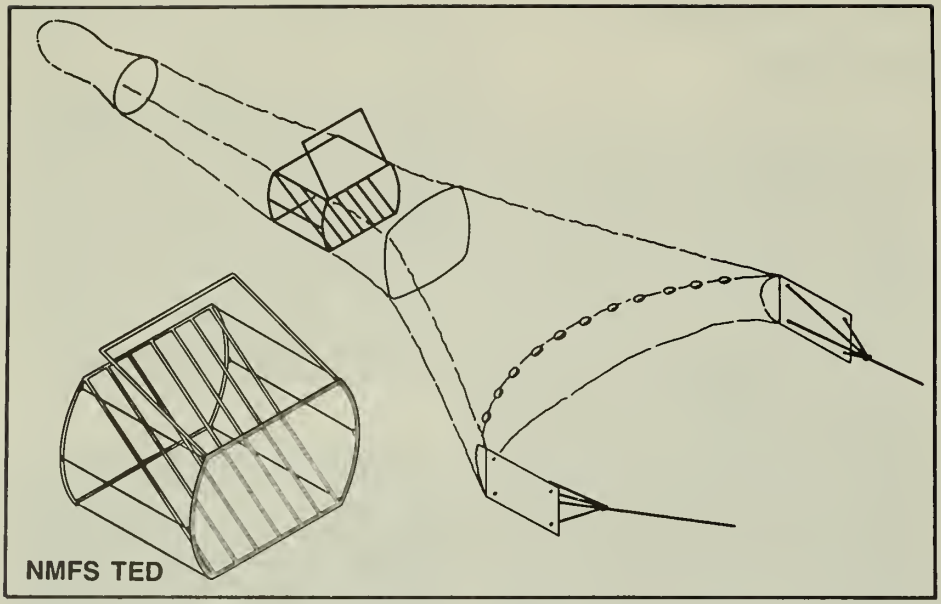
* * *

A count of booming male Attwater's greater prairie chickens (*Tympanuchus cupido attwateri*) on Attwater Prairie Chicken NWR, Texas, resulted in a total of 111 males observed and an estimated total of 222 chickens on the refuge. When the refuge was first established in 1973, only 25 prairie chickens were known to occur on the area. The nine-fold increase can be related to improved management and protection provided by the refuge. A total count of Attwater's prairie chickens in Texas has yet to be made, but past counts have indicated a steady decline off the refuge area.

* * *

Last July (1986), the FWS met with biologists from Arizona, New Mexico, and

(continued on page 6)



Excluder Devices

(continued from page 1)

shrimpers. The earliest solution, called an excluder panel, was a barrier fitted across the mouth of the trawl. The panel was made of large webbing that would prevent sea turtles from entering the net but allow shrimp through the openings. The best configuration reduced the catch of sea turtles by 75 percent but also reduced the shrimp catch by 15 to 30 percent. Because of the high shrimp loss, this was not an acceptable solution and the excluder panel was abandoned.

Another technique to reduce turtle mortality documented as part of this program was to reduce the tow time for trawls. Analysis of incidental capture data showed a direct correlation between tow time and sea turtle mortality. As tow time increases, turtle mortality increases.

Research on the NMFS TED began in 1980. By 1981, NMFS had developed gear that would reduce the incidental catch of sea turtles by 97 percent with no loss of shrimp. Since the development of the prototype TED, NMFS has worked with Sea Grant, commercial shrimpers, and others to refine it. The TED was reduced in size and made lighter and collapsible for safer, easier handling. A number of comments, suggestions, and constructive criticisms were studied and tested. Those that worked were adopted into the design.

This gear has other benefits in addition to saving sea turtles. It releases debris and by-catch such as sharks, rays, jellyballs, and horseshoe crabs. Additional separators can be installed to release most unwanted finfish, up to 78 percent during the day and up to 53 percent at night.

Voluntary TED Program

NMFS began a formal program in 1983 to encourage shrimpers to use the TED voluntarily. TEDs were built and delivered to shrimpers who agreed to use them in commercial shrimp trawling operations. NMFS gear experts worked with these shrimpers to properly install and use the TEDs. NMFS also worked with Sea Grant and industry groups to transfer this technology. The Southeastern Fisheries Association, Texas Shrimp Association, and the Bryan County Fisheries Cooperative were helpful throughout the technology transfer program. Several environmental organizations, including the Center for Environmental Education, Greenpeace, the Environmental Defense Fund, and Monitor International, also provided advice and assistance.

An advisory group, co-chaired by an industry member and a member representing a conservation group, was formed to assist the industry in adopting the new gear. Despite their hard work on this issue, the voluntary program was not successful. Only a very small number of the estimated 17,200 shrimp trawlers currently are using TEDs.

Proposed Regulations

After the failure of the voluntary TEDs program, the Director of the NMFS Southeast Region developed draft regulations that would require use of TEDs in certain areas. Concern about the proposal led to the formation of a group of shrimp industry and environmental community representatives to negotiate a mutually agreeable solution. The negotiating team reached an agreement that all but one of the participants signed. The members recommended this agreement as offering the best prospect for reducing the incidental catch and mortality of sea turtles associated with shrimp trawling while avoiding, to the greatest extent possible, adverse economic effects on the shrimp industry. Therefore, on March 2, 1987, NMFS issued the proposed rule that would implement the conditions of the mediated agreement. (Since then, two of the industry organizations represented in the negotiating group that signed the agreement have stated that they no longer endorse the agreement.)

This proposed rule would provide for a sequential transition to increased TED use. The initial focus is on areas and times most critical for the conservation of sea turtles; later, it will expand to other important areas and times. The proposed implementation schedule is summarized as follows:

Season and Area Requirements

	Effective Date	Season	Area
South Atlantic			
Offshore	July 15, 1987	all year	Cape Canaveral area to 200 miles
	January 1988	May through August	northern Florida to Ocracoke Inlet; shore to 200 miles
Inshore	January 1, 1988	all year	Cape Canaveral area to N.C.-S.C. border
Gulf of Mexico			
Offshore			
Eastern	July 15, 1987	all year	southwestern Florida and Florida Keys; less than 10 fathoms
Western	July 15, 1987	March through November	Mobile Bay to Mexico border; less than 10 fathoms
Inshore			
Louisiana	July 15, 1987	March through November	Breton and Chandeleur Sounds
Eastern	July 15, 1987	all year	southwestern Florida
Western	July 15, 1988	March through November	Mobile Bay to Mexico Border

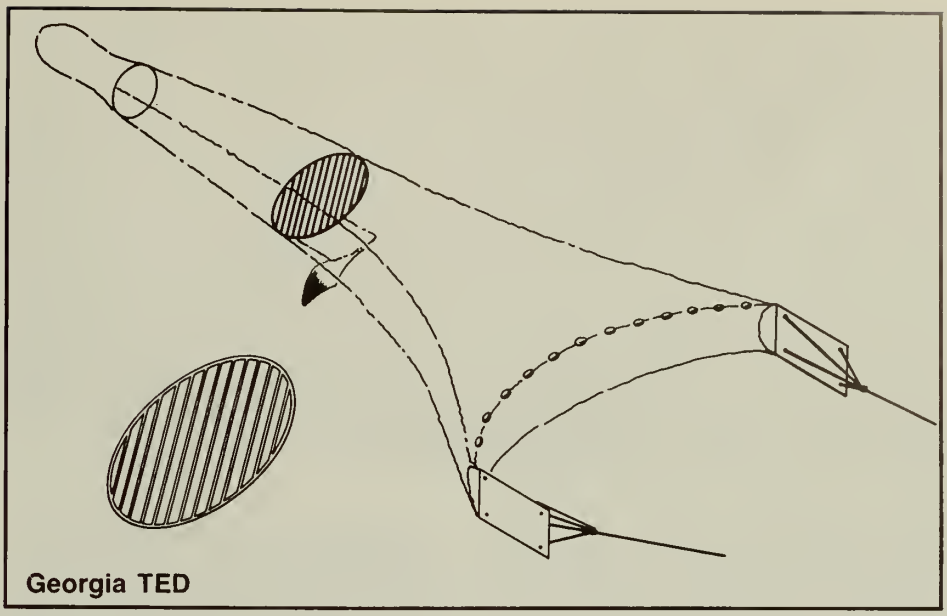
Excluder Devices

(continued from previous page)

"Inshore" means marine or tidal waters landward of the baseline from which the territorial sea of the United States is measured, and "offshore" means seaward of the baseline.

The July 15, 1987, starting date may be delayed to January 1, 1988, in certain areas or for certain trawlers if NMFS determines that there are insufficient TEDs available.

On January 1, 1989, TED requirements will be extended to water depths up to 15 fathoms in the same offshore areas of the Gulf of Mexico. This will provide significant additional protection to the critically Endangered Kemp's ridley turtle. TEDs will also be required in April and/or September 1989 north of Cape Canaveral to central North Carolina if NMFS has determined that there has been less than 80 percent total use of TEDs in these months during 1988.



Georgia TED

Approved TEDs

Under the proposed rule, four TEDs designs — the NMFS, Cameron, Matagorda, and Georgia versions — are approved devices. All four have been shown to have very high turtle exclusion rates.

Trawl Efficiency Testing

The rules provide a procedure for testing additional devices for approval. All tests for turtle exclusion will be conducted under NMFS supervision. Normally, these tests will be conducted off Cape Canaveral, Florida, using a scientific protocol developed by NMFS scientists.

The negotiators wanted to encourage additional experimentation in hopes of providing even better and less costly TEDs. The proposed rule provides the Director of NMFS' Southeast Region with the authority to allow TED efficiency experiments to be conducted by private parties. NOAA has a test protocol to aid in calculating shrimp retention and bycatch exclusion rates which the experimenter can use.

Exemptions

Shrimp trawlers using a single net with a headrope of 30 feet or less, or using two nets each with headrope lengths of 30 feet or less that are not connected to each other and are towed from opposite sides of the trawler, are exempt for TED requirements. A single independent test net with a headrope of 20 feet or less also is exempt.

Shrimp trawlers fishing for royal red shrimp in the Gulf of Mexico or royal red or rock shrimp in the Atlantic Ocean are exempt as well from TED requirements provided that 90 percent of the shrimp aboard the trawler are either of those species. Those fisheries occur in very deep water, where sea turtles are rarely encountered.

Enforcement Policy

The proposed rule notifies the public of the following interpretation and enforcement policy:

a) shrimp fishermen who do not use TEDs in the areas and at the times required by the rules are in violation of the Endangered Species Act; and
b) enforcement action will not be taken against shrimp fishermen who comply with the rules, even if Endangered sea turtles are incidentlally taken.

Economic Effects of the Proposal

The economic effects of the proposed rule are discussed in detail in a Regulatory Impact Review that was prepared in conjunction with a draft supplement to the final environmental impact statement on "Listing and Protecting the Green Sea Turtle, Loggerhead Sea Turtle and Pacific Ridley Sea Turtle Under the Endangered Species Act of 1973."

The total annual costs for TEDs will be between $3.7 and $7.4 million for the entire fleet, or $100 to $1,200 per trawler, based on a 2-year life for TEDs, repair costs, and spare TEDs.

Based on available information, NMFS believes that there will be no significant shrimp loss. In fact, some tests using the Georgia and NMFS TEDs have shown an increased catch.

Changes in the amount of bycatch will have both positive and negative economic effects. On the positive side, undesirable bycatch such as sharks, jellyfish, and debris will be reduced, resulting in a small positive benefit. However, in certain areas, some of the bycatch (for example, flounders and spiny lobster) is sold. Reduction in the catch of these species will result in a corresponding economic loss of between $220,000 and $350,000 annually for the entire industry.

A final cost is associated with reporting requirements contained in the proposed regulations. For the first year, the industry-wide cost is estimated to be $32,000, and $20,000 annually thereafter.

The total of these costs is estimated to be between $4 and $8 million each year. Additionally, administration and enforcement of the program will cost the Federal Government an estimated $1.6 million each year, for a combined total annual cost of between $5.6 and $9.6 million.

Other Action

The working group did not address in detail changes beyond 1989. Its agreement states that if less than 80 percent of the Gulf-wide shrimp effort is with TED-equipped nets, then additional requirements would be imposed to ensure at least 80 percent Gulf-wide coverage. However, this additional requirement would be waived if, by that date, Mexico has achieved comparable use of turtle excluder gear. (*Editor's note: The Republic of Mexico recently announced a program to institute the use of TEDs in all shrimp trawls within its waters, as well as other sea turtle conservation measures. See Region 2 news in this month's BULLETIN.*) The working group also recommended that conservation agreements be pursued with other Caribbean nations. Such nations should be encouraged to require use of TEDs by their shrimpers and to adopt other turtle conservation activities.

Further information on TEDs is available by writing the National Marine Fisheries Service, Office of Protected Species and Habitat Conservation, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235 or telephone (202) 673-5348.

Regional News

(continued from page 3)

Texas to discuss the possibilities of reintroducing the Mexican wolf (*Canis lupus baileyi*) back into the southwestern U.S., as called for in the 1982 Mexican Wolf Recovery Plan. Eight sites were suggested for evaluation (Texas — Big Bend and Guadalupe Mountains National Parks; New Mexico — White Sands Missile Range and Gila National Forest; Arizona — four localities in the Coronado National Forest). In response to those suggestions, Texas declined to recommend any sites, New Mexico recommended White Sands as a possible site, and Arizona suggested a total of 15 localities that it is now arranging in priority. After a preliminary information meeting with the military and National Park personnel last month, it was decided to request permission to evaluate White Sands Missile Range as a possible reintroduction site. Criteria to be evaluated include prey base, competition, open water, human impacts, access, and cover. Public opinion, the National Environmental Policy Act, and Endangered Species Act — Section 7 consultation also will be considered before a final site selection is made. When a reintroduction site is selected, wolves in that area will first be listed as an experimental, nonessential population in order to allow more flexible management of the introduced animals and their offspring both on and off the introduction area.

Mexican wolves have been extirpated from the U.S. since 1970, and have not maintained a resident population here since the early 1900's. Twenty- seven Mexican wolves are currently housed at four zoos, the offspring of four wolves captured in Mexico during 1977-1980.

Region 4 — On February 25, 1987, biologists from the FWS Jacksonville, Florida, Field Office inspected the only remaining natural population of the Stock Island tree snail (*Orthalicus reses nesodryas*) at Key West, Monroe County, Florida. (A few introduced populations may exist elsewhere in the Florida Keys.) The Stock Island population is now confined to about 20 trees in and adjacent to a county parking lot. The county has placed rocks around the trees to prevent vehicular damage, and has also deposited soil around the bases of the trees to provide an egg-laying substrate for the snails. Only 12 snails, all in aestivation, were observed. The last survey of the snails during their active season was done in July 1986, and it indicated that as few as 27 Stock Island tree snails may remain in this colony.

* * *

The Jacksonville District of the U.S. Army Corps of Engineers has published a public notice for a proposed General Permit to build boat docking facilities in manatee (*Trichechus manatus*) Critical Habitat. General Permit SAJ-55, if implemented, will allow the construction of boat docks or slips at a density of two per 100 feet of shoreline with a ratio of 1:1 power to sail. For example, if an applicant owns 100 feet of shoreline, the permit would allow a maximum mooring of one powerboat and one sailboat. Projects of this size would not require a Biological Opinion from the Service. Those wishing to construct more slips than allowed under General Permit SAJ-55, such as commercial marina developers, would still have to request an individual permit requiring a Biological Opinion from the Service. The provisions of General Permit SAJ-55 were developed by the Corps in close cooperation with the Florida Department of Natural Resources and the FWS Jacksonville Field Office.

* * *

The Choctawatchee beach mouse (*Peromyscus polionutus allophrys*) relocation conducted in January by the FWS Jackson, Mississippi, Field Office appears to have been successful. Eight pairs were transferred to Grayton Beach State Recreation Area in Florida (four pairs from Shell Island on Tyndall Air Force Base and four from St. Andrews State Recreation Area). Alabama beach mice (*P. p. ammobates*) were trapped and marked at Bon Secour National Wildlife Refuge, Alabama, in an effort to survey numbers. The last trapping effort captured 29 individuals and the continued existence of Alabama beach mice on Gulf Shore Plantation was confirmed. A red fox (*Vulpes vulpes*) was trapped at Fort Morgan, Alabama, and fitted with a transmitter to study movements of this beach mouse predator.

* * *

Region 6 — The Montana Black-footed Ferret Working Group met in Billings, Montana, on January 27, 1987. The agenda included discussion on prioritization of potential reintroduction sites in Montana, cooperation with the Wyoming black-footed ferret (*Mustela nigripes*) program, completion of prairie dog management guidelines, and future tasks for ferret recovery in Montana.

After a recent snowstorm, biologists found the tracks of a 4-year-old male black-footed ferret near Meefeetsee, Wyoming, that they have been trying to capture since last September. Biologists from the FWS and the Wyoming Game and Fish Department recently caught it and took it to Laramie, Wyoming, where it will undergo a quarantine period before being placed with the other 17 ferrets in the captive breeding program. This will be the oldest male at the captive breeding facility, which makes it an extremely valuable addition. It is the only male that researchers are confident has had breeding experience in past years, which increases the possibilities of success for captive breeding. The ferrets are currently in their breeding season, but it will be several months before results of this year's captive breeding efforts are known.

* * *

Due to low production of peregrine falcons (*Falco peregrinus*) at the Peregrine Fund's facility in Idaho, fewer birds were released in 1986. The following figures represent the number of birds hatched and percentage reaching independence in Region 6 States: Montana, 13 birds and 92 percent; Wyoming, 17 birds and 59 percent; Utah, 9 birds and 67 percent; and Colorado, 20 birds and 70 percent.

In Montana, two wild pairs of peregrines nested, producing five young. One wild pair in Wyoming produced three young. Successful breeding pairs in Utah increased from one pair in 1985 to four in 1986, producing seven young.

* * *

(continued on next page)

photo by Curtis Carley

Mexican wolf young in the captive propagation program.

Regional News

(continued from previous page)

The FWS, Wyoming Game and Fish Department, and University of Wyoming hope to be able to fund a survey effort this year in an attempt to locate the Wyoming toad (*Bufo hemiophrys baxteri*), which is found within the Laramie Basin in Albany County, Wyoming. It is thought to be a relic species left as glaciers retreated. No toads were found in 1985 and 1986 surveys. If searchers are able to survey this year and succeed in locating toads, recovery strategy and actions for this Endangered amphibian must be developed and implemented as soon as possible.

* * *

FWS field offices in Colorado and Utah are beginning a 3-year study of lead contamination of bald eagles (*Haliaeetus leucocephalus*) in those States. The purpose of the study is to develop baseline contaminant levels to monitor the effectiveness of steel shot in reducing lead poisoning in eagles.

* * *

Region 8 (Research) — Approximately 50 Aleutian Canada geese (*Branta canadensis leucopareia*) were found dead at their wintering grounds near Los Banos, California, in January-February 1987. Avian cholera is suspected as the cause of death for most of these birds. Of the 11 that have been necropsied at the National Wildlife Health Center (NWHC), avian cholera was confirmed in nine geese and lead poisoning in two. This is the first time lead poisoning has been documented in this Endangered species.

FWS Photo

Aleutian Canada goose

A Mississippi sandhill crane (*Grus canadensis pulla*) was found injured at the Mississippi Sandhill Crane National Wildlife Refuge near Gautier, Mississippi, on January 13, 1987. The bird had been traumatized by other cranes. Despite supportive therapy by local veterinarians, refuge personnel, and eventual treatment at Patuxent Wildlife Research Center (PWRC), the crane never regained the ability to walk normally or rise on its own. It died February 12 at PWRC. Necropsy at NWHC revealed a tumor along the cervical vertebrae. This is the fourth tumor identified during necropsy of 15 free-flying Mississippi sandhill cranes. Tumors are rare in wild birds; a prevalence of 27 percent is highly unusual.

* * *

The last wild California condor, AC-9, was captured April 19 on the new Bitter Creek National Wildlife Refuge. Both this bird and AC-5, which was captured February 27, were taken to the San Diego Wild Animal Park for addition to the captive breeding program.

California condors UN-1 and AC-4, a captive pair at the San Diego Wild Animal Park, have been making vigorous courtship displays to one another. Personnel at the park have observed up to five such displays in a single 2-hour period.

* * *

For the first time, the captive flock of Puerto Rican parrots (*Amazona vittata*) at Patuxent's Puerto Rico Research Station aviary has produced fertile eggs from more than two breeding pairs. A new (third) pair has formed and produced at least two fertile eggs. Egg laying began in the wild on February 18; three nests have already produced eggs. Two of these nests will be double-clutched to maximize egg production.

Buyer Beware!

Each year, more than 10 million Americans travel abroad, many of them to regions of the globe that support a flourishing trade in exotic birds and animals, fashionable jewelry and furs, and unique tropical plants. American globetrotters spend an estimated $14 billion while traveling, much of it for souvenirs, curios, and other collectibles commonly fashioned from foreign wildlife and plants.

While some of these products are legal to import into the United States, many others run afoul of Federal and international laws protecting animals and plants that are facing extinction, even when sold legally in their country of origin. Often what begins as an enjoyable vacation ends with a bitter lesson as these illegal items are confiscated, leaving the traveler with nothing more than a depleted bankroll and a receipt for seized property.

The Fish and Wildlife Service (FWS), in cooperation with the World Wildlife Fund—U.S., has developed a new brochure alerting travelers to the pitfalls of buying wildlife products abroad. *Buyer Beware!* describes the animal and plant products that are most commonly sold in foreign countries and whose importation into the U.S. is illegal. It also explains the Federal and international laws and treaties under which the FWS seeks to stem the growing trade in illegal products and to promote the conservation of the world's endangered wildlife. Because of the complexity of regulations governing wildlife importations, *Buyer Beware!* advises travelers with specific questions about certain countries they will be visiting, or about the legality of importing certain products, to contact the FWS or the World Wildlife Fund well in advance of their trip to obtain more detailed information.

Single copies of the brochure are available free from the Publications Unit, U.S. Fish and Wildlife Service, Room 148, Matomic Building, 1717 H Street NW, Washington, DC 20240. Limited bulk quantities are being made available to travel agents and tour operators as a service to their customers. Requests should be sent on letterhead to the Office of Public Affairs, U.S. Fish and Wildlife Service, Room 3447, 18th and C Streets NW, Washington, DC 20240.

BULLETIN Available by Subscription

Although we would like to send the BULLETIN to everyone interested in endangered species, budgetary constraints make it necessary for us to limit general distribution to Federal and State agencies and official contacts of the Endangered Species Program. However, the BULLETIN is being reprinted and distributed to all others, on a non-profit subscription basis, by the University of Michigan. To subscribe, write to the *Endangered Species Technical Bulletin Reprint*, School of Natural Resources, University of Michigan, Ann Arbor, Michigan 48109-1115, or telephone 313/763-1312. The price for 12 monthly issues is $15.00 (in Canada, $18 US).

New Publications

Vida Silvestre Neotropical is a new journal, published biannually by the World Wildlife Fund, on wildlife and wildland research and management in the neotropics. It focuses on the conservation of endangered plant and animal species and their habitats, sustainable use management, control of pest species, maintenance of biological diversity, indigenous uses of wildlife, methods for designing protected area systems, and related topics. Feature articles, notes, and announcements are published in the language in which they were submitted: Spanish, Portuguese, or English. Requests for information about subscriptions and guidelines for submitting manuscripts should be addressed to Curtis Freese, Co-Editor, *Vida Silvestre Neotropical*, World Wildlife Fund, 1255 23rd Street, N.W., Washington, D.C. 20037.

Habitat Suitability Index Models: Bald Eagle (Breeding Season), developed by Allen Peterson, synthesizes habitat use information on this species into a framework appropriate for field application. It is scaled to produce an index value between O.O (unsuitable habitat) and 1.0 (optimum habitat). The index is based upon an analysis of four habitat variables: 1) lake size, 2) lake productivity, 3) amount of mature forest, and 4) amount of human disturbance. Single copies of the report are available free of charge from the Publications Clerk, National Ecology Center, U.S. Fish and Wildlife Service, 2627 Redwing Road, Fort Collins, Colorado 80526.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	26	20	242	5	0	22	315	23
Birds	61	16	141	3	2	0	223	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	22	6	0	82	43
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	21
Crustaceans	4	0	0	1	0	0	5	1
Insects	8	0	0	5	0	0	13	12
Plants	119	6	1	26	3	2	157	54
TOTAL	296	52	466	80	15	37	946	243**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 209
Number of species currently proposed for listing: 27 animals
30 plants

Number of Species with Critical Habitats determined: 96
Number of Cooperative Agreements signed with States: 47 fish & wildlife
26 plants

March 31, 1987

April 1987 Vol. XII No. 4

ENDANGERED SPECIES

Technical Bulletin Department of Interior U S Fish and Wildlife Service Endangered Species Program, Washington, D C 20240

May–June 1987 Vol. XII No. 5–6

ENDANGERED SPECIES

Technical Bulletin

Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Two Animals and Four Plants Proposed for Listing Protection

During April 1987, the following species were proposed by the Fish and Wildlife Service (FWS) for addition to the Federal list of Endangered and Threatened wildlife and plants:

California Freshwater Shrimp (*Syncaris pacifica*)

The loss or deterioration of habitat, along with predation by introduced fishes, has eliminated the California freshwater shrimp from about half of its known historical range. Because most of this crustacean's remaining habitat is vulnerable, the species was proposed for listing as Endangered (F.R. 4/22/87).

S. pacifica is the only surviving member of its genus. The only other *Syncaris* species, *S. pasadenae*, occurred in southern California until the lining of stream habitat with concrete for flood control purposes caused its extinction. Stream channelization and lining already has eliminated *S. pacifica* from Santa Rosa Creek, and demand for stream modification as a means of flood control is likely to increase as rapid urban growth in the region north of San Francisco Bay continues.

photo by Jeurel Singleton

California freshwater shrimp are nearly transparent in water and can reach 2.5 inches (5 cm) in length.

The California freshwater shrimp, *S. pacifica*, is endemic to permanent, free-flowing streams in Marin, Napa, and Sonoma Counties. Within these streams, the species inhabits quiet, treelined pools with undercut banks, exposed tree roots, and submerged vegetation. Although once common in the three-county area, the shrimp has seriously declined in numbers and range. In addition to stream channelization, habitat is being damaged by siltation and other water quality problems. Certain agricultural practices destabilize stream banks, and residential development can lead to the erosion of soil into area streams. Annual construction of temporary gravel dams to provide summer swimming areas is another threat because of direct habitat loss at the sites and interruption of downstream flows. The low reproductive rate of *S. pacifica* also makes it vulnerable to extirpation in creeks with exotic predatory fishes.

Various combinations of these factors have extirpated the shrimp from Semple Creek, Laguna de Santa Rosa Creek, Santa Rosa Creek, and Atascadero Creek. The species survives within restricted portions of 11 streams that comprise approximately half of its historically known habitat. Except for parts of Lagunitas Creek within Samuel P. Taylor State Park and Golden Gate National Recreation Area, all remaining stream habitat is on privately owned land.

(continued on page 4)

Dusky Seaside Sparrow Becomes Extinct

The dusky seaside sparrow (*Ammodramus maritimus nigrescens*) became extinct June 16, 1987, when the last bird of this subspecies, an aging male, died at Walt Disney World's Discovery Island Zoological Park in Orlando, Florida.

The cause of death was not determined, although the bird was at least 13 years old, an extremely advanced age for any sparrow. It was one of the last five duskies, all males, brought into captivity during 1979-1980 while biologists searched in vain for surviving females (the last of which was seen in 1975).

The dusky was one of several subspecies of seaside sparrows native to Florida that have suffered from extensive losses of coastal salt marsh habitat. One subspecies, the Smyrna seaside sparrow (*A. m. pelonata*), is believed to have become extinct some time ago, while another, the Cape Sable seaside sparrow (*A. m. mirabilis*), was listed as Endangered in 1967 (the same year as the dusky). In an effort to conserve at least some of the dusky's genetic resources, Discovery Island biologists attempted for several years to cross the remaining duskies with birds of a more abundant subspecies, the Scott's seaside sparrow (*A. m. peninsulae*). Some hybrids have been produced, but there will be no more "pure" duskies.

photo by Paul W. Sykes, Jr.

dusky seaside sparrow

Regional News

Endangered species program regional staff members have reported the following activities for the months of April and May:

Region 1 -In early April, the Marble Bluff Fish Facility opened for passing fish up Nevada's Truckee River. Shortly after the Lahontan cutthroat trout (*Salmo clarki henshawi*) run began, a run of cui-ui (*Chasmistes cujus*) joined the passage. So far, over 4,400 cui-ui have been passed over the dam. Cui-ui larvae have begun out-migration.

* * *

The FWS Sacramento Endangered Species Office (SESO) assisted in the investigation of a potential violation of the Endangered Species Act in Sacramento County, California. Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) habitat was cut down along the east levee of the American River. The local reclamation district claims that all vegetation must be removed from the flood control levees. Unfortunately, little habitat for the beetle remains elsewhere. Both sides have agreed on an off-site area to be set aside as compensation. The district will pay for revegetation, fencing, and maintenance of the parcel.

Recent surveys found valley elderberry longhorn beetle emergence holes in elderberry plants along the Feather, Cosumnes, and upper Sacramento Rivers. Also, one female beetle was observed feeding on elderberry bushes along the American River bike trail. A survey by California Department of Fish and Game staff for the beetle from the Nimbus Dam area to the foothills found evidence of beetle activity in dense stands of elderberry plants but not in the isolated plants near the foothills. SESO staff examined two stands of elderberry plants in an area that is to be developed for housing near Roseville and did not find any evidence of beetles. The trees were nearly dead and heavily infested with larvae of leaf-roller insects. These surveys and other studies have revealed new life history information about the beetle.

* * *

The U.S. Army Corps of Engineers has agreed to undertake mitigation in a recently completed Biological Opinion to offset effects of construction and use of the Caliente Creek Flood Control System to the San Joaquin kit fox and blunt-nosed leopard lizard. These measures include purchase of 705 acres of alkali sink lands to provide long-term habitat protection for the two species and additional pre-construction surveys to reduce mortality during construction.

* * *

The SESO staff completed a "no jeopardy" Biological Opinion for the proposed Santa Nella Water Treatment Facility. The project is the first step allowing for additional urban growth in this Merced County, California, community along Interstate 5. The project indirectly affects a small group of kit foxes and would eliminate about 60 acres of prime foraging habitat. Mitigation consists of setting aside and protectively managing approximately 100 acres of formerly heavily grazed range and agricultural land.

* * *

Twenty-two new invertebrates have been recommended to be added to the candidate list for California. The majority are caddisflies, followed by butterflies and beetles. Two rare ants endemic to oak

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Acting Chief*
Office of Endangered Species
(703-235-2771)
Richard L. Jachowski, *Acting Chief,*
Federal Wildlife Permit Office
(703-235-1937)
Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Stephen W. Parry, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Director;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

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Approved Listing Actions

During April 1987, two plants and seven animals were added to the list of Endangered and Threatened species, and one animal was reclassified. These approved listing actions are summarized below:

Wide-leaf Warea (*Warea amplexifolia*)

This summer annual is endemic to the Lake Wales Ridge of central peninsular Florida, where it occupies sunny openings in long-leaf pine woodlands. Only two populations could be verified during the latest survey. The species' decline primarily has resulted from urbanization and the conversion of scrub habitat to citrus groves. *W. amplexifolia* was proposed for listing as Endangered on May 16, 1986 (see story in BULLETIN Vol. XI No. 6), and the final rule was published in the April 26, 1987, *Federal Register*.

Scrub Lupine (*Lupinus aridorum*)

Another plant endemic to the dwindling scrub habitat of the central Florida sand ridge, the scrub lupine's known distribution has been reduced to only about 350 individual plants scattered among 16 sites. All of these remaining sites have been damaged and are within some of the most rapidly growing areas of Florida. The lupine was proposed for listing as Endangered on April 24, 1986 (see BULLETIN Vol. XI No. 5), and the final rule appeared April 7, 1987.

Five Tombigbee River Mussels

Marshall's mussel (*Pleurobema marshalli*), Curtus' mussel (*P. curtum*), Judge Tait's mussel (*T. taitianum*), the stirrup shell (*Quadrula stapes*), and the penitent mussel (*Epioblasma* (=*Dysnomia*) *penita*), all freshwater mussels or clams, are endemic to the Tombigbee River system in Alabama and Mississippi. These filter-feeding mollusks require riverine habitat with clean water and a moderate-to-swift current. Much of their historical habitat has been heavily modified by reservoir and barge canal construction (primarily relating to the Tennessee - Tombigbee Waterway). The remaining mussels are in remnants of the Tombigbee River bypassed by the project and in a few tributaries. Threats to this habitat include gravel dredging and siltation from a variety of sources. The five mussels were proposed April 7, 1986, for listing as Endangered (see BULLETIN Vol. XI No. 5), and the final rule was published April 7, 1987.

Cave Crayfish (*Cambarus zophonastes*)

An obligate cave dweller, this crustacean lacks pigment in the body and the eyes (which are reduced). It is known to exist in a pool within a single cave in the Ozark Mountains of Arkansas, and the species' entire population is estimated at fewer than 50 individuals. A tract containing the cave entrance was purchased recently by the Arkansas Natural Heritage Commission and The Nature Conservancy. However, the cave's recharge area is large, and groundwater contamination is a major potential threat to the crayfish. The possibility of illegal collecting and the species' extremely small population size also make it vulnerable to extinction. *C. zophonastes* was proposed May 5, 1986, for listing as Endangered (see BULLETIN Vol. XI No. 6), and the final rule appeared April 7, 1987.

Waccamaw Silverside (*Menidia extensa*)

Also known as the skipjack or glass minnow, the small fish is endemic to Lake Waccamaw in eastern North Carolina. In addition to its restricted range, the species is threatened because its one-year life cycle makes it vulnerable to even short-term water quality problems. Lake Waccamaw already is incipiently eutrophic, and continued high rates of phosphorous input could lead to massive algal blooms and reduced oxygen levels for the fish. The November 7, 1985, proposed rule to list the Waccamaw silverside as Threatened contained a recommendation for designating the lake as Critical Habitat (see BULLETIN Vol. X No. 12). This designation was included in the final listing rule, published April 8, 1987.

Tinian Monarch Flycatcher (*Monarcha takatsukasae*)

This small, forest-dwelling bird is found only on the island of Tinian within the Commonwealth of the Northern Mariana Islands in the western Pacific Ocean. It originally was listed as an Endangered species because its 1945 numbers were thought to be critically low due to the removal of native forests for sugarcane production and the destructive impacts of World War II. Since the war, Tinian has been revegetated by a shrubby legume, *Leucaena leucocephala*, to which the monarch has adapted well. In 1982, the bird's numbers were estimated at 40,000, evidence of a recovery to apparently pre-disturbance levels.

Because the population appeared to be healthy once again, the FWS proposed on November 1, 1985, to delist the Tinian monarch (see BULLETIN Vol. X No. 12). However, recent changes led the FWS to believe it would be more prudent to reclassify the species from Endangered to Threatened rather than to remove it completely from Endangered Species Act protection. One new threat is posed by the recent accidental introduction of an insect that is defoliating the *Leucaena* on Tinian. The increased boat and trade traffic between Tinian and the island of Guam (a result of increased military and civilian development) could lead to the accidental introduction of another exotic species that is extremely harmful to forest birds: the brown tree snake (*Boiga irregularis*). This snake is believed responsible for the extirpation or near eradication of many native birds on Guam. For these reasons, the FWS has reclassified to Threatened, rather than delisted, the Tinian monarch (F.R. 4/6/87), a decision in accordance with the wishes of the Commonwealth government.

Both the Commonwealth and the U.S. Navy have advised the FWS that they have instituted rigorous programs to prevent the spread of the brown tree snake to Tinian. (Approximately two-thirds of Tinian has been leased to the Navy, including most of the monarch's habitat.)

* * *

These listed animals and plants are now protected under the Endangered Species Act, the terms of which are summarized in this BULLETIN at the end of the story on species newly proposed for listing.

Updated List Available

The updated *List of Endangered and Threatened Wildlife and Plants*, current through April 10, 1987, is now available from the Publications Unit, U.S. Fish and Wildlife Service, 148 Matomic Building, Washington, D.C. 20240.

Buyer Beware!

The April 1987 BULLETIN carried a notice for *Buyer Beware!*, a new brochure developed to alert travelers to the pitfalls of buying protected wildlife products abroad. Inadvertently left out of the notice was mention of the National Fish and Wildlife Foundation, which was a major sponsor of the brochure. We regret the omission.

Copies of the brochure can be requested from the Publications Unit, U.S. Fish and Wildlife Service, 148 Matomic Building, Washington, D.C. 20240.

Proposed Listings

(continued from page 1)

The only direct Federal activity that may affect the California shrimp is the authorization by the U.S. Army Corps of Engineers (COE) to build temporary dams on Austin and East Austin Creeks. A private organization has a COE permit to construct 3 such temporary dams on East Austin Creek and 24 on Austin Creek annually until 1990. This permit, however, can be modified or revoked if any of its restrictions (e.g., number, size) are not met. The FWS has been in contact with the COE about the status and habitat requirements of the shrimp.

Louisiana Pearlshell (*Margaritifera hembeli*)

This large freshwater mussel or clam is known to occur in 11 headwater streams of the Bayou Boeuf drainage in south-central Louisiana (Rapides Parish). Its historical range apparently has been reduced due to flooding by impoundments. Most of the remaining populations are small, localized, and threatened by sedimentation and other water quality problems. In an effort to prevent this mussel's extinction, the FWS proposed listing it as Endangered (F.R. 4/24/87).

The Louisiana pearlshell has a generally elliptical shell approximately 3.9 inches (100 millimeters) long. Its preferred habitat is stable sand and gravel substrate in small, clear, free-flowing streams. An extensive search of 39 streams in Rapides Parish during 1985 by biologists with the Louisiana Natural Heritage Program found the species in 11 streams. Of the total population (estimated in 1985 at 10,000 individuals), nearly 90 percent were concentrated in four streams: Long Branch, Bayou Clear, Loving Creek, and Little Loving Creek. The scattered distribution of *M. hembeli* suggests that the species originally occurred throughout the Bayou Boeuf headwater system and that impoundments eliminated populations in intervening areas. Now, the entire Louisiana pearlshell population of a small stream may occur in only several yards of stream length. Because most of the remaining populations are so small and localized, even beavers appear to be a significant threat; *M. hembeli* individuals found at one site in 1985 were later extirpated when the stream was inundated by a beaver pond.

Sedimentation resulting from off-road vehicle (ORV) use and clear-cut logging is the main current threat to the Louisiana pearlshell. Most of the species' range is within Kisatchie National Forest and clear cutting, especially if it occurs up to stream banks, increases erosion. This practice also results in higher rainfall runoff, which increases water velocity and scours the stream channel, making the substrate too unstable for the mussel. (The U.S. Forest Service has already taken steps to reduce impacts to the mussel from ORVs and timber management.) There is some evidence that water pollution from upstream houses and farms is another threat facing at least the Brown's Creek mussel population. Waste runoff may contain such harmful substances as motor oil, sewage, and agricultural pesticides. The FWS plans to advise residents of means to reduce or eliminate impacts on nearby streams.

Two Puerto Rico Plants

The following rare species of trees native to the Commonwealth of Puerto Rico were proposed for listing as Endangered (F.R. 4/24/87):

A medium-sized tropical evergreen tree in the verbena family (Verbenaceae), ***Cornutia obovata*** (known locally as the *Palo de Nigua*) is endemic to forests in the limestone hills and lower mountains of northwestern and central Puerto Rico. This species can reach 33 feet (10 meters) in height with a trunk diameter of 6 inches (15 centimeters). Its leaves are opposite, obovate in shape, and covered with fine hairs on the lower surface. The flowers are clustered at the ends of stems, tubular in shape, and purplish in color.

Although *C. obovata* was never known to occur in large numbers, the clearing of forests for a variety of land uses has eliminated some individuals and populations. Only seven individual trees are known to survive. Five of them are within the Rio Abajo Commonwealth Forest, and they would be in danger if forest management policies were to change in ways that would adversely affect the natural vegetation. The other two trees grow on private land, one near a trail heavily used by squatters and the other near a communication facility that also receives heavy use. It is the species' extreme rarity rather than imminent habitat destruction that is the main threat to the survival of *C. obovata*. Only mature specimens are known and, although abundant flowers have been observed, there is no evidence of recent regeneration.

Trichilia triacantha is an evergreen shrub or small tree endemic to low elevation semideciduous dry forests in southwestern Puerto Rico. This species, a member of the mahogany family (Meliaceae), can reach 30 feet (9 m) in height with a trunk 3 inches (8 cm) in diameter. Its dark green, leathery leaves are palmate and three- to seven-parted, with the leaflets bearing three sharp spines at their apex. The flowers are white. Currently, 18 *T. triacantha* individuals are known to exist at 5 sites within Guanica Commonwealth Forest.

Widespread deforestation for agriculture, grazing, and charcoal production has had a significant effect on the native flora of Puerto Rico; the forests in which *T. triacantha* now is known to occur are largely second growth. In addition to suffering the generalized impacts of wood cutting, the species traditionally has been selectively taken for the qualities of its wood (hardness, durability, and appearance). It is not known to what extent this practice continues but at least one population has been lost to cutting in recent years. Because the species is usually found along dry streambeds and ravines that carry periodic torrential rains, destruction of the few remaining specimens by flash flooding also poses the threat of extinction. Further, rapid development in the small remaining areas of similar, privately owned habitat could destroy any undiscovered individuals or populations.

(continued on next page)

photo by John MacGregor

The white-haired goldenrod is an upright-to-slightly-arching plant that attains a height of up to 39 inches (98 cm). Its deeply veined leaves are dark green above and pale below, and the stem is covered with fine white hairs. Clusters of small, yellow flowers begin blooming in late August.

White-haired Goldenrod (*Solidago albopilosa*)

An herbaceous plant in the aster family (Asteraceae), *S. albopilosa* is endemic to outcrops of Pottsville sandstone found within eastern Kentucky's Red River Gorge area of Menisee, Powell, and Wolfe Counties. It grows primarily in rockhouses (natural, shallow, cave-like formations) and beneath overhanging ledges. Intensive recreational use of these outcrops is damaging *S. albopilosa* habitat, and the FWS has proposed to list the species as Endangered (F.R. 4/24/87).

Most of the Red River Gorge is within Daniel Boone National Forest, and it has been designated a National Geological Area for its unusual topography. (There are several small, private inholdings within the gorge, but the U.S. Forest Service plans to acquire those judged most significant.) The geological features (rockhouses) with which *S. albopilosa* is associated are common in this area, but only a small number currently support the species.

Red River Gorge is a recreational area that draws approximately 240,000 "visitor-use days" per year. The rockhouses are very popular destinations or sites for hiking, camping, climbing, and picnicking. Also, because of the presence of Indian artifacts, collectors dig in even the most remote rockhouses. These activities have resulted in intensive disturbance to *S. albopilosa* habitat. The species has been extirpated from some sites and is being damaged at most of the others.

A threat of a more potential nature is the proposed Red River Lake project. Although the high-water level would not inundate rockhouses, the species' habitat could be damaged by associated construction and recreational activities. The proposed impoundment, however, is opposed by the State of Kentucky and is no longer being pursued as a viable project by the U.S. Army Corps of Engineers. In the event that the proposal is someday revived, plans for protecting *S. albopilosa* would need to be incorporated; however, reauthorization is not expected.

If the species is listed, effects on Forest Service management should be minimal. They would consist primarily of measures to reduce visitor damage at the most important *S. albopilosa* sites and careful planning of any future logging operations.

Aleutian Shield-fern (*Polystichum aleuticum*)

P. aleuticum, a perennial in the fern family (Polypodiaceae), is an extremely rare plant known from only two sites in Alaska's Aleutian Islands. This diminutive species arises from a stout, dark brown rhizome and sends out fronds that reach only about 6 inches (15 cm) high. There are no closely related ferns in North America or northern Asia. Grazing, soil instability, and the species' low numbers threaten it with extinction, and the fern has been proposed for listing as Endangered (F.R. 4/24/87).

For many years, *P. aleuticum* was known only from a 1932 collection on Atka Island. Surveys conducted in 1984 and 1985 were not successful in finding the population, although the original collection site is not known and could have been overlooked. On the other hand, reindeer, non-native animals introduced to Atka in 1914, have overgrazed the west end of the island and may have contributed to the fern's apparent disappearance. In 1975, a second *P. aleuticum* population of only 15 plants was discovered on Adak Island near the summit of Mt. Reed. The site consists of treeless, alpine talus slopes vegetated with low-growing herbs and prostrate shrubs.

Caribou were introduced on Adak in 1958, and up to 400 now occur on the island. Because they are present in the Mt. Reed area, caribou may be affecting *P. aleuticum* by grazing or trampling. A more likely limiting factor is the instability of the alpine habitat on Mt. Reed due to wind erosion and solifluction (soil movement).

Both Atka and Adak Islands are within the Aleutian Islands Unit of the Alaska Maritime National Wildlife Refuge. However, part of Atka was selected and conveyed to the Atxam Native Corporation under the Alaska Native Claims Settlement Act of 1971. The northern half of Adak (including Mt. Reed), though still within the refuge, is a U.S. Naval Reservation within which the Navy has development rights. These rights can be exercised if compatible with the refuge, and discussions with the Navy have revealed no conflicts.

The listing proposal identified several immediate measures to conserve and recover *P. aleuticum*, and some have already begun. Intensive surveys for the plant are under way, and "wanted" posters have been distributed to all refuge and Naval personnel and interested private citizens. Future activities may include fencing of fern sites to exclude caribou and propagation of the plant to create a supply for reintroduction.

* * *

Available Conservation Measures

Among the conservation benefits provided by a listing as Threatened or Endangered under the Endangered Species Act are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the FWS to develop and implement recovery plans; the possibility of Federal aid to State and Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the FWS; and the authorization to seek land purchases or exchanges for important habitat. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, various organizations, and individuals. Section 7 of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If any agency finds that one of its activities may affect a listed species, it is required to consult with the FWS on ways to avoid jeopardy or adverse modification of Critical Habitat. For species that are *proposed* for listing and for which jeopardy or adverse modification is found, Federal agencies are required to "confer" with the FWS, although the results of such a conference are non-binding. Potential conflicts almost always are avoided by planning early and using the Section 7 process.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals, except by permit for certain conservation purposes. For listed plants, the rule is different; the trafficking restrictions apply, but collecting of listed plants without a permit is prohibited only on lands under Federal jurisdiction. Some States, however, have their own laws protecting listed plants and animals that may be more restrictive.

Parvovirus and Heartworm Found in Minnesota Wolves

L. David Mech and Steven H. Fritts[1]

Just when it looked like the main threat to the Minnesota wolf (*Canis lupus*) population was long-term human development of habitat, two new, more immediate problems have appeared. Canine parvovirus (CPV) and heartworm (*Dirofilaria immitis*) recently were documented in Minnesota wolves. Both are potentially fatal and are new to wild gray wolves. Their threat to the population is unknown but could be serious.

CPV is a newly discovered disease thought to be an escaped laboratory artifact, and was first found in 1976 in domestic dogs. It raced through the dog population and killed numerous pets — especially pups — before a vaccine was developed. Affecting primarily the digestive system, it is spread via infected feces. CPV had reached the dog population in Ely, the heart of the Minnesota wolf range,

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Minnesota Wolves

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by 1979. In 1983, CPV killed 11 of 12 wolf pups and yearlings in a captive wolf colony just north of Minneapolis, thus demonstrating that CPV could be just as serious to wolves as to dogs.

Serologic studies of wolves live-trapped in northern Minnesota then showed that CPV had hit the wild wolf population. By testing serum for antibodies to the disease, we were able to conclude that about half of the surviving wolves in northern Minnesota had been exposed to CPV from 1977 through 1983. This technique, however, does not indicate how many of Minnesota's 1,200 wolves might have perished from the disease, and that remains a mystery.

photo by L. David Mech

gray wolf

That CPV does adversely affect wild wolves was documented in nearby Wisconsin in 1985. There, Wisconsin Department of Natural Resources biologist Dick Thiel found a dead, emaciated wolf that a few months earlier had had an active CPV infection. A single mortality may not seem like much of a problem, but, to a critically low wolf population that has not been able to exceed 30 members since it began to recolonize the State about 1975, the loss of one animal can be critical.

The Minnesota wolf population can withstand considerable mortality from many causes; however, fatalities along the periphery of the Minnesota range, where wolf numbers are lowest, would minimize continued dispersal of animals to Wisconsin. This could then impede or prevent wolf recovery in Wisconsin and Michigan.

The same potential problems also could result from heartworm. This parasite is spread from animal to animal via mosquitoes and has gradually made its way northward from the southern United States. It has infected dogs in central Minnesota for several years, and was first found in Ely dogs (within the wolf range) during 1986. On December 31, 1986, a blood sample from an 8-year-old wild wolf in the Ely region, No. 6021, showed larval heartworm. The wolf died as a result of capture in an illegal snare, and an autopsy showed several large adult worms in her heart.

Heartworm larvae are shed by the adult worms that inhabit the heart chambers, although they also can live elsewhere. As the host ages, the worm enlarges and the chances of new infections via more mosquito bites also increase. Thus, greater and greater strain is placed on the heart. For animals like the wolf that earn their living by running, this strain might greatly reduce chances of catching prey and result in premature death.

In 1975, Glynn Riley and Roy McBride wrote about the red wolf, just before its demise in the wild from several possible causes: "Heartworms (*Dirofilaria immitis*) have been present in all 27 wolves examined...," and "Red wolves three years of age and older usually were heavily parasitized by heartworms, sometimes to the point that the heart valves could not close" ("A Survey of the Red Wolf," pp. 263-277 in *The Wild Canids* by M. W. Fox).

Conceivably, either heartworm or CPV could diminish productivity of an affected animal or survival of its offspring by limiting its hunting abilities. In this respect, Wolf 6021's breeding history is of interest. Born about 1979, Wolf 6021 produced surviving pups in summer 1982 and 1983, and probably also in 1984. In 1985 and 1986, if 6021 bore pups, none survived beyond the first month, even though the wolf held the same territory and mate. No evidence is available connecting this animal's decreased productivity with her heartworm infection, but the possibility of such a link is strong.

Without more information about the natural history of both heartworm and CPV in wild hosts, and the hosts' responses to them, it is impossible to predict the ultimate consequences of these pathogens. Fortunately, in at least part of Minnesota, 20 years of baseline information on natural wolf population fluctuations is available to compare with any changes these two diseases may bring in wolf numbers.

Such a comparison can indicate whether medical measures must be developed to deal with these two new threats or whether the wolf population can contend with them. The answer should become apparent within the next few years. Meanwhile, the Patuxent Wildlife Research Center, in collaboration with the National Wildlife Health Laboratory, will continue to monitor the incidence of these pathogens in the wolf population.

[1]Patuxent Wildlife Research Center, U.S. Fish and Wildlife Service, Laurel, Maryland 20708

The Role of Captive Propagation in the Recovery of the Mississippi Sandhill Crane

Janet L. McMillen[1], David H. Ellis[1], and Dwight G. Smith[2]

The Mississippi sandhill crane (*Grus canadensis pulla*), darkest colored of all *G. canadensis* populations, was described as a distinct subspecies in 1972. Although its range formerly extended at least from Louisiana into Alabama, the single remaining wild population is confined to southern Jackson County in southwestern Mississippi.

The Mississippi sandhill crane was officially listed in 1973 as Endangered because of its small population (less than 50 individuals), its limited distribution, and the lack of suitable habitat. Habitat destruction and human disturbance led to its decline. Thousands of acres of nesting habitat were altered for private and commercial development. More important, large tracts of habitat were drained and planted in dense stands of slash pine (*Pinus eliottii*) for pulpwood. Access roads, drainage ditches, and highways were built across savannas, increasing disturbance, interrupting the natural flow of water, and subjecting the bird to increased human-related mortality.

A recovery program is under way to preserve the bird in captivity and augment the wild population. Key components of the effort include: (1) acquisition and management of habitat on the Mississippi Sandhill Crane National Wildlife Refuge; (2) development of a captive flock at the Patuxent Wildlife Research Center in Laurel, Maryland, for production of eggs and young; and (3) release of Patuxent-produced stock into the wild.

Habitat Acquisition and Management

The Mississippi sandhill crane NWR was officially established in Jackson County, Mississippi, in 1975 when the Fish

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and Wildlife Service (FWS) purchased 1,709 acres (692 hectares) acquired by the Nature Conservancy in 1974. Additional purchases and leases have been made, and the refuge currently encompasses about 18,000 acres (7,285 ha). Future plans call for the acquisition of an additional 2,500 acres (1,012 ha).

The habitat management objective is to restore sufficient nesting, feeding, and roosting habitat to support a population of 100 birds (30 breeding pairs and 40 nonbreeding birds). To meet this objective, efforts are being made to 1) acquire additional potentially suitable habitat, 2) cut, bulldoze, and/or burn timber and brush to provide open areas for feeding and roosting while maintaining sufficient woody vegetation to provide buffers between territories, 3) improve water economy by plugging ditches and digging small ponds near nesting territories, 4) increase winter food sources on the refuge by planting crops and improving the soil to increase invertebrate abundance, and 5) control predators to improve natural production and adult survival.

photo by David H. Ellis

This Mississippi sandhill crane chick is being fed from the bill of a taxidermically prepared crane head in an effort to sexually imprint it on cranes rather than humans.

Captive Propagation at Patuxent

Patuxent established its captive Mississippi sandhill crane flock in 1966 with four chicks reared by John Lynch from eggs collected in Jackson County in 1965–1966. The purposes of maintaining this flock are to guard against extinction due to loss of the wild population, increase genetic diversity, and provide captive-produced cranes and eggs for introduction into the wild. The Patuxent flock has grown from three birds in 1966 to 40 in late 1986 as more eggs have been collected from the wild and produced in captivity. This flock's current composition is 9 juveniles and 31 adults/subadults, including 8 productive females. The goal is to increase the captive flock to 15 pairs so that, by 1990, 20 cranes each year can be shipped to Mississippi for release.

To date, 56 eggs have been removed from the wild (an average of 2.6 annually). The removal of one egg from many of the two-egg clutches probably has not diminished recruitment in the wild because pairs typically produce two eggs in a clutch but do not successfully fledge two chicks. Of the eggs that hatched, 74 percent (23 of 31) of the young birds were successfully fledged at Patuxent. Recent wild egg acquisitions have been from pairs whose progeny are not represented in the captive flock. We hope that this will increase genetic diversity in both the captive breeding birds and those destined for reintroduction.

The first Patuxent-produced eggs were laid in 1968; however, they came from unserviced females and were infertile. Artificial insemination was begun on the crane in 1970. The first fertile egg was produced in 1973 and the first juvenile fledged in 1974. This bird was the first of its subspecies successfully raised in captivity from an egg fertilized and laid by captive adults.

Since 1970, 178 known fertile Mississippi sandhill crane eggs have been produced at Patuxent, all but three of them by artificial insemination. Out of that total, 167 remained at Patuxent; 128 (77 percent) of these hatched, and 85 (66 percent) resulted in fledglings. The mean number of young fledged per year, 1.8 before 1980, rose to 10.4 between 1980 and 1986. Peak years were 1984 and 1985, with 17 and 16 young fledged.

The major problems encountered in raising Mississippi sandhill cranes in captivity were 1) low fertility, 2) low hatchability, 3) debilitating toe/leg deformities, and 4) disease. Through the use of Florida (*G. canadensis pratensis*) and greater (*G. canadensis tabida*) sandhill cranes as research surrogates, these problems have largely been resolved. Improved artificial insemination techniques resulted in a 95 percent fertility rate for eggs from 1983 through 1986. The use of a disinfectant egg dip and frequent egg collections have decreased the loss of fertile eggs to bacterial contamination. The mean hatchability of fertile eggs from 1973 through 1979, 30 percent, was increased to 86 percent from 1980 through 1986. Deformed toes and legs in hand-reared crane chicks have virtually been eliminated by limiting daily food intake when weight gain is excessive, and by increasing the chick's activity level through swim therapy. Disease has been significantly reduced through annual pen rotation, the administration of antibiotics and other treatments for fungi and parasites, continuous monitoring of chicks, and annual examinations of adults.

Reintroduction Efforts

A "gentle release" program providing captive, parent-reared cranes for release into the wild began in 1975. Eggs laid by Mississippi sandhill cranes at Patuxent are collected and placed under captive foster parents, which rear the young until they are about 120 days old. Contact with humans is limited to ensure that natural imprinting and socialization can occur. At approximately 60 days of age, the chicks' wings are brailed (restrained with a soft plastic strap) to prevent flight.

When the birds are 4 months old, the brails are removed and the birds are transferred to community flight pens where they develop social bonds. The birds are gradually weaned from pelletized food to a diet supplemented by corn to prepare them for the food they will encounter in the wild. Prior to shipment to the refuge in Mississippi, the young are again brailed, administered antibiotics, and given a physical examination. Upon arrival at the release site in Mississippi, the young are confined to pens for about one month, where they further strengthen cohort bonds, develop site fidelity, and learn to forage for corn and natural foods. The scattered grain also attracts wild cranes, which interact with the captives and aid their integration into the wild flock after release. After a period of acclimation, the wing brails are removed, and the juveniles are allowed to leave the holding pens. Supplemental feeding is

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continued until the young become independent.

Captive-reared cranes have been released to the wild annually since 1981. Overall, their social integration and survivorship have been good. Of the 45 birds released since 1981, 19 (45 percent) still survive, and Patuxent-reared birds currently make up approximately 38 percent of the wild flock. Of those that have died, at least one bird was found shot, but most have been killed by avian or mammalian predators (including bobcats, coyotes, and dogs). Several nesting attempts of released birds have occurred. In 1985, a male that had hatched in 1979 paired and nested with a wild female. Two eggs were laid, and the birds were sharing incubation until they abandoned the nest after an accidental human disturbance. Unfortunately, the male was found dead in December 1985. Several other released birds have paired with wild birds, and in 1986, although no nesting occurred, three pairs (two with one Patuxent member and one with two Patuxent birds) established territories. Finally, in April 1987, a pair with one member of Patuxent origin was observed with a small chick.

In all, four pairs with at least one member of Patuxent origin were observed in 1987.

The future of the Mississippi sandhill crane, while not yet fully secure, is brighter now than in 1972 when the bird was described as a distinct subspecies. A sizeable National Wildlife Refuge now exists and its staff is actively involved in habitat restoration. A captive flock, now well established at PWRC, serves as a gene reservoir and a continuing source of eggs and young to bolster the wild population. The near future calls for additional habitat modification and enlargement of the captive flock until 15 breeding pairs annually produce 20 young for release. Eventually, the wild population must become self-sustaining. If current management efforts continue successfully, this goal may be reached in as few as 10 years.

Two additional programs recently have been employed to augment the wild flock. Beginning in 1982, viable eggs laid at Patuxent have been placed in the wild nests that contain infertile eggs. To date, 11 Patuxent eggs have been substituted, of which 10 have hatched. The feasibility of conducting foster-parenting at the refuge also is being investigated. Five pairs of Florida sandhill cranes have been placed in pens at the refuge and, if these pairs can successfully, routinely rear young, their eggs could be replaced with Mississippi sandhill crane eggs from Patuxent or the wild. Some Mississippi young could, therefore, be raised in their native environment. To date, none of the Florida pairs have nested, although courtship behavior has been observed.

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[1] U. S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708

[2] Southern Connecticut State University, New Haven, Connecticut 06515

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woodlands were recommended for addition to the list as well. The ants are threatened by the exotic Argentine ant and habitat loss in valley oak riparian areas. A recent survey of the butterflies of California revealed that the Pheres blue butterfly (*Icaricia icarioides pheres*), which was once believed to be extinct, does exist but is not abundant.

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Grazing and geothermal development appear to threaten several caddisfly species in the eastern Sierra Nevada that are confined to springs on public range land. One species (*Desmona pethula*) has a larval stage that leaves the water and crawls on land (with its case attached to its body) to feed on streamside vegetation. This is very unusual because most caddisflies spend their entire larval and pupal stages in the water.

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The owner of the Rio Verde Estates parcel is preparing to develop his property on San Bruno Mountain, and a permit application has been received by Daly City. The SESO has advised Daly City that the application generally conforms to the Habitat Conservation Plan agreement, but that the addition of one acre of permanent disturbance will likely require an amendment to the plan. The owner has agreed to add an acre from his adjacent Rio Verde Heights parcel as habitat compensation.

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An agreement is being developed to guide long-term management of the California least tern (*Sterna antillarum browni*) at Oakland Airport. This agreement is required by the Corps of Engineers through a Section 7 consultation on the airport's proposed fill of 450 acres of wetlands. Unless the agreement is accomplished within one year of permit issuance, the airport cannot construct its proposed runway and taxiway extension through the existing least tern colony site.

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An informal consultation with the Corps of Engineers on the proposed replacement of the Mud Slough bridge by Southern Pacific Railroad will result in some positive benefits. The loss of about 0.19 acres of wetlands and possible salt marsh harvest mouse (*Reithrodontomys raviventris*) habitat will be offset by development of a plan that calls for: (1) 0.25 acres of new habitat, (2) long-term monitoring to ensure successful revegetation, and (3) permanent protection of all salt marsh harvest mouse habitat on the railroad right-of-way.

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The Warner sucker (*Catostomus warnerensis*) has recently been documented in the potholes area in northern Warner Valley, Oregon. This area is under consideration for acquisition by the Bureau of Land Management (BLM) to help conserve the species.

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Seedlings of Malheur wirelettuce (*Stephanomeria malheurensis*) were placed in an enclosure built by the BLM's Burns District Office in southeast Oregon. Eight volunteers assisted in the project.

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A Cooperative Agreement with the State of Idaho was signed for conservation of rare, endangered and threatened plants. The Idaho Department of Parks and Recreation is now eligible to participate in the Endangered Species Grant-in-Aid Program under Section 6 of the Endangered Species Act. Idaho's first project will consist of status surveys for seven candidate plants.

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Through May 20, 1987, production of Endangered raptors at the World Center for Birds of Prey near Boise, Idaho, for the season included approximately 414 peregrine falcon (*Falco peregrinus*) eggs and 10 Mauritius kestrel (*Falco punctatus*) eggs.

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The U.S. Forest Service requested informal consultation on a proposed timber harvest adjacent to the Golden Trout Wilderness Area in the Sequoia National Forest, California, to obtain input on the placement of harvest units, location of roads, timing and intensity of cuts, and other technical matters. The Sequoia Forest staff has expressed a strong desire to design and carry out the sale in a manner that will avoid impacts to the Little Kern golden trout (*Salmo aguabonita whitei*).

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The spring population census of the Borax Lake chub (*Gila boraxobius*) showed that cattle grazing and recreational use are becoming major concerns. About 250 head of cattle were enclosed within the designated Critical Habitat, and damage to salt crusts and marsh vegetation was evident. Because of these problems, The Nature Conservancy is stepping up its negotiations for acquisition of the area. The BLM has been requested to lock gates into the Critical Habitat.

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The single Hawaiian crow (*Corvus hawaiiensis*) egg reported laid April 30, 1987, at the Olinda Endangered Species Facility on the island of Maui has been candled and found to contain a dead embryo. Olinda's aviculturist estimated

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that the embryo survived for 2 to 3 days. The cause of death has not yet been determined. A dummy egg placed in the nest has been removed to encourage production of another egg. Two other pairs of crows at the facility have built nests.

Field surveys to determine the current distribution and population size of the Hawaiian crow in the wild have focused on locating individual birds and breeding pairs on the island of Hawai'i, within koa forests 3,500 to 5,500 feet in elevation on the western slopes of Hualalai and Mauna Loa. Two birds were found on the State-owned Waiea Tract in the South Kona district. Surveys during the next quarter will examine lower elevation wet ohia forests and other geographic areas that formerly were occupied by the crow.

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A forest bird survey conducted during April on the island of Rota, Commonwealth of the Northern Mariana Islands, showed that populations appeared to be healthy and have remained stable since the 1982 survey. The status of the Rota bridled white-eye (*Zosterops conspicillata rotensis*), a Category 2 listing candidate, and the Mariana crow (*Corvus kubaryi*), an Endangered species, appears unchanged. The Rota population of the Endangered Mariana fruit bat (*Pteropus mariannus mariannus*) has been slowly increasing in numbers since 1982 and is estimated at around 2,000. A moratorium on hunting, along with the presence of a conservation officer permanently stationed on the island, is believed to be responsible for the increase in numbers.

Region 2 -Dr. James Lewis, FWS Whooping Crane Coordinator, attended the first meeting of Canada's Whooping Crane Recovery Team as the representative for the U.S. Meeting participants reviewed a draft of Canada's whooping crane (*Grus americana*) recovery plan, which is now approved in principle by Director General Clarke. The Canadian Wildlife Service expects to publish the plan shortly.

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The *Proceedings of the 1985 Crane Workshop* have been published and 150 copies distributed to FWS personnel working on management or research of whooping cranes and sandhill cranes (*Grus canadensis*). The proceedings were edited by Dr. Lewis and Jerry W. Ziewitz, and jointly published by the Platte River Trust and the FWS.

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Surveys by Ernie Kuyts of the Canadian Wildlife Service located 30 whooping crane nests this spring at Wood Buffalo National Park, Canada. On May 21, one egg was removed from each of 24 nests for transfer to Grays Lake National Wildlife Refuge, Idaho, and the Patuxent Wildlife Research Center, Maryland. As an experiment, an egg from a twenty-fifth nest was placed on a nest occupied by a female that previously had lost eggs to predators. Later observations revealed that the female continued to incubate the transferred egg. Twenty-nine active nests containing a total of 32 eggs remain at Wood Buffalo.

A drought at Grays Lake was interrupted by over 3 inches of rain in late May. The recent rains will enhance whooping crane chick rearing conditions in early summer, but a resumption of the drought could still cause poor summer-long brood rearing conditions; therefore, only 12 whooping crane eggs were taken from Wood Buffalo to Grays Lake for use in the cross-fostering experiment. These eggs were placed in the nests of the more successful sandhill crane foster parents, with territories located on more permanent wetland sites where the chance for survival of the whooping crane chicks is greatest. Ten of the 12 eggs had living embryos. Biologists were uncertain about the other two, but their embryos may have been in early stages of development where viability is more difficult to confirm.

Twelve Canadian whooping crane eggs sent to Patuxent to add to the captive flock included seven viable eggs, three that probably were infertile, and two of uncertain status.

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Mid-May aerial surveys located 17 of the 21 whooping cranes seen in Colorado during spring migration. In addition, the remains of one of last summer's fledged young was found a few hundred miles from Grays Lake, Idaho, where it died of an unknown cause during fall migration. Only two young were fledged in the summer of 1986. The remaining young bird is doing well. Three of the four female whooping cranes translocated from isolated summering sites and released at Grays Lake last summer were found during the aerial surveys. One had returned to the site where it was first captured in 1986, while the other two chose summering sites over 100 miles from Grays Lake and from their capture sites of 1986.

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A new population of the Texas snowbells (*Styrax texana*) has just been planted in the Endangered shrub's native Hill County habitat west of San Antonio. Until now, only 39 wild plants were known, these mostly growing on cliffs where they were safe from livestock and deer browsing. The reestablishment project is being directed by the San Antonio Botanical Gardens, with help from Southwest Texas Junior College, Texas Natural Heritage Program, and the FWS. The new population is being started on a private ranch with full landowner cooperation and assistance from the ranch manager. The selected site seems ideal, having water, soils, and topography similar to other sites supporting the species. Twenty-five seedlings grown by the San Antonio Botanical Gardens were planted in protective wire cages at various cliffside localities. The young plants will be monitored to determine which of the sites are most suitable for survival and growth.

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A total of 34 thick-billed parrots (*Rhynchopsitta pachyrhyncha*) have now been released in the Chiricahua Mountains of southern Arizona. Thirteen of the parrots overwintered in Arizona, but were becoming difficult to track because of failing radios. An additional five birds with radios were released into the existing flock this spring so that biologists could continue to use telemetry to monitor the birds' movements. As of early June, the flock had been more sedentary recently, which suggests that the birds may remain in the area throughout the summer and attempt nesting. The thick-billed parrot generally nests in midsummer to coincide with the increase in the availability of pine seeds, its primary food. This project is a cooperative program with the Arizona Game and Fish Department, U.S. Forest Service (Coronado National Forest), FWS, Los Angeles and San Diego Zoos, Jersey Wildlife Preservation Trust (United Kingdom), and International Council for Bird Preservation (U.S.).

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Four new bald eagle (*Haliaeetus leucocephalus*) nesting territories were discovered in Arizona this spring. A total of 23 sites were occupied in Arizona, with 19 of them active. As of May 29, 23 nestings of fledglings survived. If all 23 fledge, the 1987 nesting season will be a record level of productivity for the southwest population.

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Two adult Endangered Colorado squawfish (*Ptychocheilus lucius*) were captured from the San Juan River, New Mexico, by an interagency team of biologists from the U.S. Bureau of Reclamation, New Mexico Department of Game and Fish, University of New Mexico, and FWS. The fish, captured by electro-fishing, represent the first confirmation of the species in New Mexico in over 25 years. Additional surveys are planned for this summer and fall. A similar survey effort is being conducted concurrently on the Utah portion of the river by the Utah Division of Wildlife Resources.

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The BLM, in cooperation with the FWS and Arizona Game and Fish Department, has initiated a program directed toward removal of exotic fish species from stock tanks on BLM lands within the Aravaipa Creek watershed of Arizona. Removal of such exotics as green sunfish (*Lepomis cyanellus*) and bullheads (*Ictalurus* spp.) is necessary to prevent movement of these fish into Aravaipa Creek where they would prey upon the Threatened spikedace (*Meda fulgida*) and loach minnow (*Tiaroga cobitis*).

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Twenty-one Endangered Chihuahua chubs (*Gila nigrescens*) were captured

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from the Mimbres River, New Mexico, and taken to Dexter National Fish Hatchery. The chubs will be used to supplement the existing broodstock, which originated from 10 fish captured from the Mimbres River in 1979. Future plans involve stocking their offspring into selected tributaries of the Mimbres River after an agreement is reached among the FWS, U.S. Forest Service, and New Mexico Department of Game and Fish.

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The Nature Conservancy has purchased 11,503 acres of Matagorda Island, Texas, and the FWS recently paid $3 million for a portion of the acquisition. As funds become available, the balance will be purchased from the Conservancy over the next 2 years. This portion of Matagorda Island contains winter territories of several whooping crane family groups and has suitable habitat for expansion of the Aransas flock. The Conservancy portion of the tract will be managed by the FWS under a lease management agreement.

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The New Mexico ramshorn snail (*Pecosorbis kansasensis*), a native of southeastern New Mexico, will be the subject of a status and distribution study this summer. The study is jointly funded by the U.S. Forest Service, New Mexico Department of Game and Fish, and FWS, and will be conducted by Dr. Richard Smartt of the New Mexico Museum of Natural History and Dr. Art Metcalf of the University of Texas at El Paso. This minute (1/4-inch) snail lives in small pools within bedrock basins in ephemeral stream channels, and is currently known from only two localities. Potential threats to the existence of the snail at those two locations include gravel mining, pesticide spraying, and oil and gas development.

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The annual meeting of the Region 2 herpetological team was held in Phoenix, Arizona, on April 10 and 11. The team reviewed recently completed status work on the Chihuahuan mud turtle (*Kinosternon hirtipes murrayi*) and Sonoran tiger salamander (*Ambystoma tigrinum stebbinsi*. The team recommended that the turtle be moved from candidate Category 2 to 3C as a result of that work, and that the salamander be retained in Category 2 pending further clarification of its taxonomic status. (Category 2 taxa are those for which there is evidence that a listing proposal possibly is appropriate but for which there is not yet enough evidence to support publication of a proposal. Category 3C comprises taxa once under consideration for listing but now thought to be more abundant and/or less subject to threat.) The draft revision of the FWS Notice of Review of animal candidate species was examined and changes in the status of several species were recommended.

The primary topic of the meeting concerned the apparent decline of leopard frogs in the U.S., particularly in the Southwest. Populations of several species of leopard frogs and other *Rana* species are disappearing. Some are experiencing sudden, complete adult die-offs. The team recommended that the FWS pursue toxicological studies, concentrating on the lowland leopard frog (*Rana yavapaiensis*), which may be experiencing the same type of adult mortalities that resulted in the extirpation of the Tarahumara frog (*Rana tarahumarae*) from the U.S. Any persons having information on declines of leopard or other ranid frogs in the U.S. or Mexico are urged to contact the Region 2 Endangered Species Office (address and phone number on BULLETIN page 2).

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Implementation of the Stacy Dam biological opinion in west-central Texas is under way. A herpetologist, Okla Thornton, has been hired by the Colorado River Municipal Water District and is already in the field implementing the alternatives necessary to eliminate jeopardy to the Threatened Concho water snake (*Nerodia harteri paucimaculata*). Exceptionally high rainfall and a late spring should provide excellent habitat for the snake and its principal food source — fish. Habitat manipulation to improve juvenile feeding areas (riffles) and guaranteed stream flows make up the major alternatives to be implemented by the water district. The U. S. Army Corps of Engineers has issued the Section 404 and Section 10 permits that authorize Stacy Dam, and construction will begin soon. Before construction is completed in 1990, over 100 miles of suitable habitat on the Colorado River are to be created or improved, and at least one tributary stream, Ash Creek, will be protected for the Concho water snake.

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Recent investigations have revealed that the Endangered woundfin minnow (*Plagopterus argentissimus*) is facing serious threats. It is being completely replaced by an exotic species, the red shiner (*Notropis lutrensis*). The woundfin minnow is found only in the Virgin River of Nevada, Arizona, and Utah. In the 1970's, introduced red shiners began increasing in abundance in the Nevada portion of the river. By 1980, they had completely replaced woundfin there and become increasingly common in collections from the Arizona portion of the river. It was hoped, however, that the Virgin River Narrows, a 10-mile-long canyon, would restrict movement of the red shiner into the Utah portion of the river because the Narrows is normally dry and only contains water during the spring runoff or after summer storms. However, red shiners were discovered above the Narrows in the Utah portion of the river in 1984. By fall 1986, red shiners represented 84 percent of the fish collected near St. George, Utah. In contrast, woundfin represented only 3.2 percent. The immediate concern is that red shiners will move above the Washington Fields Irrigation Dam and replace woundfin in the last 8 to 10 miles of the Virgin River, which currently is not contaminated. Immediate action must be taken to prevent the further spread of red shiners. Chemical renovation of the river from the Washington Field Diversion to the Narrows may be the only solution.

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Region 4 -A cooperative effort by the Alabama Department of Conservation and Natural Resources, Samford University, and the FWS has resulted in the identification of six potential transplant sites for reestablishment of watercress darter (*Etheostoma nuchale*) populations. This darter is known from only three locations, all spring ponds in urban areas of Jefferson County, Alabama. Four of the six potential sites are receiving final consideration. Conservation agreements permitting the introduction of the darters to the springs have been developed with the landowners of two of the sites. Two additional springs may receive darter populations pending their designation as sites of "nonessential experimental populations."

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The U.S. Forest Service has funded a $32,000 challenge grant proposal from the FWS, North Carolina and Tennessee Heritage Programs, and North Carolina Plant Conservation Program to assist in mountain bald (alpine meadow) management. Of special concern is a 10,000-acre area of the Roan Mountain Massif, located on the North Carolina/Tennessee border, which includes 13 candidates for Federal listing and numerous State-listed species. A meeting of all involved agencies was held in late March to plan this season's work and discuss hiring of field assistants.

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The small captive colony of Choctawhatchee beach mice (*Peromyscus polionotus allophrys*) at Auburn University in Alabama produced its first offspring on March 10, 1987. Establishment of captive Perdido Key (*P. p. trissyllepsis*) and Alabama (*P. p. ammobates*) beach mice colonies also is planned.

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Approval has been obtained from the U.S. Forest Service for prescribed burning, a habitat management technique, in North Carolina's Linville Gorge wilderness. Ten plots were burned in March to test the effects of fire on mountain golden heather (*Hudsonia montana*), which occurs only within this wilderness area. During the burning, the first sighting for the year was made of a territorial pair of peregrine falcons that had returned to the gorge, hopefully to nest.

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A long-standing Florida manatee (*Trichechus manatus*) consultation under Section 7 of the Endangered Species Act has been resolved. The firm of Ferinel, Inc. had requested a permit from the U.S. Army Corps of Engineers to develop a marina on the North Fork of the St. Lucie River in Florida, an area from which the FWS had no information concerning manatee use. As part of the resolution, Ferinel agreed to fund a survey of natural resources and manatee use in the area. The results indicated no verifiable manatee use within a 5-mile (8-kilometer) radius of the project site, most likely due to the absence of food and other suitable habitat characteristics.

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A study has begun in an effort to determine the impact of boat wakes on seagrasses in Hobe Sound (Martin County, Florida), a manatee feeding area. The study is a cooperative effort of the Beaufort Laboratory of the National Marine Fisheries Service, the Marine Research Laboratory of the Florida Department of Natural Resources (DNR), the FWS Jacksonville Office, and the Sirenia Project. The 3-year study will determine the hydrological factors influencing seagrass productivity, composition, and distribution within Hobe Sound. The Florida DNR will use the data to evaluate the necessity for establishing a "no-wake zone" in Hobe Sound.

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This spring, the Jacksonville Office was notified that a Florida Department of Transportation (DOT) project would have an impact on the manatee. The project involved replacement of a 10-foot-wide culvert under South Patrick Road on Merritt Island with two 5-foot-wide culverts. The length of the culvert would be increased from about 40 to 85 feet. Following an on-site meeting with DOT, the Jacksonville Office consulted with the Florida DNR about the advisability of the project. It was decided that, to protect the manatee and eliminate the possibility of injury or death, the old culvert should be replaced with another that is 10 feet wide. This would permit manatees ample room to move through and provide enough air space in times of high water. As of June 4, a final decision had not been made by the Florida DOT to accept this recommendation. No federal funding is involved in the project.

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The Jacksonville Office has received a final status survey report on the Florida scrub lizard (*Sceloporus woodi*). The survey was conducted by the Florida Cooperative Fish and Wildlife Research Unit in Gainesville. An attempt was made to visit all remaining scrub sites within the historical range of this endemic Florida species; 529 sites were searched and 359 had scrub lizards. Many historical sites have disappeared because of conversion to citrus groves, housing, or commercial uses. The scrub lizard is nearly extirpated from the Gulf Coast of Florida, and its central and east coast scrub habitats have decreased greatly. Secure populations remain in Ocala National Forest, a State park, a State preserve, a National Wildlife Refuge, and several private conservation lands. While the scrub lizard is still widespread, its populations are expected to continue their decline.

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Eglin Air Force Base in Walton County, Florida, proposes to extend an existing golf course through Mill Creek, one of five streams that the Endangered Okaloosa darter (*Etheostoma okaloosae*) inhabits. Approximately 90 percent of the darter's range occurs on Eglin Air Force Base. Jacksonville Office biologists met with Air Force personnel this spring to discuss design constraints and actions to minimize impacts to the creek. Okaloosa darters require streams of small to medium size with a moderate to swift current and a clear, sandy substrate. Due to its limited range, the darter is especially vulnerable to habitat destruction. A Section 7 consultation is in progress.

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A helicopter survey of northern Georgia cliffs was conducted by the Asheville, North Carolina, Field Office and the U.S. Forest Service to determine the potential for peregrine falcon hacking sites and/or occupancy. Twenty-two cliffs were considered, but only two (in addition to the two already accepted for hacking) offered much potential.

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Region 5 - On March 27 and 28, a cave important to the Endangered Virginia big-eared bat (*Plecotus townsendii virginianus*) was gated to prevent disturbance of bats by unauthorized visitors. The gating project was a combined effort by the FWS (biologists from the Annapolis, Maryland, and Asheville, North Carolina, Field Stations), Cave Conservation Institute, West Virginia Department of Natural Resources/ Non-Game Program biologists, and volunteers from Albright College in Reading, Pennsylvania. Located on Monongahela National Forest land in West Virginia, the cave houses the second largest known Endangered big-eared bat maternity colony. This is the first time that an angle iron design (zero air flow restriction) gate has been placed on an Endangered bat maternity colony site. The decision to use this gate design was based on the results of a Patuxent Wildlife Research Center (PWRC) study conducted at this cave, which indicated that the bats would fly through the angle iron bars. The cave also has an alternate entrance available to the bats. The bats' use of the gate will be carefully monitored this summer.

* * *

Biologists from the FWS Gloucester Point, Virginia and Annapolis Field Stations, in collaboration with refuge personnel and the PWRC, are conducting a study assessing the presence and impacts of several types of contaminants on the ecosystem of the Dismal Swamp National Wildlife Refuge and on the Threatened Dismal Swamp shrew (*Sorex longirostris fisheri*). An inactive landfill adjacent to the refuge is suspected as a source of these contaminants, which include the pesticide chlordane. Samples of sediments, fish, and small mammals will be analyzed to determine whether or not any of these toxic substances occur at levels that could pose a threat to the shrew or to other fish and wildlife resources at the refuge.

Region 6 -Spring 1987 marked the seventh whooping crane migration during which aerial surveys were flown by the FWS Grand Island, Nebraska, Field Office. Fifty-four miles of whooping crane Critical Habitat along the Platte River between Grand Island and Lexington, Nebraska, are flown daily, weather permitting, during spring and fall migrations to determine whooping crane use and site characteristics. The earliest arrival and longest stay for a whooping crane in Nebraska was recorded this spring; a juvenile crane, which became separated from its parents during the 1986 fall migration and spent the winter with sandhill cranes in Oklahoma, was observed in the Platte River Valley for 34 days between March 17 and April 19. During survey flights, 10 riverine roost sites used by the juvenile were identified, and 5 site evaluations were completed.

* * *

As part of the Greater Yellowstone Bald Eagle Research Project, a breeding pair of bald eagles is being monitored in Grand Teton National Park, Wyoming. The adult male from the territory was trapped March 1, 1987, and fitted with a radio transmitter. The eagle was tracked until April 14, when it was determined that something was wrong. The researchers were able to capture the bird, which had extensive damage to the basal portion of the upper mandible. It was apparent that the bird had been hit by a small caliber bullet. As a result of the injuries, the male will be euthanized, ending the pair's nesting attempt. The female remains in the area, exhibiting high fidelity to the territory. Within a week of the nest failure, a subadult male and adult male moved into the area. The Greater Yellowstone research group will continue to monitor the long-term outcome of this territory, which has been occupied for the last 20 years.

* * *

For the second year, a pair of peregrine falcons is nesting in a box on a ledge near the roof of the Hotel Utah in Salt Lake City, Utah. This year, the female returned with a new, younger mate. Four viable eggs have been found in the nest.

* * *

Good news about the black-footed ferrets (*Mustela nigripes*) being held at the Wyoming Game and Fish Department's Sybille, Wyoming, captive breeding facility: a litter of six young ferrets was born

(continued on page 12)

Regional News

(continued from page 11)

June 6! As of mid-June, all six were gaining weight and appeared healthy. Several other litters are anticipated, and could arrive up through July 4.

This success in the first year of the program is due to the efforts of the Captive Breeding Specialist Group; Dr. Don Kwiatkowski, the biologist assigned to the captive breeding facility; and Dr. Tom Thorne, the Wyoming Game and Fish Department's wildlife veterinarian.

* * *

The Colorado River Fishes Recovery Team met in Las Vegas, Nevada, April 15 - 17, 1987. The meeting was called primarily to revise and update the recovery plans for the Colorado squawfish, bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*). Completed revisions should be ready for distribution at the end of calendar year 1987. The team believes that drastic measures will be necessary to prevent extinction of the bonytail chub, among them collection of all individuals encountered in the wild for use in captive propagation. It will also be necessary to release their offspring to augment existing populations as soon as possible. The team further recommended listing the razorback sucker (*Xyrauchen texanus*) as an Endangered species throughout the Colorado River Basin.

* * *

Region 8 (Research) - Another Aleutian Canada goose (*Branta canadensis leucopareia*) was found dead March 14, 1987, in the migration staging area near Crescent City, California. The FWS National Wildlife Health Center's necropsy found 17 lead shot pellets in the gizzard. A tentative diagnosis of lead poisoning was confirmed by liver lead analysis in early April. This is the third lead-poisoned Aleutian Canada goose to be diagnosed this season.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	26	20	242	5	0	22	315	23
Birds	60	16	141	4	2	0	223	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	23	6	0	83	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	5	0	0	13	12
Plants	121	6	1	26	3	2	159	56
TOTAL	303	52	466	82	15	37	955	247**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 213
Number of species currently proposed for listing: 22 animals
32 plants

Number of Species with Critical Habitats determined: 97
Number of Cooperative Agreements signed with States: 47 fish & wildlife
27 plants

May 31, 1987

May–June 1987 Vol. XII No. 5–6

ENDANGERED SPECIES

Technical Bulletin

Department of Interior U S Fish and Wildlife Service
Endangered Species Program, Washington, D C 20240

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ENDANGERED SPECIES

Technical Bulletin
Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Twelve New Listings Approved

During June 1987, five animal and seven plant taxa were added to the Federal list of Endangered and Threatened species. These approved listing actions are summarized below:

Flattened Musk Turtle (*Sternotherus depressus*)

A small freshwater turtle with a distinctively flattened carapace, this species is endemic to the Black Warrior River system in Alabama. Its numbers and range, already reduced, are threatened by collectors, disease, and habitat degradation from siltation and water pollution. The flattened musk turtle was proposed for listing in the November 1, 1985, *Federal Register* (see summary in BULLETIN Vol. X No. 12) as a Threatened species, and the final rule was published June 11, 1987.

Alabama Red-bellied Turtle (*Pseudemys alabamensis*)

Another freshwater turtle from Alabama, *P. alabamensis* inhabits the lower floodplain of the Mobile River drainage in Baldwin and Mobile Counties. The only known area repeatedly used for nesting is an island in the Tensaw River. Turtle populations nesting at this site are threatened by high rates of egg predation (mostly by fish crows, *Corvus ossifragus*) and heavy disturbance by people that use the island beach for recreation. Both factors result in a low reproductive success rate for the turtle. Trapping and sale of turtles for food and the pet trade further threaten the species. The Alabama red-bellied turtle was proposed for listing on July 8, 1986 (summary in BULLETIN Vol. XI No. 8), and the final rule listing it as Endangered was published June 16, 1987.

Mount Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*)

This subspecies is found only within Coronado National Forest in the Pinaleno Mountains of southeastern Arizona. The restricted and isolated habitat of the Mount Graham red squirrel has declined significantly over the past century and may face additional losses from logging, recreational development, and construction of a major astrophysical facility. Other potential threats are the subspecies' small population size (about 265 individuals) and competition from an introduced, non-native squirrel species. The May 21, 1986, proposal to list the Mount Graham red squirrel as Endangered (summary in BULLETIN Vol. XI No. 6) was made final June 3, 1987; however, final action on a Critical Habitat proposal has been delayed for further study. A final Critical Habitat decision must be reached no later than May 21, 1988. In the meantime, other habitat protection measures under Section 7 of the Endangered Species Act are already in effect.

Florida Scrub Jay (*Aphelocoma coerulescens coerulescens*)

Found only in central peninsular Florida, this subspecies is another victim of the region's loss of native scrub habitat. The Florida scrub jay occurs in some of the most rapidly developing real estate in Florida. At least 40 percent of former sites no longer support the bird, and the total population has declined by one-half over the past 100 years. This subspecies was proposed May 21, 1986, for listing as Threatened (summary in BULLETIN Vol. XI No. 6), and the final rule was published June 3, 1987.

Blackside Dace (*Phoxinus cumberlandensis*)

The blackside dace is a 3-inch, brightly colored fish that inhabits small streams within the upper Cumberland River basin in extreme southeastern Kentucky and northeastern Tennessee. Its range is believed to have declined substantially due to siltation and other water quality problems. Surveys indicate that segments of only 9 streams, totalling 8 stream-miles, still contain healthy populations. Because of continuing threats to the fish, the Service proposed May 21, 1986, to list it as a

(continued on page 7)

Alligator Reclassified Rangewide

The American alligator (*Alligator mississippiensis*), a reptile once in danger of extinction, has recovered to the point that the Fish and Wildlife Service recently removed it from classification as a Threatened and Endangered species (F.R. 6/4/87). It will remain, however, under a "Threatened due to Similarity of Appearance" (T/SA) classification as a means of protecting still-jeopardized crocodilian species that have similar hides.

Concern about poorly regulated or unregulated exploitation for the hide industry led the Service in 1967 to federally list the alligator as Endangered. Its comeback has been a major success story. Under State and Federal protection, the alligator began to recover in areas of Louisiana, Texas, and Florida as early as 1975. As its numbers increased, the alligator was reclassified to Threatened in coastal areas of Georgia and South Carolina, and T/SA in Louisiana, Texas, and Florida. The June 4, 1987, reclassification of the remaining areas to T/SA recognizes the recovery of the species rangewide.

Under the T/SA classification, States are responsible for management of alligators and may conduct commercial hunting seasons. Data gathered in recent years by Louisiana and Florida wildlife agencies indicate that, with proper management, past mistakes can be avoided and overhunting should no longer be a threat.

Although the American alligator is no longer believed to be in danger of extinction, a number of other crocodilian species with hides of similar appearance remain very vulnerable. The category of T/SA, described in Section 4(e) of the Endangered Species Act, permits Federal controls and monitoring in the trade of species thus classified in order to facilitate the protection of other species still listed as Endangered or Threatened. A tagging system will allow law enforcement personnel to distinguish between legally taken alligators and illegally taken crocodilians.

Further details on the reclassification are available in the June 4, 1987, *Federal Register*.

Regional News

Endangered species program regional staff members have reported the following activities for the month of June:

Region 1 - A second colony of the palmate-bracted bird's-beak (*Cordylanthus palmatus*), containing about 800 plants, was confirmed at the Mendota Wildlife Area in California's Central Valley. The original colony, which was transplanted, was apparently destroyed by a flood in 1984. The native habitat of the bird's-beak on the Mendota Wildlife Area occurs in a remnant alkali-scrub community.

* * *

The Sacramento Endangered Species Office staff investigated a new locality for the rough sculpin (*Cottus asperrimus*) in Lost Creek, part of the Hat Creek drainage in Shasta County, California. This locality was reported in a survey undertaken for the permit applications for three small hydroelectric projects. The rough sculpin is listed by the State of California as threatened and is a Category-2 candidate for a future Federal listing. Voucher specimens have been sent to taxonomic authorities for confirmation of the field identification.

* * *

One of the nine Hawaiian crows (*Corvus hawaiiensis*) at the Olinda Endangered Species Breeding Facility on the island of Maui died from egg impaction in the oviduct on June 10, 1987. It was the only bird at the facility to lay any eggs this year. It's two eggs were fertile, but the embryos survived for only about 2 days. The adult crow's carcass is being sent to the National Wildlife Health Lab in Madison, Wisconsin, for a more thorough necropsy. It is estimated that fewer than 18 of the species remain.

* * *

The Environmental Protection Agency has approved an Animal and Plant Health Inspection Service proposal to spray the island of Rota, Commonwealth of the Northern Mariana Islands, with a mixture of a pheromone and malathion for the control of fruit flies. The Fish and Wildlife Service believes the fruit fly eradication effort will not likely adversely affect the Endangered Mariana crow (*Corvus kubaryi*), the only listed species known to be on the island.

* * *

The first group of peregrine falcons (*Falco peregrinus*) were sent from the Peregrine Fund's facility in Boise, Idaho, to hack sites in Montana, Idaho, Wyoming, Oregon, and Washington. The Peregrine Fund anticipates that a total of 125 birds will be placed at hack sites or used to augment natural eyries this year.

* * *

Since the outmigration of cui-ui (*Chasmistes cujus*) larvae has been completed, flows for this fishery from Stampede Reservoir on Nevada's Truckee River have been terminated. About 100,000 cubic feet of water was used for this year's cui-ui spawning run.

* * *

Recent surveys have documented that the Delta smelt (*Hypomesus trans-*

(continued on page 3)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Acting Chief*
Office of Endangered Species
(703-235-2771)
Richard L. Jachowski, *Acting Chief, Federal Wildlife Permit Office*
(703-235-1937)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director,* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Stephen W. Parry, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Director;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories **Region 2:** Arizona, New Mexico, Oklahoma, and Texas **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7:** Alaska **Region 8:** Research and Development nationwide

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pacificus) is experiencing a significant decline. On the basis of information presented at the annual meeting of the California-Nevada Chapter of the American Fisheries Society, the Sacramento Office recently recommended the addition of this fish to the Notice of Review of Vertebrate Wildlife as a Category-1 listing candidate. The Sacramento splittail also was recommended as a candidate species (Category 2).

Region 2 - June surveys by Canadian Wildlife Service biologists indicated at least 24 whooping crane (*Grus americana*) chicks had hatched at Wood Buffalo National Park, Canada. Two late nests, established by new pairs, were discovered, making a new total of 32 nests. During the May egg transfers, biologists discovered a female whooping crane sitting on a nest although a predator had destroyed the eggs. They placed in the nest a good egg from another nest that contained two eggs. The pair of whoopers who lost their own eggs to a predator now have a big chick from the substitute egg. All of the 12 eggs transferred from Canada to Grays Lake National Wildlife Refuge, Idaho, have successfully hatched. Water conditions in Canada, and at Grays Lake (where there were 5 inches of rainfall in late May and early June), are satisfactory for chick rearing.

* * *

Since 1975, individuals involved in sandhill crane (*Grus canadensis*) and whooping crane research and management have met for a workshop every 3 years. Meeting announcements and the invitations for papers have been mailed for the next workshop, which is scheduled for late February 1988 near Orlando, Florida. Dr. James Lewis, the Service's Whooping Crane Coordinator, and Steve Nesbitt of the Florida Game and Fresh Water Fish Commission will be the co-chairmen of this workshop.

* * *

The Wyoming Cooperative Fishery and Wildlife Research Unit completed its second spring monitoring sandhill crane collisions with powerlines in Nebraska. In this project, the sandhill cranes are being used as a research surrogate species, substituting for the much rarer whooping crane. Collisions with powerlines are the number one cause of fledged whooping crane losses. The study is investigating factors that influence collisions and sections of lines suitable for testing the efficiency of line identifying markers in reducing collisions. The researchers found 75 dead sandhill cranes beneath lines this spring and observed collisions on 6 occasions in which the cranes were injured but able to leave the vicinity of the lines. Unit personnel have prepared a proposal for coopera-

(continued on page 4)

Texas Plant Proposed for Listing Protection

The large-fruited sand-verbena (*Abronia macrocarpa*), a herbaceous perennial in the four-o'clock family (Nyctaginaceae), is endemic to Leon County in eastern Texas. Only one small population is known, and it faces threats from residential development, recreation, and commercial use. Because this species is believed to be in danger of extinction, the Fish and Wildlife Service has proposed to list it as Endangered (F. R. 6/16/87).

Restricted to actively blowing sand dunes in the post oak and grassland mosaic vegetation types, the large-fruited sand-verbena is one of the many herbaceous species that temporarily dominate the bare sands during spring. The only known population occurs on dunes that lie entirely within a residential resort community. Although the dunes cover approximately 30 acres, the area occupied by *A. macrocarpa* is much less. In 1986, the Service estimated that the population contained about 250 plants. Residential expansion and recreational activities (e.g., horseback riding, off-road vehicle use) associated with the surrounding resort community already have destroyed some habitat. The landowner has been informed of the species' presence, and the Service plans to develop a cooperative management strategy that will accommodate *A. macrocarpa* habitat. Nevertheless, because the plant is so rare and is restricted to such a small area, it remains vulnerable to extinction.

Comments on this listing proposal are welcome, and should be sent to the Regional Director, Region 2 (address on page 2 of this BULLETIN), by August 16, 1987.

Available Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own laws against take of listed plants.

photo by Charles McDonald

Showy pink-purple flower clusters make* Abronia macrocarpa *an attractive part of the spring wildflower display in Texas. From 20 to 75 flowers are arranged in each spherical nodding head, which is about the size of a golf ball or larger. The plant's stems bear hairy leaves and can reach 20 inches in height.

Changes in Classification of Zimbabwe Crocodiles

In the June 17, 1987, *Federal Register*, the U. S. Fish and Wildlife Service published a final rule reclassifying ranched populations of the Nile crocodile (*Crocodylus niloticus*) in Zimbabwe from Endangered to Threatened. Also published was a proposal to give the same classification to wild crocodile populations in that country.

Originally, the Service had proposed to reclassify ranched crocodile populations in Zimbabwe to the special category of "Threatened due to Similarity of Appearance" or T/SA (see summary in BULLETIN Vol. XI No. 4). Such a designation would have recognized their recovery but regulated trade in ranched Nile crocodiles in order to protect wild populations of this species as well as other crocodilians that still need protection. However, because the crocodile ranches remain somewhat dependent on wild eggs for replenishing their stock and because wild populations are still threatened to a degree by poaching, the Service now believes that a reclassification of ranched populations to the category of Threatened (rather than T/SA) is more appropriate.

At the 1983 meeting of parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), both ranched and wild populations of the Nile crocodile in Zimbabwe were moved from Appendix I to the less restrictive Appendix II. The Service's reclassification of ranched Nile crocodiles in Zimbabwe under the Endangered Species Act from Endangered to Threatened is consistent with the new CITES classification. Under a special rule, it is now legal to import live ranched Zimbabwe crocodiles or whole skins into the U. S., provided that all applicable CITES regulations and Zimbabwe laws are met. Even though ranched populations still face some threats, the Service believes they can withstand regulated commercialization.

Simultaneously with the final rule on ranched Nile crocodiles in Zimbabwe, the Service proposed to reclassify *wild* populations in Zimbabwe also to Threatened. Wild as well as ranched Nile crocodiles have benefitted from management as a sustainable resource under Zimbabwe law and, although current population levels are probably lower than historical ones, the Service believes that wild crocodiles in that country are no longer in imminent danger of extinction.

If the proposal is made final, importation into the U. S. of sport-hunted crocodile trophies from wild populations in Zimbabwe will become legal under Section 9(c)(2) of the Endangered Species Act, provided that all Zimbabwe laws and CITES rules are followed. However, because the Service continues to believe that there is not enough information to demonstrate that wild Nile crocodile populations can withstand commercialization, commercial import into the U.S. of skins from wild populations will remain prohibited.

* * * *

Comments on the proposal to reclassify wild Nile crocodile populations in Zimbabwe from Endangered to Threatened are welcome, and should be sent to the Assistant Director, Fish and Wildlife Enhancement, Office of Endangered Species, U. S. Fish and Wildlife Service, Washington, D.C. 20240, by September 17, 1987.

The Endangered classification for *all* Nile crocodile populations in countries other than Zimbabwe remains in effect.

Regional News

(continued from page 3)

tive research along the Platte River with several utility companies in central Nebraska. If the companies respond favorably, the testing of line markers will occur in 1988 and 1989.

* * *

Dr. R. Douglas Slack and Howard Hunt, Texas A&M University, have completed their studies of managed grazing and prescribed burning at Aransas National Wildlife Refuge in Texas. These experimental practices were directed at improving upland habitat for whooping cranes. Crane use increased on recently burned units, apparently in response to the increased ability of the birds to walk about and see potential predators, and because of the more accessible foods (acorns, insects, berries). They recommended eliminating grazing from the upland habitats because it reduces the abundance of crane foods and may be contributing to brush encroachment.

* * *

Early reports from the Kemp's ridley sea turtle (*Lepidochelys kempii*) nesting beach at Rancho Nuevo, Mexico, indicated that the number of nests was alarmingly short of previous years' production by about 40 percent. Happily, late nesting activity has increased the number of nests to levels comparable to other seasons. Over 570 nests were protected as of June 24, 1987. The total number of nests for this season will be known by September.

* * *

Prototype satellite transmitters used to track movements on an 8-to-10-day interval were attached to two Kemp's ridley females at Rancho Nuevo on May 10 and May 29, 1987, by Richard Byles, Region 2's Sea Turtle Biologist. The transmitters were placed on the turtles after they had nested; both animals then swam from shore normally and headed north. Unlike previous models, the prototype transmitter is capable of measuring the temperature of the water where the turtles are swimming and provides a summary of diving information over 12-hour periods. The temperature and diving data can be obtained daily. In the future, software will be added to the transmitters so that depth information also can be collected. The data will provide answers to basic biological questions about where the turtles go, how much time they spend on the surface, and what types of water they prefer.

* * *

The U. S. Forest Service Research Station at Nacogdoches, Texas, recently completed an examination of red-cockaded woodpecker (*Picoides borealis*) colonies on the Angelina, Sabine, and Davy Crockett National Forests in eastern Texas. Researchers visited all known colonies on each forest: 62 on Angelina National Forest, 62 on Sabine National Forest, and 134 on Davy Crockett National Forest. Of the 258 colonies visited, researchers found only 22 active nests on the Angelina National Forest, 6 on Sabine National Forest, and 27 on Davy Crockett National Forest. Records from the Angelina National Forest indicate that the number of active colonies has decreased from 38 in 1983 to 22 in 1986, a 43 percent decrease in a 4-year time span. A minimum of 25 active colonies were present on the Sabine National Forest in 1978, and only six active colonies remain in 1987 —a 76 percent decrease in a 9-year time span. The Angelina, Davy Crockett, and Sabine National Forest's experienced average annual declines of 10.5 percent, 8.6 percent, and 8.4 percent, respectively. These results show that the red-cockaded woodpecker populations on the three forests are in a severe decline and are in great danger of extirpation in the near future. The primary causes of this decline appear to be insufficient maintenance of old-growth stands of pine, encroachment of hardwoods, and excessive pine tree densities.

Region 5 - During the last 2 weeks of June, 22 bald eagle (*Haliaeetus leucocephalus*) young were donated by Can-

(continued on page 5)

ada to the U.S. Eight of the eaglets went to Massachusetts and the rest to Pennsylvania. They will be hatched out into the wild this August.

* * *

A Biological Opinion on Carbofuran, a granular insecticide used on corn and other crops, was signed and sent to the Environmental Protection Agency. Interagency consultation with the Service under Section 7 of the Endangered Species Act was reinitiated last year because of the poisoning death of two bald eagles in Virginia. The Biological Opinion contained conservation recommendations to minimize Carbofuran impacts on bald eagles.

Region 6 - In May, the U.S. District Court, Great Falls Division, Montana, decided against plaintiffs Richard P. Christy, Thomas B. Guthrie, and Ira Perkins in their suit against the Department of the Interior and Secretary of the Interior Donald P. Hodel. The plaintiffs had argued that the Endangered Species Act (Act) and Service protection of the grizzly bear (*Ursus arctos horribilis*) violated their constitutional rights to "possess and protect property." The plaintiffs had lost a number of sheep to grizzly bears. Christy killed one grizzly bear, was charged with violation of the Act, and fined $2,500. He was seeking to have the original decision dismissed, and the other plaintiffs were supporting him in his endeavors. The court disagreed with the plaintiffs' charges and affirmed the fine.

* * *

Peregrine falcon hacking efforts are paying off in Utah. Four towers previously used to release young falcons into the wild along the shores of the Great Salt Lake are occupied by pairs this year. Young birds have been produced at three of the four towers. The fourth pair did not produce any eggs, possibly because the female was not sexually mature. The objective of the hacking effort at these towers is to reestablish occupancy at historical eyries on the cliffs of the Wasatch Mountains to the east.

Region 8 (Research) - A 5-year-old whooping crane at the Patuxent Wildlife Research Center laid eggs for the first time on May 18. This is the first new female to produce eggs since 1982. A total of five Patuxent females have produced six eggs this year, and the first whooping crane chick of the 1987 breeding season hatched on May 8. The chick is being reared by a female Florida sandhill crane (*Grus canadensis pratensis*) that is a proven foster parent.

* * *

On May 8, three fertile greater sandhill crane (*Grus canadensis tabida*) eggs were flown from Patuxent to Florida for fostering into wild nests. The eggs are part of the ongoing cross-fostering experiment to determine the feasibility of introducing whooping cranes into a nonmigratory Florida sandhill crane flock.

* * *

The captive breeding flock of bald eagles at Patuxent produced a total of 42 eggs in 1987; 15 eaglets were produced.

* * *

As part of the endangered Hawaiian forest birds research project, the first rat and predator survey on Mauna Kea has been completed by staff at Patuxent's Mauna Loa Research Station on the island of Hawai'i. Data are being analyzed to determine if there is any difference in the frequency of capture of these species between areas of high and low bird abundance.

* * *

A total of 21 eggs were produced by 4 known pairs of wild Puerto Rican parrots (*Amazona vittata*) in 1987; all eggs were fertile and 11 eggs hatched (8 chicks are in wild nests and 3 are in Patuxent's Puerto Rico Research Station aviary). In captivity, 4 breeding pairs have produced 37 eggs; 13 were fertile and 4 chicks have been produced. (See story in this BULLETIN on the Puerto Rican parrot.)

* * *

Biologists at Patuxent's Minnesota Research Station have determined that, in the winter of 1986-1987, the wolf (*Canis lupus*) population in the Superior National Forest experienced a 12 percent decline while the deer population increased 17 percent.

Court Halts Project Pending Reinitiation of Consultation and Disposition of Claims to "Mitigation" Lands

Laguna Niguel (California) Field Office

Acting only 5 weeks after oral arguments, the Ninth Circuit Court of Appeals directed the District Court for the Southern District of California to enjoin work on the Sweetwater River Flood Control Channel and the widening of Interstate Highway 5 (known together as the Combined Federal Project) in southern California.

The appeal was granted on the grounds that the local District Court earlier had looked only at whether or not damaging impacts to promised "mitigation" lands (quotations added) were imminent. Such impacts could result from another area development, the Chula Vista Bayfront Project. The Appeals Court ruled that impacts involving habitat of two Endangered birds, the California least tern (*Sterna antillarum browni*) and light-footed clapper rail (*Rallus longirostris levipes*), had been overlooked, and that reinitiation of consultation was required because of a change in effects of the action that had not been anticipated during the earlier consultation.

The Ninth Circuit held "that the Corps of Engineers is in violation of Section 7 (a) (2) by allowing destruction or adverse modification of any part of the birds' habitat without first insuring the acquisition and preservation of the mitigation lands."

The conclusion of the ruling states: "...the statute dictates that if an agency plans to mitigate its project's adverse effects on an endangered species by acquiring habitat and creating a refuge, it must insure the creation of that refuge before it permits destruction or adverse modification of other habitat. The Sierra Club is entitled to (1) an injunction against any work west of I-5 until the Federal defendant's cross claim is resolved, (2) a declaration that the Corps of Engineers violated the Endangered Species Act by refusing to reinitiate consultation, and (3) an injunction against all work on the project unless the Corps of Engineers reinitiates consultation within 30 days of the issuance of the mandate in this appeal, with the injunction continuing until such time as consultation is reinitiated."

History And Status Of The Endangered Puerto Rican Parrot

Sandra L. MacPherson
Endangered Species Research Branch
Patuxent Wildlife Research Center

The Puerto Rican parrot (*Amazona vittata*) has been on the verge of extinction for over 20 years. Its status, however, was once very different. Historical records show that it was abundant throughout the island of Puerto Rico and indicate that it once inhabited the adjacent Islands of Culebra, Vieques, and Mona. Biologists speculate that parrot numbers formerly may have exceeded one million individuals.

With European colonization of Puerto Rico in the 1500's, the parrot population began to decline steadily. The parrot's fruit-eating and cavity-nesting habits make it very dependent upon forests for its existence, and deforestation in the late 1800's increased the severity of its decline. A few decades later, parrots could no longer be found on any of the adjacent islands and were only known to exist in five areas of Puerto Rico.

By about 1940, Puerto Rican parrots could only be located in the Luquillo Mountains of eastern Puerto Rico, particularly within the 11,000-hectare (27,180-acre) Caribbean National Forest, the largest area of native vegetation left on the island. In addition to habitat destruction, taking of birds for pets, shooting of birds as farm pests, and illegal hunting contributed to the decline. Today, just over 80 parrots remain in existence — approximately 41 in the wild and 42 in captivity.

Concern for the parrot's plight led the Fishery and Wildlife Section of the Puerto Rican Commonwealth Department of Agriculture and Commerce (now the Puerto Rico Department of Natural Resources), with support from the U.S. Forest Service and the U.S. Fish and Wildlife Service to conduct an intensive study of the parrot and its nesting areas from 1953 to 1956. Following the decline of the parrot from an estimated 200 individuals in 1954 to 70 in 1966, the parrot was declared an Endangered species (1967). In 1968, the Fish and Wildlife Service and the Forest Service, with initial support from the World Wildlife Fund, began an intensive research program for Puerto Rican parrot recovery that continues today.

In spite of this research program, the wild parrot population continued to decline until it reached its lowest level in 1975, when only 13 individuals were known to exist. Since then, however, through the concerted efforts of dedicated biologists, the wild population has slowly increased to approximately 41 individuals today. Nest site improvements (e.g., measures to prevent the entrance of water into tree cavities), provision of artificial nest sites, exclusion of honeybees from nest sites, reduction of nest site competition from the more aggressive pearly-eyed thrasher (*Margarops fuscatus*), and combatting warble fly (*Philornis pici*) parasitism have allowed for enhanced reproduction of wild pairs. Also, parrot nests have been guarded during the breeding season for the past several years to provide protection to the breeding parrots, and their eggs and young, against predators like the red-tailed hawk (*Buteo jamaicensis*). In 1987, the nest watching effort was increased when the National Audubon Society provided seven volunteers to protect parrot nests as well as to collect information on parrot movements and behavior (see accompanying story).

Another conservation effort that has been very successful has been the manip-

(continued on page 7)

Volunteer Nest Watchers on the Puerto Rican Parrot Project Recognized

A ceremony was held in Puerto Rico on May 8 to recognize the significant contribution of seven National Audubon Society volunteers on the Patuxent Wildlife Research Center's Puerto Rican parrot project. The volunteers honored were Mark Duff, Gail Morgan, David McLain, Karen Wilson, Becky Abel, Greg Harris, and Greg Burkett. These individuals volunteered for 3 months or more to assist project biologists guarding Puerto Rican parrot nests and assisted in caring for birds at the Puerto Rico Research Station aviary. The ceremony, held at the U. S. Forest Service's Institute of Tropical Forestry, was attended by 18 individuals representing all of the cooperators on the parrot research and management project (U. S. Forest Service, Puerto Rico Department of Natural Resources, U. S. Fish and Wildlife Service, and National Audubon Society). Whitney Tilt, wildlife specialist with the National Audubon Society and initiator of the volunteer program, was in attendance to pay tribute to the volunteers. In addition to project staff, the Fish and Wildlife Service was represented by Doug Buffington, Deputy Regional Director, Region 8 (Research); Marshall Jones, Chief, Endangered Species Division, Region 4; and Randy Perry, Chief, Endangered Species Research Branch, Patuxent Wildlife Research Center (Region 8). Each volunteer was presented with a specially-designed parrot shirt, a small stipend from the National Audubon Society, and a certificate of appreciation from the Fish and Wildlife Service to formally recognize their exemplary service.

Front row, left to right: ***Whitney Tilt, Greg Harris, Gail Morgan, Becky Abel, Mark Duff, Karen Wilson, and Raul Perez-Rivera.***

Back row, left to right: ***Randy Perry, Marc Bosch, Doug Buffington, Kelly Brock, Jose Colon, Gerald Lindsey, Jose Vivaldi, Frank Wadsworth, Wayne Arendt, Marshall Jones, Dan Nolan, and Bernie Rios.***

ulation of some wild nests to stimulate pairs to produce two clutches of eggs a year, rather than the one clutch usually produced under natural circumstances. This technique, known as "double-clutching," involves removing the first clutch of eggs from a nest and taking the eggs into captivity for incubation. Removal of the eggs stimulates the pair to produce a second clutch, thereby greatly increasing yearly production. In 1987, this technique was used on two of the four active wild nests.

As a measure to prevent extinction of the species, as well as to learn more about its reproductive biology, a decision was made to established a captive population of Puerto Rican parrots. The effort began in 1971 with the transfer of two adult birds from the Puerto Rico Zoo at Mayaguez to an aviary in the Luquillo Mountains. Since 1973, the captive population has been increased by the collection of eggs from the wild for incubation and captive rearing, the salvaging of chicks from a variety of mishaps in the wild, and the production of young by captive pairs. Between 1981 and 1987, only two pairs produced fertile eggs. This year, however, for the first time, two other captive pairs produced fertile eggs — an exciting event for the parrot project. In addition, the development of an artificial insemination technique has resulted in the first fertile egg produced from a captive pair of the Hispaniolan parrot *(Amazona ventralis)*, a less threatened species being used as a research surrogate. Once perfected, the technique will be used on the Puerto Rican parrot. Recent changes at the aviary, including pair manipulations, modifications of husbandry practices, and changes in the aviary's physical structure give hope for even greater production of Puerto Rican parrots in the future.

photo by Noel F.R. Snyder

Puerto Rican parrots at nest in the Caribbean National Forest, Puerto Rico

Unfortunately, despite the fact that the parrot population has been slowly increasing over the past decade, the parrot's long-term survival is still not secure. A major concern is that, with the location of both the wild and captive flocks in the Luquillo Mountains, the species could be lost to a hurricane, disease, or fire. Therefore, plans are under way by the Puerto Rico Department of Natural Resources to establish a second captive population of parrots on the island away from the Luquillo Mountains. Additional plans include the establishment of a second wild population of parrots in the Rio Abajo forest owned by the Commonwealth.

The outlook for the recovery of the Puerto Rican parrot is optimistic; however, there is still much to learn about the species before comprehensive and long-term management strategies can be effective. Critical steps toward recovery will continue to include captive propagation, release of captive-produced parrots to bolster the wild population, protection of the wild population, management and protection of habitat (including nests), increased law enforcement and public awareness, and continued research on the requirements of captive and wild populations.

Twelve Listings

(continued from page 1)

Threatened species (summary in BULLETIN Vol. XI No. 6). The final rule was published June 12, 1987.

Two Puerto Rico Plants

The **elfin tree fern (*Cyathea dryopteroides*)** and **Cook's holly (*Ilex cookii*)** are rare plants native to the Central Cordillera of Puerto Rico. As a result of habitat loss, only about 70 of the tree ferns are thought to survive, and the total known holly population now stands at one mature tree and approximately 35 sprouts or seedlings. The few remaining plants are vulnerable to further degradation of their delicate mountaintop habitat by construction of communications facilities, road building and maintenance, and military training exercises. Both species were proposed September 25, 1986, for listing as Endangered (summary in BULLETIN Vol. XI No. 10), and the final rule was published June 16, 1987.

Running Buffalo Clover (*Trifolium stoloniferum*)

Although it is historically documented from seven States, with populations of at least local abundance, only four individuals of this species survive at one site in West Virginia. The owner of the property containing the site has been very cooperative with the Service in protecting the species; however, any population this small could be extirpated by such activities as trampling or other inadvertent destruction by humans or other animals; competition or diseases from introduced plants; and vandalism or unauthorized collecting. The Service proposed March 10, 1986, to list the running buffalo clover as Endangered (summary in BULLETIN Vol. XI No. 4), and the final rule was published June 5, 1987. Live shoots from the wild population have been propagated and viable seeds produced at the University of Kentucky. Some of these propagules will soon be ready for reintroduction into the clover's range as part of an overall recovery effort.

Jesup's Milk-vetch (*Astragalus robbinsii* var. *jesupi*)

Only three populations of this perennial herb are known to exist, all of them along the banks of the Connecticut River in Vermont and New Hampshire. The species, which has always been vulnerable to extinction because of its rarity, recently has come under more tangible threats. One danger is the increasing recreational use of the sites. Another threat is the potential for future hydropower projects that could either inundate the plants or adversely alter the scouring river flows each spring that maintain the open bedrock habitat upon which the species depends. The Service proposed December 19, 1985, to list the Jesup's milk-vetch as Endangered (summary in BULLETIN Vol. XI No. 1), and the final rule was published June 5, 1987.

Sacramento Mountains Thistle (*Cirsium vinaceum*)

This perennial grows on steep calcium carbonate deposits immediately adjacent to flowing springs in the Sacramento Mountains of southeastern New Mexico. Recent data indicate that there are 20 populations of the species with a total of 10,000 - 15,000 individuals. The thistle, which depends on springs and streams, is vulnerable to developments that would reduce or eliminate surface water. Trampling by livestock is another threat. A proposal to list the Sacramento Mountains thistle as Threatened and to designate its Critical Habitat was published in the May 16, 1984, *Federal Register* (summary in BULLETIN Vol. IX No. 6). The final listing rule was published June 16, 1987; however, the Critical Habitat proposal was with-

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Twelve Listings

(continued from page 7)

drawn on the grounds that it covered too broad an area. Even so, the U. S. Forest Service, which administers the land (Lincoln National Forest) containing about 90 percent of the thistle's sites, will work with the Service under other provisions of the Endangered Species Act to protect important habitat. The Forest Service already has given protection to several of the sites.

Rough-leaved Loosestrife (*Lysimachia asperulaefolia*)

A perennial herb with showy yellow flowers, the rough-leaved loosestrife is endemic to the coastal plain and sand hills of North and South Carolina. Within this region, the species occurs in the fire-maintained ecotones between long-leaf pine woodlands and pond pine pocosins (wetlands). Only 9 of the historically known 19 populations survive today, all of them in North Carolina. The others were eliminated by suppression of naturally occurring wildfires, which maintained the open areas needed by the plant; drainage and conversion of wetlands to silvicultural, agricultural, and other uses; residential and industrial development; impoundment of wetlands for recreational uses; and other factors. Because the remaining populations are vulnerable to these same threats, the rough-leaved loosestrife was proposed for listing as an Endangered species on April 10, 1986 (summary in BULLETIN Vol. XI No. 5). The final rule was published June 12, 1987.

Geocarpon minimum

This plant, the only species in a monotypic genus, is a small, succulent annual. Although 17 populations exist in Arkansas and Missouri, only 5 are considered vigorous. They are vulnerable to conversion of natural habitat to pasture lands, the impacts of off-road vehicles, and silvicultural practices. Because *G. minimum* is a pioneer species that tolerates little competition, overcrowding and shading from other plants — a consequence of vegetational succession — is another major threat. The Service proposed April 10, 1986, to list *G. minimum* as Threatened (summary in BULLETIN Vol. XI No. 5), and the final rule was published June 16, 1987.

* * * *

These listed species now are protected under the Endangered Species Act, the benefits of which are summarized in this BULLETIN at the end of the story on the proposal to list a Texas plant as Endangered (page 3).

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	27	20	242	5	0	22	316	23
Birds	60	16	141	5	2	0	224	55
Reptiles	8	6	60	10	4	13	101	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	24	6	0	84	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	5	0	0	13	12
Plants	126	6	1	28	3	2	166	56
TOTAL	309	52	466	86	15	37	965	247**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 213
Number of species currently proposed for listing: 17 animals
26 plants

Number of Species with Critical Habitats determined: 97
Number of Cooperative Agreements signed with States: 47 fish & wildlife
27 plants

June 30, 1987

July 1987 Vol XII No. 7

ENDANGERED SPECIES

Technical Bulletin Department of Interior, U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of Interior. U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Listing Protection Proposed for Eleven Plants and Animals

During July 1987, seven plant and four animal taxa were proposed for addition to the Federal lists of Endangered and Threatened wildlife and plants. If the listings become final, Endangered Species Act protection will be extended to the following:

Chisos Mountain Hedgehog Cactus (*Echinocereus reichenbachii* var. *chisoensis*)

Native to the southwestern United States, the Chisos Mountain hedgehog cactus is very restricted in numbers and distribution. Its entire population of approximately 1,000 plants is known from only a few places in southern Brewster County, Texas. Fortunately, these sites are protected as part of Big Bend National Park. The species' low numbers and localized occurrence nevertheless make it vulnerable to extinction from collecting or habitat disruption. To help increase its protection, the Service has proposed to list the Chisos Mountain hedgehog cactus as Threatened (F.R. 7/6/87).

This cactus grows amid sparse Chihuahuan Desert vegetation on alluvial flats near the Chisos Mountains, the local range from which the cactus takes its name. Between World War I and World War II, before the park was established, this area was heavily overgrazed by livestock. Removal of the native short grass cover may have altered the preferred habitat conditions for establishment of Chisos Mountain hedgehog cactus seedlings. The return of native grasses may create an environment more favorable to the cactus seedlings; however, recovery of overgrazed desert rangelands is a slow process and some desert plant communities never return to their former composition.

Because the Chisos Mountain hedgehog cactus is so rare and has such attractive flowers, some private and commercial collectors find it desirable. Although collecting any cacti in the park without a permit is prohibited, taking of the Chisos Mountain hedgehog cactus probably has occurred in recent years, and any illegal collecting is detrimental to such small populations. They also are potentially vulnerable to harm from road maintenance and trail building unless these activities take the species' presence into account. No Federal activities that might adversely affect the cactus are known or expected.

photo by Kenneth D. Heil

The Chisos Mountain hedgehog cactus is a small, barrel-shaped variety with deep green to bluish-green stems up to 6 inches (15 centimeters) tall. Its attractive flowers have petals that are red at the base, white at mid-length, and fuschia at the tips.

Two Southwestern Bats

Two other residents of the southwest also have been proposed for listing (F.R. 7/6/87), this time as Endangered: the **Mexican long-nosed bat (*Leptonycteris nivalis* and Sanborn's long-nosed bat (*L. sanborni*).** Both species occur as far south as Central America and reach the U.S. at the northern end of their ranges. They have declined dramatically in recent years, primarily the result of killing by humans and overexploitation of the bats' food plants.

Bats in the genus *Leptonycteris* are small, weighing at most one ounce (28 grams). They differ strikingly from most others in the U.S. in having an elongated muzzle with a small nose "leaf" at the tip. The long tongue, an adaption to feeding on flowers, measures up to 3 inches (76 millimeters), compared to a maximum head and body length of about 3.75 inches (90 mm). Both *L. nivalis* and *L. sanborni* are adapted for life in arid country, and are found mainly in desert scrub habitat in the northern parts of their ranges; farther south, however, they sometimes occur at high elevations on wooded mountains. For roosting during the day, these bats depend almost entirely on caves and abandoned mine tunnels. Populations in the U.S. and northern Mexico apparently migrate southward in the fall and return in the spring, with groups occupying the same roosting sites year after year.

The only known *L. nivalis* roosting site in the U.S. still in use is a shallow cave within Big Bend National Park in Texas. Even though the cave is protected, its *L. nivalis* population has plunged from an estimated 10,650 bats in 1967 to about 1,000 in 1983. A recent FWS-funded survey indicated that populations in Mexico also are

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Regional News

Endangered species program regional staff members have reported the following news for the month of July:

Region 1 — An interagency rescue effort was carried out during the first week of July to salvage Lahontan cutthroat trout (*Salmo clarki henshawi*) from sections of By-Day Creek (Mono County, California), which is drying up because of this year's low runoff. Over 200 fish were rescued and taken to a headwater stream (Horse Creek) in the East Walker River drainage. The salvaged fish will be held in that glacial-fed stream until they can be used for a planned reintroduction into Slinkard Creek later this year.

* * *

Dr. Jack Williams, of the Fish and Wildlife Service's Sacramento (California) Endangered Species Office, recently presented a draft protocol for conducting introductions of Endangered and Threatened fishes at the American Society of Ichthyologists and Herpetologists meeting in Albany, New York. A manuscript describing the protocol will be submitted to the American Fisheries Society for official adoption.

* * *

Four bald eagle (*Haliaeetus leucocephalus*) nestlings removed from nests along coastal British Columbia, Canada, were released at key hack sites in California by the Ventana Wilderness Sanctuary.

* * *

Three productive bald eagle nests were observed at Cascade Reservoir near Boise, Idaho. Idaho's 1987 total includes 26 productive nests and 31 active nests.

* * *

The 1987 southern sea otter (*Enhydra lutris nereis*) census was completed recently by the Service and the California Department of Fish and Game. The total of 1,650 included 220 pups and was up from last year's total of 1,570. Although this year's census appears promising, the indicated upward trend has not been statistically substantiated.

Editor's note: A final rule authorizing establishment and containment of an experimental population of southern sea otters in the vicinity of San Nicolas Island, off the coast of southern California, was published in the August 11, 1987, *Federal Register*. Future editions of the BULLETIN will contain more news on this recovery effort.

* * *

A recent 3-acre fire at California's Antioch Dunes National Wildlife Refuge could enhance Antioch Dunes evening-primrose (*Oenothera deltoides* ssp. *howellii*) propagation by opening overgrown habitat. Fortunately, the fire occurred in an area where there were not any Antioch Dunes evening-primroses, Contra Costa wallflowers

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Acting Chief*
Office of Endangered Species
(703-235-2771)
Richard L. Jachowski, *Acting Chief, Federal Wildlife Permit Office*
(703-235-1937)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director*; William F. Shake, *Assistant Regional Director*; Wayne S. White, *Endangered Species Specialist*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director*; Conrad A. Fjetland, *Assistant Regional Director*; James Johnson, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director*; John S. Popowski, *Assistant Regional Director*, James M. Engel, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; John I. Christian, *Assistant Regional Director*, Marshall P. Jones, *Endangered Species Specialist*.

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director*, Stephen W. Parry, *Assistant Regional Director*, Paul Nickerson, *Endangered Species Specialist*.

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920), Galen Buterbaugh, *Regional Director*; John D. Green, *Assistant Regional Director*, Barry S. Mulder, *Endangered Species Specialist*.

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director*; Jon Nelson, *Assistant Regional Director*; Dennis Money, *Endangered Species Specialist*.

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director*; *Endangered Species Staff*; Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

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Regional News

(continued from page 2)

(*Erysimum capitatum* var. *angustatum*), or host plants of the Lange's metalmark butterfly (*Apodemia mormo langei*).

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Results from the latest transect surveys at the Coachella Valley Preserve in southern California show a decline in numbers of the Threatened Coachella Valley fringe-toed lizard (*Uma inornata*) observed, but not nearly as great as that for the desert iguana (*Dipsosaurus dorsalis*) and the zebra-tailed lizard (*Callisaurus draconoides*). The reason for the apparent decline in the number of all lizards presumably has been the extremely dry conditions in the area this year.

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Extremely high water temperatures are the apparent cause of a die-off of Endangered Borax Lake chubs (*Gila boraxobius*) in southeastern Oregon. High air temperatures, coupled with cloudless and windless conditions, intensified the naturally warm water conditions. Expected cooler air temperatures should lead to more moderate water temperatures in the lake.

Region 2 — Studies on the status of two New Mexico salamanders, the Sacramento Mountains salamander (*Aneides hardii*) and the Jemez Mountains salamander (*Plethodon neomexicanus*) are currently being conducted by the Service (Region 2), the U.S. Forest Service, and the New Mexico Department of Game and Fish. Both salamanders have been under study for several years to determine their range, abundance, ecological and biological needs, distribution in relation to ongoing timber management, and the effects of timber harvest on the salamanders. The current study will be completed in the fall of 1988.

These salamanders inhabit higher elevation, old-growth, mixed conifer woodlands. The Sacramento Mountains salamander is endemic to the Sacramento, Capitan, and Sierra Blanca Mountains of Lincoln and Otero Counties; the Jemez Mountains salamander is endemic to the Jemez Mountains of Sandoval and Los Alamos Counties. Study results will be used to determine the needs for Federal protection and to determine methods for minimizing the impacts of timber harvests on the salamanders' habitat.

* * *

A new Ozark big-eared bat (*Plecotus townsendii ingens*) maternity colony was discovered in Adair County, Oklahoma, in June. Based on emergence counts, biologists estimated that about 260 of the bats are using the cave. The newly discovered colony is one of the largest known maternity colonies of this Endangered subspecies.

* * *

Through a Section 6 agreement with the Service, Paul Knight and Anne Cully of the New Mexico Energy, Minerals and Natural Resources Department have been working on several Threatened and Endangered plants. Monitoring plots have been established at populations of Kuenzler's cactus (*Echinocereus fendleri* var. *kuenzleri*), Knowlton's cactus (*Pediocactus knowltonii*), Mesa Verde cactus (*Sclerocactus mesae-verdae*), McKittrick pennyroyal (*Hedeoma apiculatum*), Zuni fleabane (*Erigeron rhizomatus*), Mancos milk-vetch (*Astragalus humillimus*), and gypsum wild buckwheat (*Eriogonum gypsophilum*). Data being collected on these plants include information on pollination,

(continued on page 9)

Protection Approved for Gopher Tortoise and Audubon's Crested Caracara

The gopher tortoise (*Gopherus polyphemus*), a large terrestrial turtle that digs extensive burrow systems, occurs along the coastal plain from South Carolina through Florida to southeastern Louisiana. Widespread reductions of its well-drained pine woodland habitat due to urban and agricultural uses have eliminated the tortoise from more than 80 percent of its western range. Certain timber management practices (fire suppression and clear cutting) threaten much of the remaining habitat, and collecting of tortoises for food and the pet trade is another danger. Among the other animals affected by the gopher tortoises's decline are up to 29 vertebrates that use the burrows for refuge from predators and as a cool, moist microenvironment. On July 8, 1986, the Fish and Wildlife Service proposed to list the gopher tortoise's western population (extending from the Tombigbee and Mobile Rivers in Alabama to southeastern Louisiana) as Threatened (see summary in BULLETIN Vol. XI No. 8-9). The final listing rule was published in the July 7, 1987, *Federal Register*.

Audubon's crested caracara (*Polyborus plancus audubonii*) is a hawk about the size of an osprey that occurs primarily from Panama through Central America and Mexico to Cuba and the southwestern United States. There also is an isolated population in peninsular Florida. Once common on the State's central prairie region, the Florida caracara population has declined to an estimated maximum of 500 birds, less than one-third the number existing in 1900. Again, habitat alteration is the main problem. The crested caracara in Florida is a bird of the open prairie country and nearby wetter areas with scattered cabbage palms for nesting. Large areas of this habitat type have been lost to citrus groves, other agricultural uses, and real estate development. In an effort to prevent the bird's extinction, the Service proposed June 23, 1986, to list the Florida population of Audubon's crested caracara as Threatened (see feature in BULLETIN Vol. XI No. 7). The final rule was published July 6, 1987.

* * *

Both of these listed animals now receive protection under the Endangered Species Act, the terms of which are summarized in this edition of the BULLETIN at the end of the story about species newly proposed for listing.

Requirements for Turtle Excluder Devices are Approved

The National Marine Fisheries Service of the U.S. Department of Commerce has published final regulations to require the use of turtle excluder devices (commonly referred to as TEDs) by shrimp trawlers in the Gulf of Mexico and in the Atlantic Ocean off the southeastern United States (F.R. 6/29/87). These rules were designed to reduce the incidental capture and drowning of Threatened and Endangered sea turtles in shrimp trawls while minimizing regulatory effects on shrimpers.

Specific information on the various zones, seasons, TED specifications, and restrictions on tow times is contained in the June 29, 1987, *Federal Register*, pp. 24244-24262. The September BULLETIN will summarize modifications in the final rules from the version originally proposed on March 2, 1987 (see earlier feature in BULLETIN Vol. XII No. 4).

Perdido Key Beach Mouse Relocation

Mike Dawson
Jackson (Alabama) Field Office

An additional Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) population has been established on Gulf Islands National Seashore in Florida. Listed as Endangered in June 1985, the Perdido Key beach mouse was originally found on much of Perdido Key, which extends along the Gulf Coast of Baldwin County, Alabama, and Escambia County, Florida. Designated Critical Habitat for the species now consists of 1.8 miles (2.9 kilometers) of occupied habitat (Gulf State Park, Alabama) and 9 miles (14.5 km) of currently unoccupied habitat (Perdido Key State Preserve and Gulf Islands National Seashore, both in Florida).

In July 1979, researchers estimated that there was a population of 26 Perdido Key beach mice at Gulf State Park (Florida Point, Alabama) and an estimated population in Florida of 52 individuals on Gulf Islands National Seashore at the eastern end of Perdido Key. However, Hurricane Frederick, which hit the coast in September 1979, apparently destroyed the entire eastern population of the subspecies, and the Florida Point population to the west was so low that only one individual was trapped there during a 1981 survey. By April 1986, the population apparently had increased slightly but still consisted of no more that 31 individuals.

Because of the precarious status of the Perdido Key beach mouse, a top recovery priority was to establish an additional population. A release site was selected on Gulf Islands National Seashore, Florida, approximately 0.9 mile (1.5 km) from the eastern end of Perdido Key. This site was chosen because of well developed dunes, a productive stand of seed oats (*Uniola paniculata*), and limited human disturbance. Trapping surveys over the preceding 3 years had verified the absence of beach mice in the area.

To provide initial protection from predators and to hold the released mice in one location for an adequate time to permit burrow establishment, a large enclosure was constructed in the primary dunes. The enclosure had a circumference of approximately 164 feet (50 meters). Its walls were made of sheet aluminum, 4 feet (1.2 m) wide, which was buried about 18 inches (46 centimeters) in the sand and arranged to encircle most of a dune. Chicken wire (1-inch mesh) was attached to the upper edge of the aluminum, resulting in a wall extending about 6 feet (1.8 m) above the ground. Posts were placed along the ridge of the dune, and the entire enclosure was covered with plastic bird mesh to exclude potential avian predators.

photo by Mike Dawson

This enclosure was built to protect the reintroduced Perdido Key beach mice until they established burrows.

A November 1986 survey of the existing Perdido Key beach mouse population at Gulf State Park (Florida Point) indicated that its numbers had increased slightly from the April 1986 estimate. On November 15, three pairs of beach mice were trapped at Florida Point for relocation to Gulf Islands National Seashore. These mice were transported to the enclosure and released on November 16, 1986.

The mice explored the enclosure briefly, then entered existing ghost crab burrows or constructed burrows of their own. Supplemental food (sunflower seeds) and water were provided. On November 17, a check of the enclosure revealed evidence that some mice had escaped. Frequent checks over the next few weeks continued to note mouse tracks inside and outside of the enclosure. On January 13, 1987, one additional pair of beach mice was captured at Florida Point and moved to the enclosure. Several openings were made in the enclosure in February so that mice could freely move in and out. On April 11, three additional pairs of beach mice from Florida Point were relocated to the enclosure. Openings in the enclosure were closed temporarily until their burrows were established. Supplemental food has been provided throughout the relocation effort.

Recent surveys have indicated that the relocated mice have dispersed to surrounding dunes and established new burrows. There are plans to conduct live-trapping at these areas in November 1987 to determine if the new beach mouse population is reproducing.

Proposal to List Thornber's Fishhook Cactus is Withdrawn

Thornber's fishhook cactus (*Mammillaria thornberi*), a small, cylindrical succulent with hooked spines, is known from the Sonoran Desert in Pima and Pinal Counties, Arizona. It was proposed in 1984 for listing as a Threatened species on the basis of data that the cactus was imperiled by low numbers, a limited distribution, and a variety of threats to the habitat. (See story in BULLETIN Vol. IX No. 5).

Subsequent to the proposal, the Fish and Wildlife Service received new information indicating that listing *M. thornberi* currently is not warranted under the terms of the Endangered Species Act. Estimates of the species' numbers have been revised upward and threats to the habitat have been judged less severe than originally thought. Accordingly, the Service published a notice in the July 27, 1987, *Federal Register* withdrawing the listing proposal.

Thornber's fishhook cactus and its habitat will nonetheless receive management protection on four sites: Saguaro National Monument, Organ Pipe Cactus National Monument, Tucson Mountains County Park, and a tract of land in Avra Valley set aside by the Bureau of Reclamation as mitigation for construction of a Central Arizona Project aqueduct. In addition, the collection of all cacti, including *M. thornberi*, from the wild without a permit is prohibited by Arizona State law.

Proposed Species

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severely declining. The other species, *L. sanborni*, once occurred from central Arizona and southwestern New Mexico through much of Mexico to El Salvador. In recent decades, this species has disappeared from most of its former roost sites in the U.S., including southern Arizona's Colossal Cave, which contained as many as 20,000 of the bats until the 1950's. A survey of historical roosting sites in Mexico located the species in only three places, and found very few bats in two of those. To the south of Mexico, *L. sanborni* is known only by a single specimen collected in El Salvador in 1972.

Although the reasons for the decline of the long-nosed bats are not entirely clear, habitat disruption is suspected as the major cause. The two most important habitat components for these bats are roosting sites and food sources. There are only a limited number of caves and mines that provide the proper environment for roosting, and most of these sites are increasingly subject to destruction and disturbance. Vandals have been known to kill large numbers of these bats for fun. Also, in some parts of Mexico, all bats are considered possible vampire bats, and control operations often destroy all species of bats in a cave.

The other main limiting factor for the bats is the dependability of their food supply. Instead of insects, *Leptonycteris* depends on the night-blooming flowers of certain paniculate agaves (century plants) and columnar cacti. The bats feed on the highly caloric nectar and protein-rich pollen of these plants to fuel their high metabolism. Both bat species have adapted long muzzles and tongues for reaching deep into the flowers.

Mexican long-nosed bat

photo by Merlin D. Tuttle, Bat Conservation International

This Sanborn's long-nosed bat is pollinating on* Agave palmeri *flower as it feeds on the plant's pollen and nectar.

There is an apparent close interdependence between these bats and their food plants. Annual bat migrations seem to be associated with the times that certain agaves and cacti are flowering in certain areas. The plants benefit, too; long-nosed bats are thought to be the most important pollinator of the giant saguaro (*Cereus giganteus*) and organ pipe (*C. thurberi*) cacti, as well as some agaves, in the northern part of the bats' ranges. As they migrate southward into northern Mexico, the only food plants available to the bats are agaves. These same agaves, however, are being intensively harvested by "moonshiners" for small-scale production of tequila and other alcoholic beverages made from the plants. Excess harvest and other factors resulting in elimination of agaves may have contributed substantially to the drastic decline in long-nosed bat populations. In turn, the drop in bat numbers has coincided with a decline in the reproductive success of some agave species, possibly because of inadequate pollination. Other agaves, along with the saguaro and organ pipe cacti, also may be affected. This apparent linkage could lead to a downward spiral with further declines in both the bats and their food plants, with serious implications for the entire southwest desert ecosystem.

Kearney's Blue-Star (*Amsonia kearneyana*)

Only eight individuals of Kearney's blue-star, a herbaceous perennial plant in the dogbane family (Apocynaceae), are known to exist. All eight are restricted to a single canyon in the Baboquivari Mountains of southern Arizona, a site that is within the Tohono O'odham (formerly Papago) Indian Reservation. The current *A. kearneyana* population, which is down from the 25 plants found in 1982, is threatened with extinction from the effects of overgrazing and (possibly) insect predation. Accordingly, the Service has proposed listing this species as Endangered (F.R. 7/10/87).

A single Kearney's blue-star has up to 50 erect or ascending stems that give the plant a hemispherical shape. Lance-shaped leaves with soft hairs are arranged alternately on the stems, which can reach as high as 32 inches (81 cm). The plant's white flowers are borne in clusters at the ends of branches.

Kearney's blue-star grows in the riparian vegetation zone along a dry, rocky wash. This habitat has been severely modified by cattle grazing. Although cattle apparently do not eat this plant, they contribute to increased erosion by disturbing the topsoil, and they may trample *A. kearneyana* seedlings. Overgrazing of other vegetation also can lead to a decline in floral diversity, which in turn may be accompanied by a reduction in pollinator numbers and species. Poor pollination success could explain, at least in part, the fact that the Kearney's blue-star population is showing very little reproduction. Another explanation may be seed predation by stinkbugs (*Chlorochroa ligata*), which are known to damage the seeds of a related plant.

Sacramento Prickly Poppy (*Argemone pleiacantha* ssp. *pinnatisecta*)

A robust perennial in the poppy family (Papaveraceae), this plant has attractive white and yellow flowers, long, relatively

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Proposed Species

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narrow leaves, and up to 12 prickly stems that can grow as high as 60 inches (15 decimeters). It is known only from several canyons in the Sacramento Mountains of south-central New Mexico. A 1982 survey located three colonies containing fewer than 170 individuals. Because of evidence that these small populations are declining, the Service has proposed to list *A. p.* ssp. *pinnatisecta* as Endangered (F.R. 7/13/87).

Within its limited range, the Sacramento prickly poppy requires relatively moist soils found on north-facing slopes, in canyon bottoms, along roadsides, and near leaks in water pipelines. About half of the plants are on New Mexico State or Otero County highway rights-of-way. The rest occur on private property, a State park, and Lincoln National Forest.

Colonies of the species that occur along roadsides are vulnerable to road widening and maintenance, roadside mowing, and herbicide applications.

The U.S. Forest Service manages Lincoln National Forest, on which several populations of the prickly poppy occur. As a matter of policy, the Forest Service already gives consideration to such Federal listing candidates in its environmental assessments and other planning. If this plant is listed, the existing protection will be strengthened; the Forest Service will, under Section 7 of the Endangered Species Act, ensure that none of its activities (e.g., construction and maintenance of roads and trails, designation of water rights and grazing allotments) will jeopardize the species. The Federal Highway Administration also will protect the species when it funds any State or county road work by ensuring that such roadwork will not jeopardize the prickly poppy. No major impacts on Federal activities are expected.

photo by Peggy Olwell

The Sacramento prickly poppy has attractive white and yellow flowers.

Cattle grazing can have both direct and indirect effects on the Sacramento prickly poppy. When cattle stocking rates are high, some plants of this species are eaten while others are trampled. Overgrazing not only reduces plant cover, it also disturbs topsoil and increases erosion. This degradation in the local watershed can increase the probability and severity of flash floods. The Sacramento prickly poppy is particularly vulnerable to flooding because many of the plants occur in drainages. For example, one population of the plant was nearly eliminated during a flash flood in 1978.

The diversion of permanent spring water from drainages in the Sacramento Mountains to pipelines for human and livestock use creates artificially dry conditions in some places where the moisture-dependent prickly poppy occurs. Installation of a pipeline in one canyon, with subsequent drying of the habitat, probably caused the greatest decline in the plant's numbers.

Mathis Spiderling (*Boerhavia mathisiana*)

The Mathis spiderling is a small perennial herb with small, bright pink flowers. This member of the "four o'clock" family (Nyctaginaceae) is known to grow only on outcrops of caliche (calcium carbonate) in the south Texas plains. Although caliche outcrops occur at various places within the region, *B. mathisiana* has been found at only two sites.

Fewer than 250 individuals of the species are known to exist. Most are in the San Patricio County population, which apparently was fragmented by caliche mining into four colonies. Because the demand for caliche gravel is expected to increase, further habitat loss is probable. The Live Oak County population, which consists of fewer than 10 plants, is thought to be a remnant of a once larger population that was greatly reduced by residential development. Further residential and commercial development of this area, which is near a recreational lake, could eliminate additional plants. Both populations are on private lands, and the Service plans to seek landowner cooperation for conserving of the remaining plants.

Pitcher's Thistle (*Cirsium pitcheri*)

C. pitcheri is a member of the composite or sunflower family (Asteraceae). It grows on sand beaches and open dune complexes along the Great Lakes shorelines of Michigan, Indiana, Wisconsin, and Ontario, Canada. Although the species also was reported historically from the shore of Lake Michigan in Illinois, it apparently has been extirpated from that State. Because of the vulnerability of its habitat, *C. pitcheri* has been proposed for listing as a Threatened species (F.R. 7/20/87).

Pitcher's thistle apparently has a limited ability to disperse seed, along with other characteristics that restrict it to narrowly defined microhabitats along open lakeshores. This plant seems able to tolerate infrequent disturbances of its habitat (once every 5 to 10 years), and it can recolonize disturbed areas if a large enough colony remains. However, Pitcher's thistle cannot withstand *frequent* (monthly to annual) habitat disturbance.

Shoreline development is reducing *C. pitcheri* habitat. In addition to the loss from construction activities, some dunes have been bulldozed to provide better lake views for cottage residents. Dune areas also are favorite places for the use of off-

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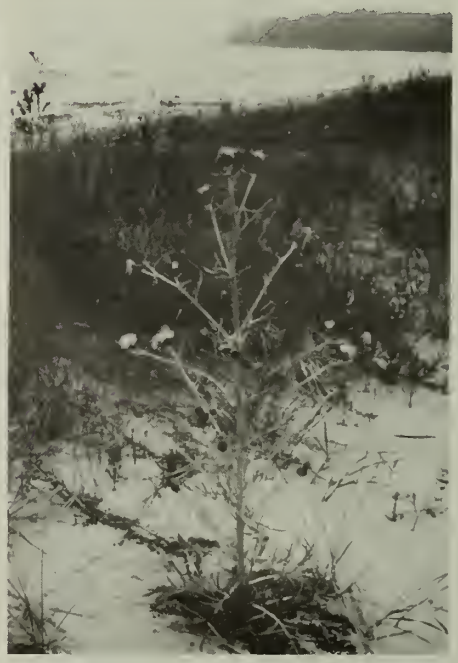

Pitcher's thistle bears dense, white-wooly, deeply divided leaves with long petioles and cream-colored or yellowish flowers.

road vehicles, which probably cause as much damage to the species as anything. Some landowners also have attempted to eradicate the plant directly in the belief that it is an undesirable weed. Most of the remaining Pitcher's thistle colonies are on public lands. The species is found on the Indiana Dunes National Lakeshore (Indiana), the Nordhouse Dunes area of the Huron-Manistee National Forest (Michigan), the Sleeping Bear Dunes and Pictured Rocks National Lakeshores (Michigan), a small stretch of Wisconsin shoreline on Lake Michigan managed by the U.S. Coast Guard, and several State parks. Although maintaining quality shoreline habitat is an objective of the agencies that manage these lands, *C. pitcheri* colonies could be damaged if subjected to heavy, frequent recreational use.

Habitat management practices employed by the National Park Service are intended to improve the condition of Pitcher's thistle colonies on National Lakeshores. No known Federal activities are expected to interfere with conservation of the species on Federal or other lands.

Daphnopsis hellerana

This plant has no known common name, perhaps because it is so rare. Historical records refer to four populations of the species on the island of Puerto Rico, but only two remain and they contained only seven individuals each at last count. Because of the species' low numbers and continued vulnerability from habitat loss, the Service has proposed to list *D. hellerana* as Endangered (F.R. 7/6/87).

D. hellerana, a member of the mezereum family (Thymelaeaceae), is an evergreen shrub or small tree that can reach up to 20 feet (6 meters) in height. It is a dioecious species, meaning that the male and female flowers are borne on separate plants. *D. hellerana* is endemic to subtropical moist forests in the limestone hill region of northern Puerto Rico.

Nearly all of the historical and surviving populations of this plant have been located near Puerto Rico's main human population center, the San Juan/Bayamón area. Urban and industrial development, quarrying of limestone for use in construction, landfills, and the clearing of forests by yam planters all have contributed to the decline of *D. hellerana*. One of the two remaining populations is in the Dorado area on Commonwealth of Puerto Rico (Land Authority) property; however, this land is not in protective status and is subject to quarrying and the construction of roads and power lines. The other *D. hellerana* population is at Toa Baja on Federal land that is under the jurisdiction of the National Institutes of Health but leased to the University of Puerto Rico's School of Medicine. There are no known current activities on this property that are expected to jeopardize the species' survival. Nevertheless, the populations at Toa Baja and Dorado are extremely small, and observations suggest that there currently is not enough successful reproduction to sustain either population.

Cumberland Sandwort (*Arenaria cumberlandensis*)

Although a member of the "pink" family (Caryophyllaceae), the Cumberland sandwort is a perennial with white flowers. This herbaceous plant reaches 6 inches (15 cm) in height and has relatively long, narrow leaves. *A. cumberlandensis* is named for the general region in which it grows, a limited portion of the Cumberland Plateau in north-central Tennessee and adjacent Kentucky. Only five populations are known, and their vulnerability has led the Service to propose *A. cumberlandensis* for listing as an Endangered species (F.R. 7/6/87).

Most *Arenaria* species in the southeastern U.S. grow in hot, dry, sunny environments; *A. cumberlandensis*, however, needs a very different habitat. This plant is restricted to the floors of rockhouses (shallow, cave-like openings in cliff faces), overhung ledges, and solution pockets in sandstone rock faces. These structures can provide the critical combination of shade, moisture, cool temperatures, and high humidity needed by *A. cumberlandensis*.

Of the species' five known populations, four occur in Tennessee. The largest population is in the Pickett State Park and Forest (Pickett County), where the habitat faces impacts from recreational activities (e.g., camping, hiking) and, potentially, from logging. A very small population of fewer than six clumps is located on the watershed of a municipal water supply reservoir in Fentress County. On public and private lands along the border of Fentress and Morgan Counties, another small population of *A. cumberlandensis* is vulnerable to trampling by hikers and habitat damage resulting from logging. A population of about 50 clumps is known from Scott County on the Big South Fork National River and Recreation Area, which is managed by the National Park Service. The Cumberland sandwort site has been severely damaged through trampling by recreational visitors, collectors of Indian artifacts (who dig within the rockhouses), and trash dumping. Fortunately, the Park Service is now aware of the rare plant's presence, strongly supports listing, and will implement measures to conserve the species' habitat.

Kentucky's lone *A. cumberlandis* population is in McCreary County on Daniel Boone National Forest. It is subject to the same threats facing the Tennessee populations, although the U.S. Forest Service has expressed interest in protective measures and plans no logging operations near the site.

Shasta Crayfish (*Pacifastacus fortis*)

Under the common name "placid crayfish" (so called because of its behavior), *P. fortis* originally was proposed in 1977 for listing as a Threatened species. The proposal was later withdrawn for procedural reasons. Since a 1978 survey, the numbers of this vulnerable crustacean have dropped by about 50 percent in the face of habitat degradation and competition from introduced crayfish species. Now commonly referred to as the Shasta crayfish, named after the northern California county where it is found, *P. fortis* has been reproposed for listing, this time as Endangered (F.R. 7/10/87).

Shasta crayfish are native to a small portion of the Pit River drainage system, including tributaries of the Fall River and

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photo by Robert R. Currie

cumberland sandwort

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Hat Creek subdrainages. They inhabit cool, clear, spring-fed lakes, rivers, and streams, usually at or near a spring inflow source where waters remain at a constantly cool temperature year-round. Unlike some other crayfish species, *P. fortis* seems most abundant where aquatic plants are absent. Another important habitat requirement appears to be the presence of enough volcanic rubble substrate to provide cover for escape from predators.

Because of its specialized habitat needs, the Shasta crayfish is particularly vulnerable to changes in its aquatic environment. Siltation of the rubble substrates, increases in water temperatures and turbidity, and other forms of water pollution not only make the habitat less hospitable to *P. fortis* but actually favor the spread of introduced crayfish. These exotic species, which are more adaptive and have higher reproductive rates, are expanding into the range of the Shasta crayfish at an alarming rate, competing with it for food and living space. Two exotics have displaced native crayfish species in other regions and are doing the same to *P. fortis*.

Activities that have led to alteration of the aquatic habitat include projects such as stream impoundments, diversions, and channelization. Other impacts are related to agriculture: the increasing demand for water has lowered the water table in some areas and reduced springflows; pesticides washed into the waterways harm aquatic invertebrates; and nutrient-rich run-off is increasing the growth of aquatic plants, rendering the habitat unsuitable for the Shasta crayfish. Water turbidity is increasing due to livestock grazing and certain forms of recreation near watercourses.

Most of the land within the Shasta crayfish range is privately owned. The U.S. Forest Service and Bureau of Land Management administer less than 10 acres each, but these areas are being managed in ways consistent with conservation of the species. If *P. fortis* is listed by the Fish and Wildlife Service, the U.S. Army Corps of Engineers and Federal Energy Regulatory Commission will probably need to consult with the Service on their involvement with future water developments, but no significant conflicts are anticipated. The Service will investigate means of eliminating the exotic crayfish species and seek to work with landowners on ways to control potentially toxic runoff. A Federal listing would complement the protection already available for the species under California's own endangered species legislation.

photo by Daniel F. Williams

Tipton kangaroo rat

Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*)

Kangaroo rats (*Dipodomys*) are small mammals that, like Australian kangaroos, can travel rapidly by hopping about on their elongated hind legs, using their long, tufted tails as rudders. They mainly inhabit dry, open country in western North America where they construct burrows for shelter and, often, for storing food.

Three *Dipodomys* taxa are listed by the Fish and Wildlife Service as Endangered, and a number of others are candidates for future listing. One of these candidates is the Tipton kangaroo rat (*D. n. nitratoides*), which the Service recently proposed for listing as Endangered (F.R. 7/10/87). This subspecies has been eliminated from over 96 percent of its former range, due mostly to conversion of its native scrub and grassland habitat to agricultural uses.

The Tipton kangaroo rat is restricted to the Tulare Lake Basin of the San Joaquin Valley in south-central California. Within this region, it inhabits the soft, friable soils of the basin floor that escape seasonal flooding. An integral member of its ecosystem, the Tipton kangaroo rat influences floral distribution by dispersing native plant seeds, transporting them in external cheek pouches to underground food caches. The small rodents also serve as prey for a variety of carnivores, including the Endangered San Joaquin kit fox (*Vulpes macrotis mutica*). Kangaroo rat burrows aerate the basin soils, another benefit to the vegetation, and the burrows are used for refuge by a number of other species, one of which is the Endangered blunt-nosed leopard lizard (*Gambelia silus*). Extinction of the Tipton kangaroo rat therefore would have impacts beyond its own loss.

The decline of the Tipton kangaroo rat

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photo by Ted Rado

Typical habitat of the Tipton kangaroo rat on the Paine Wildflower Memorial Preserve, owned by The Nature Conservancy.

indicates how much native habitat in the Tulare Lake Basin has been altered. Historically, the subspecies occurred over approximately 1,700,000 acres (695,000 hectares) in parts of Fresno, Kings, Tulare, and Kern Counties. By 1985, however, its range had fallen to 63,400 acres (25,700 ha), less than 4 percent of the original amount. Conversion of habitat for agricultural production accounts for most of the past decline and continues to threaten much of the remaining range.

Much of the remaining habitat consists of small fragments surrounded by agricultural lands on private property. However, approximately 6,400 acres (2,600 ha) are administered by local, State, and Federal agencies. These public lands currently contain low- to moderate-density populations of the Tipton kangaroo rat and are thought to be relatively secure from modification. Many of the extant occupied habitats, however, may be too small to ensure the long-term survival of their individual Tipton kangaroo rat populations.

Possible Federal actions that may affect the Tipton kangaroo rat are issuance of agricultural leases on Bureau of Land Management holdings; construction by the Soil Conservation Service of evaporation ponds for agricultural runoff; issuance of permits by the Environmental Protection Agency for development of oil and natural gas reserves; and Bureau of Reclamation water projects that would assist in converting native habitat to agricultural lands. Such actions also would be likely to affect the Endangered blunt-nosed leopard lizard and San Joaquin kit fox, whose habitat is already protected under the Endangered Species Act. No major conflicts between Federal activities and conservation of these vulnerable animals are expected.

* * *

Available Conservation Measures

Among the conservation benefits provided by a listing as Threatened or Endangered under the Endangered Species Act are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the Service to develop and implement recovery plans; the possibility of Federal aid to State and Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service; and the authorization to seek land purchases or exchanges for important habitat. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, various organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If any agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy or adverse modification of Critical Habitat. For species that are *proposed* for listing and for which jeopardy or adverse modification is found, Federal agencies are required to "confer" with the Service, although the results of such conferences are non-binding. Potential conflicts almost always are avoided by planning early, consulting informally during initial planning phases, and using the Section 7 process.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals, except by permit for certain conservation purposes. For listed plants, the rule is different; the trafficking restrictions apply, but collecting of listed plants without a permit is prohibited by the Act only on lands under Federal jurisdiction. Some States, however, have their own laws protecting listed plants and animals that may be more restrictive.

Land Donation Will Help Protect Endangered Bats

Twin Cities, Minnesota, Regional Office

A 90-acre tract of land in southeast Missouri was donated recently by the Pilot Knob Ore Company of St. Louis to the Fish and Wildlife Service as a refuge for an Endangered species, the Indiana bat (*Myotis sodalis*). The tract includes an abandoned ore mine with multiple entrances, the result of iron ore mining around the turn of the century. Upon donation, the property became part of the National Wildlife Refuge System.

Approximately 140,000 Indiana bats, an estimated one-fourth of the species' entire population, spend each winter in the mine system. These bats require hibernacula with an extremely narrow temperature range, ideally 40-47 degrees Fahrenheit with a maximum of 50 degrees Fahrenheit. After hibernation, the bats leave in the last part of April, returning in September. Little is known of the species' whereabouts during the summer months, but it is believed that Indiana bats from Pilot Knob Mine disperse throughout much of Iowa, Illinois, and northern Missouri. Thanks to the donation by Pilot Knob Ore Company, this Indiana bat colony has a better chance to survive.

The donation of the tract on Pilot Knob Mountain has opened the way for the Service to construct barriers and signs at the mine entrances to prevent people from entering the caves, thereby offering a substantial degree of protection for the bats. Disturbances from human intrusions arouse the bats from hibernation, thereby burning energy that they need to survive the winter. Such disturbances are believed to be a major cause of the species' Endangered status. The barriers and signs also will reduce the chances of accidental injuries to explorers.

Pilot Knob Mine, along with two other cave sites in Missouri, two in Indiana, and two in Kentucky, house three-quarters of the world's population of hibernating Indiana bats. By the end of this year, it is expected that all seven of these hibernation sites will have bat-protection barriers at their entrances.

Regional News

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flowering, fruiting, recruitment of young, growth, mortality, threats, and loss of plants. Soil samples were taken from several monitoring plots to determine pH, texture, organic content, and radioactivity. The long term benefits from this monitoring will provide a better understanding of the biology of these plants, as well as an indication of the populations' stability. These data can then be used to make decisions on management and recovery of the species.

In addition to the monitoring efforts, new populations of the McKittrick pennyroyal, Mancos milk-vetch, and Kuenzler's cactus were discovered this year.

After a 7-week absence, the thick-billed parrots (*Rhynchopsitta pachyrhyncha*) that were released last fall in the Chiricahua Mountains of southern Arizona have returned. The birds disappeared in early June, but as of July 31, one flock of unknown size was reported from Tonto Creek in central Arizona and another was back in the Chiricahuas.

The masked bobwhite (*Colinus virginianus ridgwayi*) releases on Buenos Aires National Wildlife Refuge in southern Arizona are being hampered by a lack of rainfall. Dry conditions on the refuge are not favorable to the survival of the chicks, which are being held there in cages prior to release. The chicks, which were produced by the captive flock at the Patuxent Wildlife

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Regional News

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Research Center in Maryland, are being held longer than usual in anticipation of summer rains.

Seven adult bobwhites carrying radio transmitters are being tracked at the refuge. Most adults are paired, but nesting will likely be delayed until there are better weather conditions. The single masked bobwhite nest found on the refuge in early June contained 11 eggs. At least seven chicks hatched, but they probably did not survive.

Region 4 — An agreement to protect the first bald eagle nest to produce young in Tennessee since breeding eagles disappeared from that State has been reached between the private landowner, the Tennessee Wildlife Resources Agency, and the Service. Averett Lumber Company of Clarksville will protect the nest and its surrounding area, and will postpone construction of several goose hunting pits. The proposed hunting pits were to be constructed just outside the primary protection zone around the nest, and it is not clear at this time whether or not they would have a significant impact on the nesting eagles. The agreement to delay pit construction will permit the Service to study the eagle pair using the site. The study, already underway, will continue for about one and a half years.

* * *

A Center for Sea Turtle Research has been established at the University of Florida by the Florida State Legislature and University Board of Regents. The goal of the center is to conduct research on all aspects of sea turtle biology and to further sea turtle conservation through research and international education. Established in recognition of the outstanding achievements and pioneering research of Dr. Archie Carr, the center enhances the University of Florida's international preeminence in sea turtle studies. Dr. Carr, the first director of the center, died in May of this year. Dr. Karen Bjorndal recently was named associate director. Dr. Bjorndal also is Chairman of the Marine Turtle Specialist Group, part of the Species Survival Commission of the International Union for Conservation of Nature and Natural Resources.

* * *

Georgia's Fort Benning, which has the second highest number of red-cockaded woodpeckers (*Picoides borealis*) in the State, is proposing to construct a parachute drop zone. If the project goes as currently planned, it will be necessary to clear all vegetation within the zone. An active woodpecker colony (with one bird) currently existing in the proposed area would be destroyed. The Service recently entered into formal Section 7 consultation with the Army, and the Army has made a preliminary offer to attempt to relocate the impacted bird.

The Asheville (North Carolina) Field Office has been assisting the National Park Service in evaluating use by bats of several historical buildings and two abandoned mine systems within Great Smoky Mountains National Park. A small population of eastern big-eared bats (*Plecotus rafinesquii*) was found in one building. This species appears to be declining throughout its range and may be proposed for addition to the Federal Endangered and Threatened species list within the next few years. The Service has recommended that the park provide alternate roost sites for all bats that would be displaced by building repair in the park.

The largest known hibernating populations of *P. rafinesquii* exist in two abandoned sets of copper mines; a small maternity colony (80 adults) was found in one of them, and a smaller, apparently nonproductive, colony was found in the other. The Service is providing approximately $6,000 to the park to protect these colonies. Chain-link fences will be installed around five of the mine entrances, and a steel gate will be installed at another. The remaining entrances, which provide access to mines of no value as bat hibernation or maternity sites, will be blasted shut by the Park Service.

* * *

A representative of the Asheville Office has met with the city administrator for North Augusta, South Carolina, to discuss the Service's proposal to list the relict trillium (*Trillium reliquum*) as an Endangered species. The largest population of the species exists in and around the northern portion of the city, and the administrator had expressed concern that listing the plant might interfere with the city's planned improvement of sewer facilities. The Service plans to work closely with the city during design and construction of the sewer lines to ensure the plant's protection. Another smaller population of relict trillium also is located on city-owned land. The city has no plans to sell or extensively develop this site and will probably register it as a Natural Area if the plant is listed. A public hearing to list the relict trillium as an Endangered species was held in North Augusta in mid-June, and no significant problems were raised.

The Service has received a status survey report on seven mammals of Florida's east coast. Biologists from the University of Florida's Cooperative Fish and Wildlife Research Unit reached the following conclusions: the beach cottontail rabbit (*Sylvilagus floridanus ammophilus*), the seashore cotton rat (*Sigmodon hispidus littoralis*), and the Anastasia Island mole (*Scalopus aquaticus anastasae*) are all secure; Goff's pocket gopher (*Geomys pinetis goffi*) and the Anastasia Island cotton mouse (*Peromyscus gossypinus anastasae*) are presumed extinct; and the southeastern beach mouse (*Peromyscus polionotus niveiventris*) and Anastasia Island beach mouse (*Peromyscus polionotus phasma*) have lost large amounts of habitat and continue to face severe threats. The Service is considering whether or not to propose listing the latter two taxa as Endangered or Threatened.

* * *

Members of the Jacksonville (Florida) Field Office staff spent time searching for Bartram's ixia (*Spenostigma coelestinum*) last spring. This plant, a Category 2 candidate for listing, is a member of the iris family (Iridaceae) with large flowers that open at dawn and close by noon. Endemic to northeastern Florida southwest of Jacksonville, the plant is restricted to the moist, grass understory of pine flatwoods that experience low intensity ground fires every few years.

Bartram's ixia was found at a dozen localities in five of the seven counties where it historically occurred. At most localities, it occurred only as scattered plants at the edges of road rights-of-way or in small remnants of pine flatwoods that have not been converted to pine plantations. The largest populations were on an exceptionally wide road right-of-way with a large flora of wildflowers, on road edges and vacant lots in a large rural subdivision in Middleburg, and in a remnant tract of flatwoods near Middleburg that has been preserved until now because it is used as a cattle range rather than for pulpwood production. The development of pine plantations and the cessation of regular burning of the pine woods appear to have extirpated the ixia from much of its former habitat.

Region 6 — On June 30, 1987, Service personnel met with representatives of the U.S. Air Force and The Nature Conservancy at Warren Air Force Base, Cheyenne, Wyoming, to discuss the status of the Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*) as a listing candidate. The group visited several

(continued on next page)

Regional News

(continued from page 3)

Gaura populations, reviewed the existing Memorandum of Understanding and Management Plan, and discussed future management options.

* * *

The eskimo curlew (*Numenius borealis*) has been thought by some people to be extinct or nearly so. A flurry of observations in coastal Texas in the early 1960's raised speculation that the bird still survived at that time. But few observations were made in the following years, and hopes again diminished. In the 1980's, however, there have been several observations of this species on migration in the central and southern United States and in several areas of Canada. One bird was reported on the Platte River in Nebraska in mid-April 1987. At least two more were reported along the Texas coast in late April and early May 1987. Finally, in late May, Canadian Wildlife Service biologists found a pair in the Canadian Arctic. Preliminary reports indicated that a nest may have been located.

In response to the increased number of observations of eskimo curlews, a group of shorebird specialists from the United States and Canada at the recent American Ornithologists' Union meeting in San Francisco met to discuss ideas for recovering the species from the brink of extinction. Among the ideas mentioned were increasing public awareness that the species is not extinct; characterizing migration, winter, and nesting habitat; and protecting and managing known migration stopover areas.

* * *

The Salt Lake City (Utah) Fish and Wildlife Enhancement Office has again been involved in a cooperative effort to protect American peregrine falcon (*Falco peregrinus anatum*) fledglings from the hazards of learning to fly in a big city. As reported in BULLETIN Vol. XII No. 5-6, a pair of peregrines nested on a ledge at the Hotel Utah again this year. Two eggs hatched. As the fledglings began to try their wings, they had to be rescued from the top of the Marriot Hotel, from a maple tree, and from a canopy over a downtown shop. One bird even spent the night in the garage of a wildlife agent from the Utah Division of Wildlife Resources after it was located on the ground behind the hotel at midnight.

photo by Don Bleitz

eskimo curlew

Ten 5-week-old peregrine falcons that hatched in captivity at the Peregrine Fund's World Center for Birds of Prey in Boise, Idaho, were placed in nest boxes in the Great Salt Lake area recently as part of Utah's effort to reintroduce the species. Utah now has five active nesting pairs in the northern half of the state, including the pair mentioned in the paragraph above. The southern half of the State, with its many cliffs and canyons, has more than 40 nesting pairs.

* * *

On June 29, 1987, during a survey at Fort Peck Lake, Montana, for piping plovers (*Chadrius melodus*), two least terns (*Sterna antillarum*) were located on a small island. Although no nest was located, the terns appeared to be exhibiting nesting behavior. Further surveys of the island did not result in other least tern sightings; however, a nesting pair with a nest containing one egg was later observed on a nearby island. This is the first known occurrence of nesting least terns in Montana. To avoid nest disturbance, the site was not revisited for about 3 weeks, at which time the least terns were again sighted, but neither nest nor least tern young were observed.

* * *

The Wyoming Game and Fish Department continues to report that black-footed ferrets (*Mustela nigripes*) born in the captive breeding program are doing well. Six kits (four females and two males) born on June 6 are about one-half grown and now look much like their parents. They are active, move about freely in their cage, and are feeding independently. Another litter of two kits born on June 30 did not fare quite as well. One died, and the surviving female was weak and listless for a time but is now growing and appears to be getting stronger. This kit is being well cared for by its mother and should become more active and independent soon. Concern for the well-being of the young ferrets continues at the Sybille Wildlife Research Unit, but their growth and activity are very encouraging.

Region 8 (Research)— Several Cooperative Research Units are involved in studies concerning the piping plover, which was listed in 1985. The South Dakota Cooperative Fish and Wildlife Research Unit is in the second summer of field work to determine nesting locations and population status of piping plovers along the Missouri River and its tributaries in South Dakota. Although nesting dates varied, nest sites were the same for both years.

The Missouri Unit is engaged in studies in North Dakota to assess population dynamics of breeding piping plovers. Variability of recruitment rates and causes of the variability (e.g., predators) will be examined.

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Regional News

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Meanwhile, major North American wintering sites of piping plovers are being located. Other objectives of this study are to determine physical attributes of habitats used by wintering piping plovers and to assess what factors (e.g., human disturbance) may be affecting wintering habitat. Surveys of piping plover habitat have been completed for the southern Atlantic coast; the Gulf Coast through Mexico to the Yucatan Peninsula will be surveyed next winter.

* * *

Biologists on Patuxent's Kirtland's warbler (*Dendroica kirtlandii*) research project participated for 3 days during the week of June 8 in the 1987 Kirtland's warbler singing male census in Michigan. The census accounted for 167 singing males, a 20 percent decline from the 210 males counted last year.

* * *

Fifteen bald eaglets were produced at the Patuxent Wildlife Research Center in 1987. The birds have been released into five States (Georgia, Missouri, New Jersey, Pennsylvania, and Tennessee).

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	27	20	242	5	0	22	316	23
Birds	60	16	141	6	2	0	225	55
Reptiles	8	6	60	11	4	13	102	21
Amphibians	5	0	8	3	0	0	16	6
Fishes	39	4	11	24	6	0	84	47
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	5	0	0	13	12
Plants	126	6	1	28	3	2	166	58
TOTAL	309	52	466	88	15	37	967	251**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 217
Number of species currently proposed for listing: 19 animals
32 plants

Number of Species with Critical Habitats determined: 97
Number of Cooperative Agreements signed with States: 47 fish & wildlife
27 plants

July 31, 1987

August 1987 **Vol. XII No. 8**

ENDANGERED SPECIES

Technical Bulletin Department of Interior, U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

September 1987 Vol. XII No. 9

ENDANGERED SPECIES
Technical Bulletin
Department of Interior, U.S. Fish and Wildlife Service
Endangered Species Program, Washington, D.C. 20240

Two Plants and Three Animals Proposed for Listing

Five taxa were proposed by the Fish and Wildlife Service during August for addition to the Federal lists of Endangered and Threatened wildlife and plants. If the proposals are later made final, Endangered Species Act protection will be extended to the following:

Lakeside Daisy (*Hymenoxys acaulis* var. *glabra*)

Radiant masses of yellow blossoms make the Lakeside daisy one of Ohio's more spectacular wildflowers. This low-growing, herbaceous perennial with densely tufted leaves is a member of the aster family (Asteraceae). In the United States, the Lakeside daisy is currently known from one fragmented population on the Marblehead Peninsula of Ottawa County, Ohio. Former populations in Mason, Will, and Tazewell Counties of Illinois were extirpated by the effects of quarrying, grazing, and industrial development on the plant's limited habitat. In Ontario, Canada, where it is considered rare, the Lakeside daisy occurs in small areas on Manitoulin Island and the Bruce Peninsula. Because of this plant's limited distribution and vulnerability, the Service has proposed to list it as Threatened (F.R. 8/19/87).

The most serious threat to the Lakeside daisy is habitat destruction. This plant grows only in dry, rocky prairie areas. In Ohio, the sole remaining U.S. population consists of seven scattered colonies on private land that is actively being quarried for limestone. Lakeside daisies occasionally reappear 15 to 20 years after quarrying operations have moved to a different site, but not abundantly. Another significant threat is the succession of woody growth, which reduces the amount of open, sunny prairie needed by the Lakeside daisy.

Because none of the known Lakeside daisy populations are on public lands, the involvement of private landowners in management and recovery activities will be essential. The landowners have been informed of the daisy's presence and precarious status, and the Service will seek their cooperation in conservation actions for the species.

Houghton's Goldenrod (*Solidago houghtonii*)

Another member of the aster family, Houghton's goldenrod is a perennial that grows up to 30 inches (77 centimeters) tall and produces clusters of relatively large yellow flowers in a more or less flat-topped inflorescense. This species is native to sand beach flats along the northern shorelines of Lakes Michigan and Huron, including some areas inhabited by two other listing candidates, the Pitcher's thistle (*Cirsium pitcheri*) and dwarf lake iris (*Iris lacustris*). *S. houghtoni* habitat faces threats from residential development, off-road vehicles and other human-related disturbance, and hydrological changes in the Great Lakes (e.g., rising lake levels). Accordingly, this species has been proposed for listing as Threatened (F.R. 8/19/87).

Currently, there are 39 known *S. houghtoni* sites in 8 Michigan counties and 2 sites in Ontario, Canada. Of the U.S. populations, 2 are on Federal lands, 11 are on State lands, and one is on property owned by The Nature Conservancy; the remaining 25 areas are on privately owned land subject to various types of habitat alteration. Up to 10 formerly known *S. houghtoni* populations may have been extirpated within the past 10 years. The sites on Federal lands—a small island in Chippewa County (administered by the Bureau of Land Management) and an area of Hiawatha National Forest in Mackinac County—are not imperiled by any known Federal activities.

Two Klamath River Fishes

The **Lost River sucker (*Deltistes luxatus*)** and the **shortnose sucker (*Chas-***

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photo by Guy Denny

Lakeside daisy

Endangered species program regional staff members have reported the following activities for the month of August:

Region 1 — The woodland caribou (*Rangifer tarandus caribou*) translocated to northern Idaho from British Columbia, Canada, to augment an Endangered herd are being monitored through radio telemetry. One female caribou was found dead, but the cause of death could not be determined. The good news is that most of the transplanted animals are remaining in the area of the releases.

* * *

While conducting a field examination of the proposed Shorelands project in the San Francisco Bay area with representatives of the project applicant, the Sacramento Endangered Species Office staff discovered that a 20-acre wetland on which two salt marsh harvest mice (*Reithrodontomys raviventris*) were trapped in 1985, recently had been disked. The site lies within the proposed right-of-way of a major access road to the proposed development. The landowner had been notified by certified mail in 1986 that Endangered mice inhabited the area that now has been disked.

* * *

The El Segundo blue butterflies (*Euphilotes battoides allyni*) began their mating flight about 3 weeks earlier this year than previously recorded. The population is up to approximately 2,000 adults. Lange's metalmark butterflies (*Apodemia mormo langei*) also started to fly earlier this summer than in years past. Also, the population is expected to be higher than in the prior 9 years.

* * *

The Sacramento Office issued a final Biological Opinion addressing the exploration for oil reserves over a 27 square mile portion of the southern San Joaquin Valley. Species of concern included the federally-listed San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia silus*), and giant kangaroo rat (*Dipodomys ingens*). Measures incorporated as project actions by the applicant, Chevron USA, included pre-project surveys, avoidance of sensitive areas, rehabilitation of temporarily disturbed habitats, and construction of barricades to prevent future vehicle intrusion. These measures were developed prior to issuance of the opinion through discussions among the applicant, consulting Federal agencies, and the Service.

* * *

The Bureau of Land Management reports 90 percent survival of the Malheur wire-lettuce (*Stephanomeria malheurensis*) planted in the recovery effort initiated earlier this year. Reduced survival was reported from plots where plants were placed with sage and cheat grass. Given the success of the recovery action, a change in the permit for collecting seeds will be initiated.

* * *

The Region 1 Director has signed a finding that the information in a petition for list-

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Acting Chief*
Office of Endangered Species
(703-235-2771)
Richard L. Jachowski, *Acting Chief,*
Federal Wildlife Permit Office
(703-235-1937)
Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director,* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Harvey Nelson, *Regional Director,* John S. Popowski, *Assistant Regional Director,* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Assistant Regional Director,* Marshall P. Jones, *Endangered Species Specialist*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100), Howard Larson, *Regional Director,* Stephen W. Parry, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Director,* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories **Region 2**: Arizona, New Mexico, Oklahoma, and Texas **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands **Region 5**: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7**: Alaska **Region 8**: Research and Development nationwide

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ing the northern spotted owl (*Strix occidentalis caurina*) as Endangered is "substantial" under the terms of the Endangered Species Act. The Fish and Wildlife Service is now undertaking a status review on the owl, and asks that any pertinent information be sent to the Regional Director. (address on BULLETIN page 2).

Region 2 — Based on counts made in June, a minimum of 454 Ozark big-eared bats (*Plecotus townsendii ingens*) were present in previously known maternity caves in Oklahoma. This count is 15 higher than the count in 1986, and is in addition to 260 bats found in a previously unreported maternity cave recently located. (This new cave was mentioned in last month's BULLETIN.)

* * *

Another record for whooping crane (*Grus americana*) reproduction occurred this summer in Canada; 23 or 24 fledging-age chicks were present in early August in Wood Buffalo National Park. Twenty-one of the chicks were banded. The previous high production was the 21 offspring produced in 1986. With the excellent chick production of 1987, 125 to 130 whooping cranes can be expected to arrive at wintering grounds on the Texas coast this winter.

Chick production has been good in Canada since 1984. A recent evaluation of population trends indicates a 10-year periodicity in production of young that is probably associated with nesting habitat conditions. Recent declines in the water

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Reintroduction of Colorado Squawfish into the Lower Colorado River is Proposed

The Colorado squawfish (*Ptychocheilus lucius*) is North America's largest minnow, with records of specimens reaching 6 feet long and 80 pounds in weight. Historically, this fish was plentiful throughout the Colorado River and its major tributaries in Arizona, New Mexico, Utah, Colorado, and Wyoming. Many early settlers preferred the squawfish as a food source over the native trouts, and described the flesh as white, flaky, and sweet. Squawfish can readily be caught by sport anglers using artificial lures or bait.

After much of the natural Colorado River ecosystem was altered by the construction of dams, the diversion of water, and the introduction of exotic fishes, Colorado squawfish disappeared from the lower river basin. The last known naturally occurring squawfish specimen from Arizona waters was collected in 1969. Currently, the only surviving natural populations occur in parts of the upper Colorado River basin, especially in segments of the Green and Colorado Rivers within Utah and Colorado.

In August 1985, as part of an effort to recover the Endangered Colorado squawfish, the Fish and Wildlife Service and Arizona Game and Fish Department began a 10-year cooperative program to establish two "experimental populations" in the Salt and Verde Rivers of Arizona (see BULLETIN Vol. X No. 10). This category of experimental population, along with the subcategories of "essential" and "non-essential," were authorized by the 1982 amendments to the Endangered Species Act. The purpose is to promote wider acceptance of attempts to reintroduce listed species by allowing additional management flexibility (see BULLETIN Vol. IX No. 9). Under that authority, more than 176,386 Colorado squawfish have been stocked into Arizona waters, and another 100,000 are due to be stocked in autumn 1987.

With the encouragement of the Arizona Game and Fish Department, which hopes to establish a sport fishery for the Colorado squawfish in the lower Colorado River, the Service proposed to establish a third non-essential experimental population of the species in Arizona (F.R. 8/26/87). Habitat that appears suitable for the Colorado squawfish still remains in parts of the lower river; the reintroduction site would be the main river channel between Imperial Dam and Parker Dam. This stretch is within the species' historical range and is isolated from all other Colorado squawfish populations.

Management authority for non-essential experimental populations is described in Section 10(j) of the Endangered Species Act. In essence, they are treated as species *proposed* for listing as Endangered or Threatened. Although Federal agencies are required to "confer" with the Service on activities that may jeopardize such designated populations, the results of these conferences are non-binding. In the lower Colorado River, any experimental population of Colorado squawfish is expected to be compatible with existing recreational and other uses. The proposed designation also contains a special rule authorizing sport take of the Colorado squawfish from the experimental population if the angler is complying with all applicable State fishing regulations.

If the proposal is approved, all reintroduction stock will come from Dexter National Fish Hatchery in New Mexico, where successful techniques for rearing Colorado squawfish have been developed. Fry produced at the hatchery would be provided to the State of Arizona's Page Springs Hatchery in Cornville, where they would be raised to fingerling size. As many as 100,000 fingerlings could be released the first year, and plans call for stocking annually over 10 years. Annual surveys would monitor fish health and population changes.

photo by Donald P. Toney

Colorado squawfish

Running Buffalo Clover Discovered at New Sites

Judy Jacobs
Annapolis, Maryland, Field Office

This has been a good year for the running buffalo clover (*Trifolium stoloniferum*). When this rare plant was listed as Endangered (June 5, 1987), it was known from only a few individuals at one site in West Virginia. A second site, containing four individuals in 1984, failed to appear in 1985 and 1986. This past summer, however, a single plant did reappear at this second West Virginia site. In even better news, three new populations of this rare clover were recently discovered. One population in north central Kentucky was found by Mark Evans, botanist with the Kentucky Heritage Program, and two nearby in southeastern Indiana were discovered by Mike Homoya and Jim Aldrich, Indiana Heritage Program botanists.

These finds greatly increase the genetic base of the species and improve its chances for recovery. Also, the new locations allow greater insights into the plants' habitat requirements. All are located in relatively rich soils in areas that are occasionally mowed or grazed. This supports the hypothesis that occasional, moderately intense disturbance may benefit the clover or even be essential to its maintenance. Agricultural researchers are interested in studying the running buffalo clover's potential as a forage plant. This, of course, would require that vigorous plants can be grown and maintained in a field situation. Identifying the factors that the clover requires for vigorous growth is a top recovery priority for this Endangered plant.

photo by Rodney Bartgis

running buffalo clover

Federal Protection Approved for Inyo Brown Towhee and Puerto Rican Crested Toad

The **Inyo brown towhee (*Pipilo fuscus eremophilus*)** is a medium-sized, sparrow-like songbird restricted to desert riparian habitat in the Argus Mountains of Inyo County, California. Fewer than 200 are estimated to remain. These non-migratory birds are highly dependent on dense vegetation that faces potential threats from overgrazing, water diversion, mining, and certain recreational activities. The Fish and Wildlife Service's November 23, 1984, proposal to list the Inyo brown towhee as Threatened (see summary in BULLETIN Vol. IX No. 12) was made final August 3, 1987.

About three-fourths of the towhee's habitat is within the U.S. Navy's China Lake Naval Weapons Center. The Navy base has eliminated livestock grazing on the testing range, and is working to control the harmful impacts of wild burros and horses on the fragile desert riparian zones. Most of the other Inyo brown towhee habitat is on property administered by the Bureau of Land Management. Both agencies are planning a cooperative program to conserve the towhee's habitat. There are no known Federal projects or activities that will be significantly affected by the listing rule.

Included in the final listing rule was a designation of Critical Habitat (see maps in the August 3, 1987, *Federal Register*). In response to a request by the State of California, the Service concurrently proposed to designate several additional areas as Critical Habitat.

The **Puerto Rican crested toad (*Peltophryne lemur*)** is an amphibian yellowish-olive to blackish-brown in color with prominent crests above the eyes. This species was known historically from two islands, but it apparently has been extirpated from one — the island of Virgin Gorda in the British Virgin Islands — and remains only on the main island of Puerto Rico. Its populations declined as breeding areas were drained or filled in for construction, cultivation, and mosquito control. Because development pressure where the sole known healthy population survives is accelerating, the Service proposed December 23, 1986, to list *P. lemur* as Threatened (see summary in BULLETIN Vol. XII No. 1). The final rule was published August 4, 1987.

* * *

These listed animals are now protected under the Endangered Species Act, the terms of which are summarized in this BULLETIN at the end of the story on species newly proposed for listing.

Final Regulations on Turtle Excluder Devices

Gloria Thompson
National Marine Fisheries Service

Six species of sea turtles are listed under the Endangered Species Act as Endangered or Threatened. Five of these, the loggerhead, Kemp's ridley, green, leatherback, and hawksbill, are caught in shrimp trawls in waters off the southeastern United States. Based on observer data, the U.S. Department of Commerce estimates that 47,973 turtles are incidentally caught annually and, of these, 11,179 die. To combat this problem, the National Marine Fisheries Service (the Commerce Department's agency responsible under the Endangered Species Act for marine species) developed gear that would release captured turtles without reducing the shrimp catch. By 1981, it produced the Turtle Excluder Device (commonly known as the TED) and began a technology transfer program to encourage voluntary usage by the shrimpers. This program included providing prototypes to shrimpers who wished to try them. Despite these efforts, there was little voluntary use.

On March 2, 1987, the agency proposed rules that would require U.S. shrimp trawlers in the Gulf of Mexico and in the Atlantic Ocean off the southeastern coast to use approved gear in specific locations and at specified times in order to reduce incidental captures of Endangered and Threatened sea turtles (see BULLETIN Vol. XII No. 4).

Based on comments received in writing and at 17 public hearings, the agency published final regulations in the June 29, 1987, *Federal Register*. Measures to reduce the incidental take and mortality of sea turtles in shrimp trawls will be phased in as shown in the table. (Maps of the affected areas are included in the *Federal Register*.)

In offshore waters at specified times, all shrimp trawlers 25 feet and longer are required to use qualified TEDs, and all shrimp trawlers smaller than 25 feet are required to restrict tow times to 90 minutes or less. In inshore waters at specified times, all shrimp trawlers are required to restrict tow times to 90 minutes or less. In both inshore and offshore waters, shrimp trawlers that use TEDs are exempt from the tow time restrictions. The rules specify criteria and procedures for qualifying additional TEDs; specify areas, seasons, and vessel sizes for which approved TEDs or 90 minute tow times must be used; establish reporting requirements; continue measures for resuscitation and release of captured sea turtles; and continue the effects of designated Critical Habitat. These rules will reduce substantially the incidental catch and mortality of Endangered and Threatened sea turtles associated with shrimp trawling.

For further information on TEDs, contact the Office of Protected Resources and Habitat Programs, National Marine Fisheries Service, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235; 202/673-5348.

SUMMARY OF FINAL TED REGULATIONS

Areas	Start	Vessel Size	Requirement	Season	Coverage
Offshore					
Canaveral Area	10-1-87	≥25 ft	TED	all year	all waters
Southwest Florida Area	01-1-88	≥25 ft	TED	all year	shore to 15 miles[1]
Gulf Area	03-1-88	≥25 ft	TED	3/1 to 11/30	shore to 15 miles[2]
Atlantic Area	05-1-88	≥25 ft	TED	5/1 to 8/31	all waters
Canaveral Area	10-1-87	<25 ft	90 minute tow[3]	all year	all waters
Southwest Florida Area	01-1-88	<25 ft	90 minute tow[3]	all year	shore to 15 miles[1]
Gulf Area	03-1-88	<25 ft	90 minute tow[3]	3/1 to 11/30	shore to 15 miles[2]
Atlantic Area	05-1-88	<25 ft	90 minute tow[3]	5/1 to 8/31	all waters
Inshore					
Canaveral Area	10-1-87	all	90 minute tow[3]	all year	
Southwest Florida Area	01-1-88	all	90 minute tow[3]	all year	
Gulf Area	03-1-88	all	90 minute tow[3]	3/1 to 11/30	
Atlantic Area	05-1-88	all	90 minute tow[3]	5/1 to 8/31	

[1]Will extend to all waters 1-1-89.
[2]Will extend to all waters 3-1-89.
[3]Tow time restrictions do not apply to vessels using TEDs in each net during trawling.

The Endangered Palila of Hawaii

Donald W. Sparling
Environmental Contaminants Research Branch
Patuxent Wildlife Research Center

Illustration by H. D. Pratt

palila

Biologists with Federal and State conservation agencies recently determined that the palila, a native species of Hawaiian bird, is still at critically low population levels. The palila is a member of the Hawaiian honeycreepers, a subfamily of birds found only in the Hawaiian Islands. This small, yellow-headed bird with a gray back, greenish wings and tail, and light belly once occupied much of the mamane-naio forests on the big island of Hawai'i but now only occurs on a small portion of Mauna Kea, one of the island's high volcanic mountains. Even within this fragment of its original range, the palila is considered to be at the minimal level needed to sustain itself, and the species is listed as Endangered.

Several factors have been suggested for the decline of this once plentiful species. Diseases like avian malaria and avian pox may limit the distribution of the species to higher mountain elevations where mosquitoes that carry the diseases are rare or absent. Human interference, such as military training activities, may discourage the birds from using otherwise suitable habitat. Perhaps the greatest problem currently facing the palila, however, is habitat destruction by non-native ungulates. Feral goats, feral sheep, and mouflon sheep extensively eat the young mamane trees on whose fruits palila depend for a source of food.

Because of these problems, the palila has twice been the subject of legal action at the Federal level. In 1979, a district judge in Hawaii ruled that the feral goats and sheep maintained for hunting purposes had to be removed from Mauna Kea, the last of the palila's habitat. In 1986, the district court determined that mouflon sheep, which had been introduced as trophy game animals, also had to be removed. The judge determined that mouflon posed harm to the ecosystem on Mauna Kea by eating mamane and naio, injuring large trees and preventing regeneration of mamane. The removal of mouflon should not only help protect the palila but other rare species of birds and plants as well.

Since 1975, the Fish and Wildlife Service, through its Mauna Loa Research Station, has monitored the populations of the palila and other endangered species of forest birds. In 1980, the palila monitoring program became more extensive when the Hawaii Department of Lands and Natural Resources' Division of Forestry and Wildlife cooperated as a partner in annual counts. At first, the counts were conducted once a year, but since 1984 two counts have been taken each year to coincide with the prebreeding and postbreeding seasons.

Biologists from the Fish and Wildlife Service and the Hawaii Division of Forestry and Wildlife conducted the most recent (July 1987) palila count. The population estimate reached was 3,624 $\pm$859 birds.

The most recent prebreeding count occurred in January 1987. State and Federal biologists estimated that there were 3,444 $\pm$ 956 palilas at that time. This January count was an appreciable increase over the previous year's prebreeding estimate and was the highest count since 1981.

Despite the possible increase in numbers of the palila over the past few years, the species still remains at critically low population levels. At present, biologists are cautiously optimistic that the birds may positively respond to the removal of ungulates from palila habitat. Intensive studies on the habitat requirements of this Endangered species are under way in hopes of a better understanding of how humans can ensure the continued survival of this beautiful bird.

Until recently, Mr. Sparling was with Patuxent's Mauna Loa, Hawaii, Research Station.

The Role of Lead in Condor Mortality

Oliver H. Pattee
California Research Station
Patuxent Wildlife Research Center

The precipitous drop in numbers of wild California condors (*Gymnogyps californianus*) has been attributed to a number of causes, including illegal shootings, collisions with man-made obstructions, environmental contaminants, and poisonings associated with animal damage control programs. The California condor population continued to decline even after the initiation of the California condor recovery research program in 1980. The wild population consisted of 15 to 17 individuals in the fall of 1984, yet by the spring of 1985 only 9 birds could be found. Only one of the 6 to 8 birds that vanished during 1984-1985 was recovered for necropsy, and it was found to have died of lead poisoning. Because the decline in the wild population appeared to be accelerating, a decision was made to bring all wild birds into the captive breeding flocks.

Of the four carcasses of California condors recovered since 1980, one died apparently of cyanide poisoning following an encounter with an M-44 device ("coyote getter") and the other three died of lead poisoning. The apparent source of the lead was bullet fragments, evidently obtained from game animal carcasses left in the field and subsequently fed upon by condors. A hunting season connection is further suggested by the timing of the deaths; the three birds were found dead or ill on January 3, March 22, and April 10. Since lead poisoning is a slowly debilitating prob-

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Condor

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lem, exposure probably occurred much earlier. The bird captured January 3, 1986, in an extremely weakened condition exhibited elevated blood lead levels (1.8 parts per million, wet weight) when captured earlier (November 1, 1985) and had exhibited abnormal behavior by mid-December, 6 weeks later. This example suggests that a bird dying in April may have been exposed as early as December or January.

Although these data suggest that lead poisoning is an important cause of mortality in California condors, further research is essential. The Patuxent Wildlife Research Center will be examining the availability of lead and the susceptibility of cathartids to lead poisoning at its Ventura, California, and Laurel, Maryland, locations. Because the recovery effort emphasizes reestablishing a wild population of California condors, future research will concentrate on determining the magnitude of the lead problem and developing management schemes to alleviate the hazards. Initial work suggests that California condors can be attracted to supplied, contaminant-free carcasses for a significant portion (40-50 percent) of their diet.

photo by Noel Snyder

California condor AC-3 was treated for lead poisoning at the San Diego Zoo but died January 18, 1986.

* * *

(*Editor's note*: Currently, all California condors are in two captive breeding flocks. There are 8 males and 6 females at San Diego Wild Animal Park and 5 males and 8 females at the Los Angeles Zoo.)

Man and Manatee: Planning for the Future

Thomas Baugh
Jacksonville, Florida, Field Office

The explosive growth in Florida's human population, coupled with related development, is threatening the fragile population balance of the manatee (*Trichechus manatus*). Florida grows by an estimated 800 to 1,000 people a day or in excess of 300,000 people a year. About 78 percent of the current 12 million residents live in Florida's coastal areas, and 82 percent of the projected 1986-1990 growth is expected to occur on or near the coast. Unfortunately, man and manatee are meeting in Florida waters with increasing frequency and the results are — all too often — dead manatees. In response, new, more comprehensive plans for this mammal's survival are being developed by the U.S. Fish and Wildlife Service and Florida Department of Natural Resources.

The best available information indicates that there are about 1,200 manatees using Florida waters, about 600 on each coast, with little to indicate any significant exchange between the two populations. These figures are based on an intensive survey conducted by Federal and State biologists when the manatees congregated in the warm water of power plant outflows during the exceptionally cold winter of 1983-1984.

Research has documented that at least 125 to 130 manatees die each year in Florida. Over the past 3 years, 30 percent of these deaths were caused by humans and, of those, 65 percent (19.5 percent of the total) were deaths due to boats and barges. The causes of an additional 36 percent of all manatee deaths are listed as unknown but are thought to include some additional deaths due to human causes. About 80 percent of all manatees are scarred by boat propellers. Even when manatees are not killed by propellers, scarring can interfere with feeding, reproductive activity, and the rearing of young. It is currently estimated that 120 to 130 manatees are born in Florida each year.

In Florida, the Fish and Wildlife Service shares manatee conservation responsibilities with the Florida Department of Natural Resources. Both agencies feel that development and implementation of manatee protection plans may aid manatee survival. To be effective, these plans must include provisions to reduce the number of human-related manatee deaths, stabilize manatee populations, and preserve and rehabilitate manatee habitat. These goals can be achieved by the careful integration of biological, social, economic, and other information; the analysis of this information in terms of manatee and human needs; specific recommendations for manatee recovery; and the communication of these recommendations to all interested parties.

At this time, it is anticipated that manatee protection plans will be developed for all areas of Florida that have manatee habitat. Draft manatee protection plans will be cooperatively prepared by the Service and the Florida Department of Natural Resources. The final protection plans will identify areas of greater or lesser risks to the manatees, specify the nature and intensity of those risks, and make specific recommendations to remove or control the risks. The development of comprehensive planning may be more effective than current approaches to manatee conservation and, at the same time, continue to allow for the multiple use of Florida waters.

photo by Thomas Baugh

Florida manatee and young

Proposed Listings

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***mistes brevirostris*)** are fishes native to the Klamath Basin of south-central Oregon and north-central California. Both are normally large and long-lived; for example, *D. luxatus*, the sole species in its genus, can reach about 10 pounds in size and live at least 40 years. Widespread moderation of their natural riverine habitat, water pollution, and impacts from exotic fish species have severely reduced the range and numbers of *D. luxatus* and *C. brevirostris*, prompting the Service to propose listing them as Endangered (F.R. 8/26/87).

Historical biological surveys in the Klamath Basin (1879, 1898) indicated the presence of large populations of fishes, suckers in particular. Spawning runs of suckers were large enough to provide a major food source for Indians and local settlers. Even through the 1970's, runs of suckers moving from Upper Klamath Lake to spawning areas in the Williamson and Sprague Rivers were great enough to support a popular sport fishery. During the past 3 years, however, the Klamath Tribe and local biologists have been alarmed enough by sharp population declines in both species that the Oregon Fish and Game Commission closed the 1987 sport fishery.

Although the causes of the decline are varied and not fully understood, there clearly has been a drastic reduction in spawning success. The construction of dams has been particularly destructive in that they have blocked the fishes from the habitat they need for successful spawning. Recent data show that neither species has successfully recruited young into the population for approximately 18 years. One dam alone, the Sprague River Dam near Chiloquin, Oregon, probably eliminated more than *95 percent* of the two species' historical spawning habitat in the Upper Klamath Lake drainage. Although fish ladders have been built, their effectiveness in facilitating movement of suckers over the dam has been minimal to non-existent; Lost River and shortnose suckers are strong swimmers, but their leaping ability is greatly limited.

Hybridization with related species is a threat to the genetic purity of the Lost River and shortnose suckers. Although hybridization does occur naturally, it becomes a problem when one species (such as *C. brevirostris*) becomes more rare. Further, hybridization is facilitated by dams that, when they block natural spawning runs, force individuals of different species to spawn in mass in the dam tailwaters. Exotic fishes are yet another threat because they can compete with native species for food, prey on larval suckers, and introduce new parasites and/or diseases.

Upper Klamath Lake and its tributaries are now the primary refuge for the remaining Lost River and shortnose suckers. However, survey work performed during 1984-1986 by the Oregon Department of Fish and Wildlife, the Klamath Tribe, and the Fish and Wildlife Service revealed continuing, drastic declines there as well. For example, the estimated population of 23,123 Lost River suckers in the 1984 Upper Klamath Lake spawning run fell to 11,861 by the 1985 run.

Most of the habitat occupied by the two fishes is administered by the U.S. Forest Service, although some marshes used by both species are within the Upper Klamath National Wildlife Refuge. Forest Service and refuge personnel have been actively involved in determining the status of fish resources in the area and will be important in conservation of the two suckers. Possible recovery actions to be evaluated include rehabilitation and protection of the few remaining spawning streams, obtaining pure stock for captive propagation and reintroduction, and research into structures or methods to help the fish move successfully around dams. Moreover, if the listing proposal is made final, Federal agencies involved in funding, authorizing, or carrying out any action that may affect the two fishes (e.g., new dams, water diversion projects) will be required to consult with the Fish and Wildlife Service on ways to avoid jeopardizing the species' survival.

Photo by M. Coleman

shortnose sucker

Visayan Deer (*Cervus alfredi*)

Known only from the Visayan Islands in the central Phillipines, this small deer has the most restricted range of all surviving species in the genus *Cervus*. It is a small animal, standing only about 25 inches (64 centimeters) at the shoulder. This deer's coat, remarkably dense and soft, is generally dark brown on the upper parts and buff-colored below. Yellowish white spots on the shoulders, back, and sides are one characteristic that distinguishes the Visayan deer from related species.

The Visayan deer originally occupied eight islands and was fairly widespread until World War II. After the war, the advent of intensive upland logging led to a precipitous decline in the species' numbers. Logging not only eliminated the dense forest habitat upon which the Visayan deer depends but also made its range more accessible to settlers and hunters. The increasing human population in the region practiced slash-and-burn agriculture, which involves clearing away trees, harvesting crops until the soil is exhausted, and moving on to another area. This practice, which is shrinking tropical forests worldwide, has accounted for about as much forest destruction in the Phillipines as commercial logging. In an ironic twist, logging was greatly curtailed in this area of the Phillipines in 1983, but the resulting unemployment led many people to turn to slash-and-burn agriculture and to subsistence hunting. Habitat loss has been so devastating that the Visayan deer is thought to have disappeared entirely from four of the islands comprising its historical range. It still survives on the other four (Leyte, Negros, Samar, and Panay), but only in relatively small, isolated pockets of habitat.

The Visayan deer was proposed by the Service on August 19 for listing as an En-

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Proposed Listings

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dangered species. Although it already is protected under Phillipine law and some of its habitat falls within government reserves, the deer is still being sought for food and the hunting pressure is intense. The current Phillipine government is concerned about the deer and its habitat; however, enforcement personnel and funding for conservation work are in short supply. Attempts to establish a captive breeding facility in the Phillipines have not yet been successful. Further complicating the picture is the fact that, to a large extent, the Visayan deer occurs in areas that are sometimes under the influence of rebel forces and where military operations take place.

If current trends continue, the Visayan deer may not survive the twentieth century. By focusing more attention on the plight of this small but beautiful animal, the Service hopes to stimulate international efforts to preserve ecosystems in the Phillipines. The nation's new government has shown much interest in such efforts.

* * *

Available Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against take of listed plants.

Indiana Bats: Down for the Count

Richard L. Clawson
Missouri Department of Conservation

Standing above the entrance to a cave in southern Indiana, I prepared to descend, rigging to a rope my team and I had dropped into the 30-foot pit. I had come to conduct my biannual census of the Endangered Indiana bats (*Myotis sodalis*) that hibernate there each winter. Listening to the roar of trucks and cars on the nearby interstate highway, I was struck by the thought that thousands of people drove past that cave every winter, oblivious to the bats or their plight. Few people know about Endangered bats and fewer still care. And yet I was about to witness one of the most spectacular sights of my career in biology: a living tapestry of irregular shape, 20 feet long and 10 feet across, composed of animals so tiny that I could cup one entirely within my closed hand. The bats were arrayed on the ceiling of a ledge so cramped that I had to take great care not to dislodge them as I crawled beneath to measure their cluster and census them.

Usually, about one-fourth of the Indiana bats that hibernate in this cave form the same cluster in the ledge area. The rest are nearby, their clusters extending into a large room. I have been in awe of this particular cluster since I began censusing the cave 4 years ago, and I always come away a bit humbled. Despite our ability to count them, to weigh and measure them, to record the temperature at their roost site, or whatever other physical parameters we care to examine, we still do not know some of the most fundamental things about them. How far did they come, where did they spend the summer, what habitats do they use and need and what threatens them there, how did they find this particular cave, what would they do if it became unavailable to them, and an entire host of other questions concerning their biology and behavior remain to be answered.

I was on my way down to count these Endangered bats, but it is they who are on the way down. Even with our best efforts to date, I still counted fewer Indiana bats rangewide than I did 2 years before. I have conducted this census three times now, and each time, despite individual fluctuations among the caves, gains at one have been more than offset by losses at another; the result has been continued decline.

Causes of Decline

The Indiana bat is a medium-sized member of its genus and weighs less than one-third of an ounce (6 to 9 grams). No subspecies are recognized. They are found throughout much of the eastern half of the United States, with the largest hibernating populations found in Indiana, Missouri, and Kentucky. The species is extremely vulnerable due to its penchant for aggregation; fully 85 percent of the entire known population winters in only seven caves.

Indiana bats have been little studied and, until very recently, poorly known even in terms of their distribution, abundance, and status. The work of early investigators was limited to the hibernation caves used by the species, and only since the mid-1970's has anything been learned about their summer distribution and ecology.

photo by Merlin D. Tuttle, Bat Conservation International

Indiana bats are so small that one can fit within a closed hand.

One of the first species in the United States to be recognized as Endangered, the Indiana bat has received legal protection as such since the passage of the Endangered Species Act of 1973. It is endangered primarily due to the direct and indirect actions of man. The most serious known cause of decline is human disturb-

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Indiana Bats

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ance of hibernating bats. Once in hibernation, bats must conserve their body fat supplies until spring or face starvation. When aroused from hibernation, they can expend 10 to 30 days of these limited reserves.

Vandalism and direct destruction of roosting bats have been documented as well. Improper gating of cave entrances and construction for cave commercialization have altered cave microclimates, rendering some caves unsuitable for Indiana bat hibernation.

Other human-related factors that have been implicated in the decline of the species include habitat changes (such as stream channelization and bank modification, forest clearing and alteration, and agricultural development) and indiscriminate collecting. Although pesticide poisoning of Indiana bats has not been documented, other North American bats in agricultural habitats have declined due to the effects of pesticides, and it is likely that the species suffers at least some level of contamination. Natural phenomena associated with Indiana bat declines include flooding of hibernacula, freezing during severe winter weather, and collapse of mines occupied for hibernation.

Habitat

Indiana bats hibernate in large, densely packed clusters of about 300 bats per square foot in caves or mines that have stable winter temperatures below 50 degrees Fahrenheit, with the preferred temperature being 39 degrees to 46 degrees. Specific roost sites that provide this climate are selected and used from year to year. Usually the majority of bats will be found just beyond the twilight zone of the hibernation cave, but this varies with time of season and configuration of the cave. Only a small percentage of the available caves provide for the Indiana bat's specialized requirements. For example, only 24 of Missouri's more than 4,700 known caves ever have contained hibernating colonies larger than 100 Indiana bats.

Recent studies indicate that Indiana bat maternity colonies are formed mostly in riparian and floodplain forest near small to medium-sized streams, although bats also have been found along tree-lined drainage ditches and in upland sites. It may be that this apparent pattern is more a function of habitat availability than of the species' actual preference. Clearing for agriculture has restricted forest habitats largely to riparian zones in their summer range. To date, few maternity roosts have been studied. Of these, three have been in riparian habitat and one was in an open, pastured woodlot. Roosts also have been found in the hollow of a tree and behind loose, exfoliating bark of both dead and living trees.

Optimum summer habitat must include mature trees, both to provide roost sites and because Indiana bats forage around the crowns of large trees. Preferred stream habitat appears to consist of streams lined on both banks with mature trees that overhang the water by at least 10 feet. Streams without riparian vegetation do not appear to be suitable. Upland forest with a well-developed canopy but poorly developed sub-canopy layer also appears to provide summer habitat.

Ecology and Behavior

Indiana bats are insectivorous. More than eight orders of insects have been identified in studies of their habits. Moths (order Lepidoptera), beetles (Coleoptera), and flies and midges (Diptera) are preferred prey.

Indiana bats are active from April through October, migrating seasonally between their summer roosts and hibernation caves. Summer colonies begin to disperse in August, and migrants return to their hibernacula in the months from August through October. The females enter hibernation first, followed by the males. It is during this time that mating takes place. Females store the sperm until spring, when ovulation and fertilization occurs.

In the yearly cycle, females leave the hibernacula first, in late March or early April. Males follow, but their exit is spread over a longer period, and some remain near their hibernation caves throughout the summer. Pregnant females migrate to their maternity roosts, arriving in early to mid-May where they form colonies of 50 to 100 individuals. The young, one per female, are born in June or early July. Males may migrate as well but, like most other species of bats, they generally do not roost with the females and young during the nursing period.

Preservation Efforts

An Indiana Bat/Gray Bat Recovery Team was assembled in the 1970's. The Recovery Team's responsibilities include advising the U.S. Fish and Wildlife Service of actions deemed necessary to preserve these endangered bats. Among these are monitoring the populations, cave protection, public education, and others. Actions for the Indiana bat to date have centered on the hibernation caves.

The team separated caves known to harbor Indiana bats into several classes based on population sizes. The most important (Priority 1) caves, of which there are 8, recorded populations of 30,000 or more bats each. The second category (Priority 2) contained populations above 1,000 but less than 30,000. All of the Priority 1 caves are or soon will be in public ownership, and of these six are gated or fenced and the other two will be protected in the near future. Many of the Priority 2 caves are protected as well.

Since 1983, I have censused seven of the eight Priority 1 caves on behalf of the Service. (One is an extremely dangerous abandoned mine that cannot be censused). We elected to have only one person census these caves in order to reduce observer bias, thus attempting to ensure that population trends noted in the census were real. Regular censusing did not begin until the 1980's and was not standardized until 1983. Over that time span, the Indiana bat has declined by 55 percent in these caves. The situation in the Priority 2 caves in several States is similar, with notable exceptions in Indiana and Kentucky. Despite efforts to protect this species during hibernation, the population has continued to decline.

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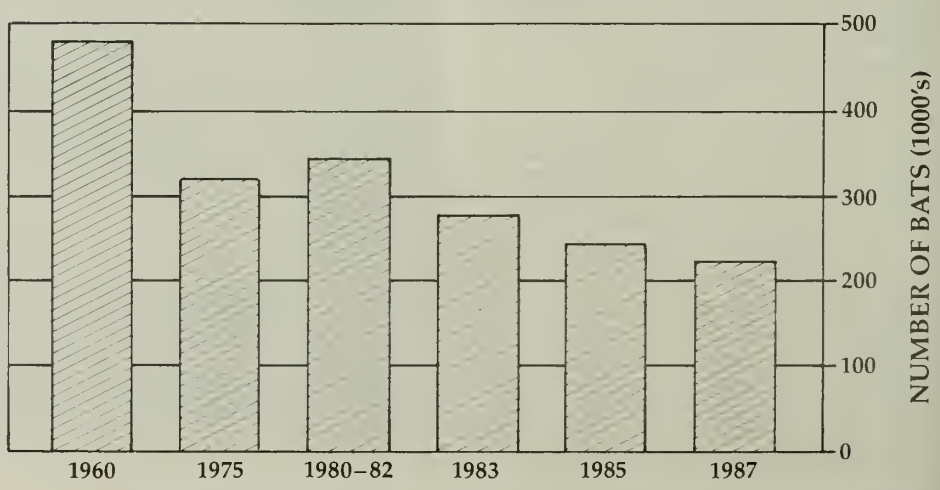
INDIANA BAT POPULATIONS
AT 7 PRIORITY 1 HIBERNACULA-1960-1987



Indiana Bats

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The Future

Overall, the prognosis for the Indiana bat is not good. We must gain a better understanding of the rest of its life cycle, learn what factors besides the known hibernation-associated ones are contributing to the species' decline, and correct them. A radio telemetry study of a maternity colony is getting underway in Illinois and may help provide answers. Research is needed throughout the principle summer range of the Indiana bat to determine its habitat preferences, whether or not summer habitat is a limiting factor, and what threats there are to its existence during the non-hibernation period (particularly from pesticides).

I hope that in the future when I go down to census Indiana bat populations, the trend is reversed and I can chronicle the rebound of this endangered bat. There still is time, and the mechanism (the Endangered Species Act) is in place to accomplish it, but if the Indiana bat continues to be "down for the count," the species could be knocked out completely.

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(*Editor's note*: Mr. Clawson has been a member of the Indiana Bat/Gray Bat Recovery Team since 1980 and team leader since 1984.)

Regional News

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level of the nesting area may indicate the beginning of a dry cycle that could cause reproduction or chick survival to decline in future years. Water conditions are still fair in the nesting grounds, but winter precipitation will be important in determining 1988 nesting habitat conditions.

Twelve whooping crane chicks hatched in May from eggs taken to Grays Lake National Wildlife Refuge in Idaho, but only 2 could be found by mid-August. Sandhill cranes (*Grus canadensis*) also experienced poor chick production and survival at the refuge this year. The cause of the poor survival rates is unknown.

* * *

Bitter Lake National Wildlife Refuge recently announced its intention to manage its aquatic resources for native fishes. The refuge, located in east-central New Mexico along the Pecos River, is home to the Endangered Pecos gambusia (*Gambusia nobilis*), the Threatened Pecos bluntnose shiner (*Notropis simus pecosensis*), and several listing candidates, including the greenthroat darter (*Etheostoma lepidum*) and the Pecos pupfish (*Cyprinodon pecosensis*). James Brooks, fisheries management biologist from Dexter National Fish Hatchery in New Mexico, has initiated surveys of the refuge's ponds and sinkholes. With the assistance of the refuge staff, all non-native fishes will be removed from the refuge in order to provide secure habitats for native fish and to enhance their recovery potential.

Region 4 — The Endangered Mississippi sandhill crane (*Grus canadensis pulla*) set a record for the number of nests produced during its March-June 1987 nesting season. The 18-year-old record of eight nests in one season was broken on May 25, when a pair of cranes that had lost its nest earlier in the season renested. Nine nests containing a total of 14 eggs were found on and near the Mississippi Sandhill Crane National Wildlife Refuge in Jackson County, Mississippi. In addition, although successful nesting by restocked cranes has never been documented, refuge biologists found a nest with a chick on April 8, 1987, belonging to a 5-year-old released crane and a wild mate. Since the discovery of that first nest in April, three more nests have been produced by released cranes. The four new pairs resulted in a near doubling of the five-nest total found in 1986. The long-term recovery goal for the Mississippi sandhill crane is a stable population of 100 cranes and 30 breeding pairs. Currently, there are 50 to 55 cranes and a minimum of 9 breeding pairs.

* * *

Two Florida east coast beach mice may be proposed for listing as Endangered or Threatened. The Anastasia Island beach mouse (*Peromyscus polionotus phasma*), considered for Endangered status, formerly occurred from the mouth of the St. Johns River in Duval County south along the coastal beaches to the end of Anastasia Island in St. Johns County. Most of the former habitat for this subspecies has been destroyed by beachfront development. Today, viable populations are believed to occur only at the Anastasia State Recreation Area on the northern part of Anastasia Island and on the Fort Matanzas National Monument at the southern end of the island. The southeastern beach mouse (*Peromyscus polionotus niveiventris*), considered for Threatened status, formerly occurred from Ponce (Mosquito) Inlet, Volusia County, south along the coastal dunes to Hollywood Beach, Broward County. As with the Anastasia Island beach mouse, much of the habitat of this subspecies has been destroyed by beach development. Good but vulnerable populations remain on Federal lands on Merritt Island and the Canaveral National Seashore where there are sizable amounts of protected habitat.

* * *

The taxonomic status of the Okeechobee gourd (*Cucurbita okeechobeensis*), a listing candidate, is being investigated by the Jacksonville, Florida, Field Office. The plant was once relatively abundant near the southern and eastern shores of Lake Okeechobee until agricultural development destroyed most of its habitat in the 1920's. Dr. R. W. Robinson, a squash and pumpkin geneticist at the New York State Agriculture Experiment Station of Cornell University, has not found the gourd in recent years. Two other biologists have located only a few plants. The Okeechobee gourd is similar to a Mexican gourd described as *Cucurbita martinezii* by Liberty Hyde Bailey of Cornell, who had collected and worked with the Florida gourd earlier. The Mexican gourd has proved popular among American vegetable breeders as a source of genetic disease resistance for domestic gourds and squashes, a quality that has encouraged searches for new populations and evaluation of its relationship to the Florida plant.

In 1980, Dr. Robinson and a collaborator presented evidence in a newsletter article that the Florida and Mexican gourds should be assigned to the same species. He has continued to examine the gourds and is still convinced that the difference between them is slight. A Russian-language paper by A.I. Filov, which recently came to the attention of Cornell scientists, formally combined the two gourds into a single species. Filov, in 1966, named the Mexican plants *Cucurbita okeechobeensis* var. *martinezii*. A Cornell student, T. Andres, who is completing a doctoral thesis in *Cucurbita* systematics, is likely to treat these plants similarly. This taxonomic treatment leaves the Florida Okeechobee gourds as a distinct variety that remains eligible for Federal listing separately from the Mexican gourds.

* * *

Region 5 — The annual Virginia big-eared bat (*Plecotus townsendii virginianus*) maternity colony census, conducted this past June, showed that the number of adult female bats has increased for the fifth consecutive year. In West Virginia, where the majority of colonies (nine) occur, the count is up only 2 percent from last year, but the population has grown by nearly a third since the surveys began in 1983. The population at Virginia's one colony is apparently stable. At Kentucky's three colonies, numbers were up more than 40 percent from last year. Continuing these counts annually will reveal long-term trends within colonies and may also shed light on the dynamics of colony formation and division.

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An Endangered mollusk, the pink mucket pearly mussel (*Lampsilis orbiculata*), has been rediscovered at its

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Regional News

(continued from page 11)

type locality in the upper Ohio River. It was found upstream of Huntington, West Virginia, by Service biologist Bill Tolin. This is the first time in 75 years that this mussel has been seen in this river reach; there is only one other occurrence in the Ohio basin within a thousand river miles. This find indicates that water quality in the area is still high enough to provide habitat for this rare mussel. Actually, according to Tolin, water quality in the area has greatly improved in recent years.

Region 7 — Last observed on Adak Island in 1975 by botanist Dr. David K. Smith, the Aleutian shield-fern (*Polystichum aleuticum*) is one of the rarest ferns in North America. In April 1987, the Service proposed that the Aleutian shield-fern be designated an Endangered species (summary in BULLETIN Vol. XII No. 5-6). Efforts in recent years to find an extant population of *P. aleuticum* had failed until this August, when Dr. Smith—after searching for several days—located seven plants on Mt. Reed, Adak Island, Alaska. Now assured that the shield-fern is not extinct, evaluation of a final rulemaking adding this plant to the Endangered species list will continue.

* * *

The most recent recovery effort for the Endangered Aleutian Canada goose (*Branta canadensis leucopareia*) was the successful translocation of 136 birds (60 adults and 76 goslings) from the main breeding island of Buldir to Amchitka Island, Alaska. It is our hope that female hatch-year birds from this release will return to Amchitka when sexually mature and establish breeding territories there. Field biologists from the Alaska Maritime National Wildlife Refuge also confirmed that Aleutian geese are once again nesting on Agattu Island. This population was reestablished in 1984 after the introduced arctic foxes (*Alopex lagopus*) were removed and family groups of geese from Buldir were released there. For the first time in decades, Aleutian geese were found nesting on Nizki Island. Nizki was the site of a release of over 350 primarily captive-propagated Aleutian geese in 1981. Currently, Aleutian geese nest on Chagulak, Agattu, Nizki, and Kaliktagik Islands in addition to Buldir.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	27	20	242	5	0	22	316	23
Birds	60	16	141	7	2	0	226	55
Reptiles	8	6	60	11	4	13	102	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	39	4	11	24	6	0	84	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	5	0	0	13	12
Plants	126	6	1	28	3	2	166	56
TOTAL	309	52	466	90	15	37	969	247**

*Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 213
Number of species currently proposed for listing: 20 animals
35 plants

Number of Species with Critical Habitats determined: 98
Number of Cooperative Agreements signed with States and Territories: 49 fish & wildlife
34 plants

August 31, 1987

September 1987 Vol. XII No. 9

ENDANGERED SPECIES

Technical Bulletin

Department of Interior U S Fish and Wildlife Service
Endangered Species Program Washington D C 20240

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October 1987 Vol. XII No. 10

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Reintroduction of Rare Catfish is Proposed for Virginia Stream

A joint Federal/State effort to reestablish a population of the yellowfin madtom (*Noturus flavipinnus*), a rare species of catfish, into part of its historical range was proposed recently by the Service (F.R. 9/8/87). Under the proposal, the reintroduced fish would be designated a "non-essential experimental population."

The yellowfin madtom is a small species that once inhabited many streams in the upper Tennessee River basin. After much of this aquatic habitat was altered by impoundments and water pollution, the yellowfin madtom was reduced in range to three locations: Citico Creek in Monroe County, Tennessee; the Powell River in Hancock County, Tennessee; and Copper Creek in Scott and Russell Counties, Virginia. To prevent its further decline into extinction, this fish was listed in 1977 as a Threatened species.

Good habitat for the yellowfin madtom remains in the North Fork of the Holston River, Virginia. If the proposal to establish a non-essential experimental population in this stream is approved, the U.S. Fish and Wildlife Service, Tennessee Wildlife Resources Agency, and Virginia Commission of Game and Inland Fisheries will cooperate to bring fish in from the Citico Creek population to the Holston River. Current plans call for releasing 100 to 200 young-of-the-year yellowfin madtoms for 3 consecutive years, funds permitting. Special care would be taken not to jeopardize the donor population.

Designation of reintroduced species as experimental populations was authorized by the 1982 amendments to the Endangered Species Act. The goal was to promote wider acceptance of efforts to reintroduce Endangered and Threatened species by permitting greater management flexibility (see BULLETIN Vol. IX No. 9). A "non-essential" experimental population is one whose survival is not essential to the survival of the species as a whole. If the reintroduction proposal is approved, management authority for the experimental population will rest with the State of Virginia.

photo by J.R. Shute

Michael Etnier collecting yellowfin madtom eggs and fry in Citico Creek for laboratory propagation and research

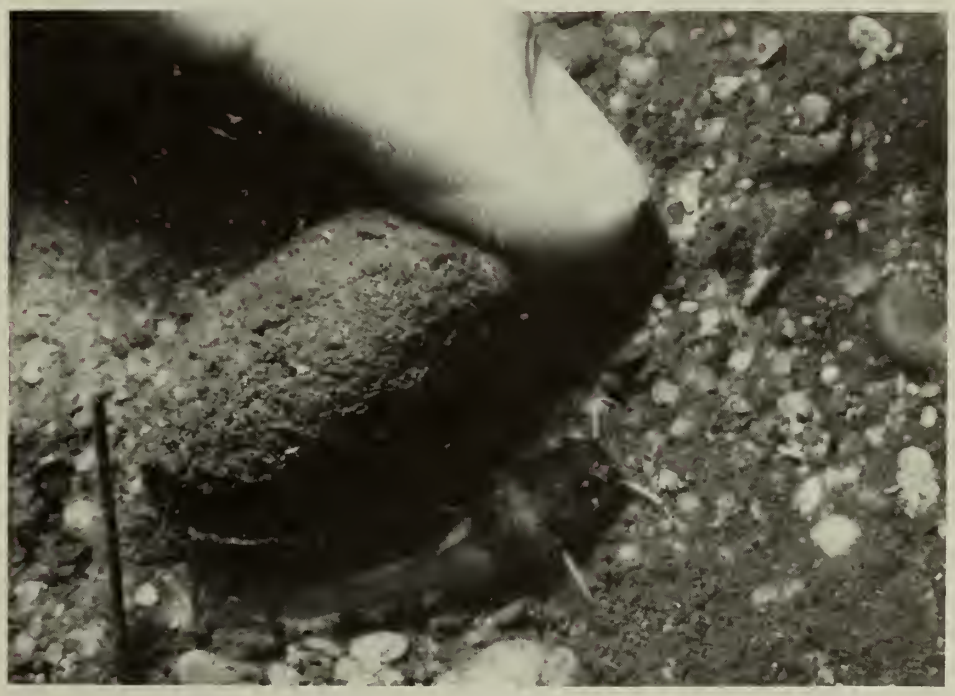

photo by J.R. Shute

The yellowfin madtom is a small species of catfish that requires a slab rock substitute for nesting.

Regional News

Endangered species program regional staff members reported the following activities for September:

Region 1 — Staffs from the Fish and Wildlife Service's Sacramento Endangered Species Office, California Department of Fish and Game, National Park Service, Presidio of San Francisco, Berkeley Botanical Garden, and Saratoga Horticultural Foundation recently assessed the progress of the Raven's manzanita (*Arctostaphylos pungens* var. *ravenii*) propagation and recovery effort. They found that propagation efforts have been highly successful because 65 rooted cuttings are now available for transfer to the wild. This represents a 30 to 40 percent survival rate of the cuttings taken during January 1987. In addition, the Berkeley Botanical Garden was able to germinate and grow one new plant from the seed of the single remaining wild plant. The genetic purity of the seedling has not yet been confirmed.

* * *

The presence of the Endangered Smith's blue butterfly (*Euphilotes enoptes smithi*) was recently confirmed in remnant coastal dune habitats at Sand City, Monterey County, California. The survey also documented the black legless lizard (*Anniella pulchra nigra*), a Category 2 listing candidate, and three candidate plant species. Because some of these dune habitats have been proposed for residential and commercial development, the City Council of Sand City tentatively agreed to seek development of a habitat conservation plan to protect the affected Endangered species and an incidental take permit, pursuant to Section 10(a) of the Endangered Species Act.

* * *

Contamination continues to spread from the 28th Street landfill within the City of Sacramento, California. Numerous elderberry plants, habitat of the Endangered valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), have been lost. The Director of the City's Public Works Department agreed to investigate the cause of the elderberry decline and any relationship with the contamination. The California Water Resources Control Board has documented high levels of numerous contaminants spreading from the landfill into the nearby American River.

* * *

Based on the recent report on the effects of the Salt Caves Project to the shortnose sucker (*Chasmistes brevirostris*), recently proposed for listing as Endangered, the Oregon Department of Environmental Quality denied a permit for the project. Larval shortnosed suckers could have been stranded if the Klamath River flows had been reduced.

Region 2 — Whooping crane (*Grus americana*) migration was delayed, apparently by mild weather, in both the Canadian and Rocky Mountain populations. Only a few individuals started southward during September from the summering areas.

Dr. Rod Drewien captured four wild sandhill cranes (*Grus canadensis*) in Idaho and shipped them to the Patuxent Wildlife Research Center in Maryland where they were placed in quarantine. They eventually will be force-paired with

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Office of Management Authority*
(202-343-4968)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Dirrector;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

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Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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Regional News

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captive-reared birds and the pairs returned to Grays Lake for release next spring. This experiment is to develop techniques that might be applicable to promoting pairing and nesting among whooping cranes.

Dr. James Lewis, the Service's Whooping Crane Coordinator, met with the Canadian Whooping Crane Recovery Team in Regina, Saskatchewan. One item of discussion was Canadian sites that might become the location for a second captive flock.

* * *

In September, the Oklahoma Cooperative Fish and Wildlife Research Unit attached radio transmitters to six juvenile Ozark big-eared bats (*Plecotus townsendii ingens*). The radios weigh 0.75 grams each and last about 14 days; however, the glue that holds the radio on the bat only lasts about 10 days. The bats were tracked over a range of 3 miles with these radios. The research unit will continue its radio-tagging work next spring and summer after the bat hibernation period.

* * *

Biologists from the U.S. Forest Service, New Mexico Department of Game and Fish, and the U.S. Fish and Wildlife Service successfully transplanted approximately 300 Endangered Gila trout (*Salmo gilae*) from South Diamond Creek in the Aldo Leopold Wilderness to Trail Canyon Creek in the Gila Wilderness. The effort involved the use of two crews, one on South Diamond Creek where the fish were gathered and another on Trail Canyon Creek where the fish were stocked. A Forest Service helicopter was used to make the transfer. Establishment of a population of Gila trout in Trail Canyon Creek will enhance future recovery efforts by providing a source for Gila trout to introduce into Mogollon Creek, which will be the next stream to be renovated. With the Trail Creek stocking, each of the five wild populations of Gila trout have been restocked at least once, a critical step in the recovery of the species.

* * *

The Mexican Wolf Propagation Committee is evaluating a study on a lineage of captive wolves, known as the Ghost Ranch Mexican wolves, to determine if they should be integrated into the Service's wolf breeding program. The lineage of Mexican wolves *(Canis lupus baileyi)* in the current program was founded by three males and one female, a constant worry to population geneticists due to the small number. If the Ghost Ranch Mexican wolves are indeed pure wolves, they could be used to increase the genetic diversity of the Service's Mexican wolf propagation group by adding another two founding members. Additional comments on the electrophoretic and mitochondrial DNA study will be requested before the decision is made to cross the two Mexican wolf lineages.

Region 6 — The National Park Service funded a graduate student at Colorado State University to conduct a study in Rocky Mountain National Park on competition between the greenback cutthroat trout (*Salmo clarki stomias*), a Threatened species, and the brook trout (*Salvelinus fontinalis*). Results of this study indicate that the brook trout juveniles were the dominant competitor and that they excluded juvenile greenbacks from favorable stream positions. Evidence of interactions between greenbacks and brook trout greater than 6 inches (150 millimeters) in length was minimal; therefore, these interactions were not considered a major factor in cutthroat displacement. Low water years appeared to have negative impacts on greenbacks by reducing backwater habitat and forcing young-of-year greenbacks into the main channel where they must compete against larger fish and expend more energy to maintain stream position. For further information on this study, contact Dr. Fausch at Colorado State University in Fort Collins, Colorado, or Bruce Rosenlund, Fish and Wildlife Assistance Office, U.S. Fish and Wildlife Service, 730 Simms Street, Suite 292, Golden, Colorado 80401.

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Four Species Proposed for Endangered Species Act Protection

A freshwater clam, shrubby desert oak, and two fishes endemic to desert springs were proposed during September for listing as Threatened or Endangered species. If the proposals are made final, Endangered Species Act protection will be extended to these animals and plants:

James Spinymussel (*Pleurobema collina*)

North America has a rich diversity of freshwater clam or mussel species. These mollusks feed by filtering nutrients out of the water; however, as they take in food, they also concentrate pollutants in their body tissues. Many species declined in numbers and range when waterways became degraded by turbidity and pollution. Some mussels have become extinct, and 28 have been listed as Threatened or Endangered. Recently, the Service proposed listing another, the James spinymussel, as Endangered (F.R. 9/1/87).

Most juveniles of this species have one to three short but prominent spines on each valve (half-shell). The spines usually disappear by the adult stage, when the shells reach about 2 inches (5 centimeters) in length. Collection records indicate that this mussel once was widely distributed in the James River drainage system upstream of Richmond, Virginia. Although its decline probably started when municipal growth and industrialization in the James River basin began to affect water quality, the James spinymussel persisted in much of its range through the mid-1960's. Since then, the mussel has disappeared from up to 95 percent of its historical range. Survival is documented in only four headwater creeks in Craig and Botetourt Counties of Virginia and Monroe County, West Virginia.

Because the James spinymussel has been reduced in range to only a few relatively small areas, the species is vulnerable to rapid extinction. Potential threats to the remaining stream habitat include discharges from a sewage treatment plant, siltation from logging operations, runoff of agricultural fertilizers and pesticides, and stream channelization. Widespread die-offs of mussels have occurred in southwestern Virginia and, although the cause is unknown, similar die-offs in James spinymussel habitat could jeopardize the remaining population of this species. Competition from exotic species is yet another danger; the Asiatic clam (*Curbiculata fluminea*), a species accidentally introduced into the James River system, has been reported to occur at densities of more than 1,000 individuals per square meter downstream of Richmond. The spread of this exotic is closely correlated with the decline of the James spinymussel, and further spread could threaten the remaining spinymussel populations.

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photo by D. Neves

James spinymussels have one to three spines on each shell until they reach the adult stage.

Expanding the Range of The Endangered Species Technical Bulletin

In 1981, cuts in the U.S. Fish & Wildlife Service budget forced the Office of Endangered Species to limit distribution of the Endangered Species Technical Bulletin. Prior to the cutbacks the bulletin was sent free of charge to anyone who wished to receive it. Since 1981, however, the Service has been able to distribute the bulletin to only federal and state agencies and official contacts of the Endangered Species Program.

The Endangered Species Update fills the gap left by this budget crunch. Published by the School of Natural Resources at The University of Michigan, the Update is part of a reprint program initiated in 1983. Since its inception, the program has established itself as an important forum for information exchange on endangered species issues. Recently the name of the reprint has been changed to the Update and the amount of supplementary information on species conservation efforts outside the federal program increased. In addition to providing a reprint of the latest issue of the ESTB, the newly designed Update includes:

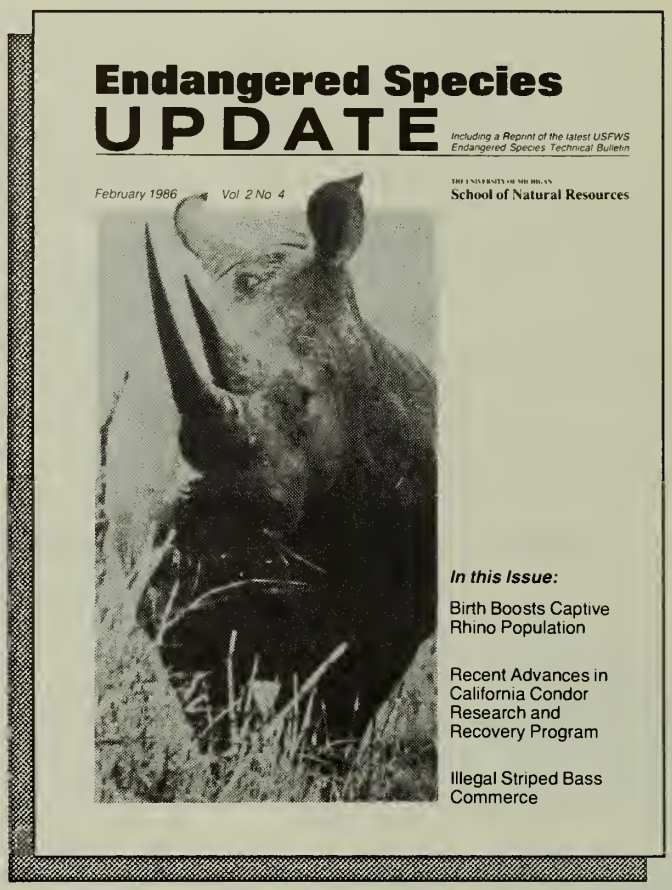
A Feature Article - Upcoming article topics include a 15 year retrospective on the Endangered Species Act, the private land trust movement and its contribution to species conservation, and global climate change and its effect on habitats.

A Book Review- covering a recent publication in the field of species conservation.

Technical Notes - produced by The Center for Conservation Biology at Stanford University, this section will serve to provide information on current and ongoing research in the field.

Bulletin Board - listing upcoming meetings and current announcements.

In order to keep this unique source of information alive, it is important to let people know of its availability. If you know of anyone who might be interested in receiving the Endangered Species UPDATE, please pass on the subscription information. The annual subscription fee is only $15 for 12 monthly issues. This covers the cost of production and mailing. Every subscription is vitally important to the operation and improvement of the reprint program.



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Proposed Listings

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Hinckley Oak (*Quercus hinckleyi*)

The small but attractive Hinckley oak grows amid the Chihuahuan Desert scrub vegetation of Presidio County in western Texas. Only three small populations are known, each consisting of fewer than 60 plants. Because of potential threats to their survival, the Service has proposed to list the species as Threatened (F.R. 9/16/87).

Two of the populations are near Solitario Peak on a ranch that the owner plans to develop for exotic game hunting. Biologists fear that introduced animals may disturb the soil, trample the plants, and eat the acorns, leaves, or stems of the Hinckley oaks. The third population is found on private land along a road near the town of Shafter. Future road widening or realignment could eliminate part or all of this population unless precautions are taken.

Possible actions that could be taken to recover the Hinckley oak include the collection of acorns for cultivation and future reintroduction of young plants into suitable habitat; coordination with the Texas Highway Department to avoid impacts from road work; and conservation agreements with landowners.

photo by J.R. Shute

The small, holly-like leaves of the Hinckley oak last for more than one season, and the acorns are produced annually.

photo by A.M. Powell

The Hinckley oak, a shrubby tree that reaches a maximum height of only 4 feet, can occur as a single stem or as clonal groups that form dense thickets. It grows in the Chihuahuan Desert of western Texas.

Two Nevada Fishes

The **Clover Valley speckled dace (*Rhinichthys osculus oligoporus*)** and **Independence Valley speckled dace (*Rhinichthys osculus lethoporus*)**, small fish in the minnow family (Cyprinidae), are found only in small spring systems in the desert of northeastern Nevada. Their survival is threatened by their limited distribution, the use of spring flows for irrigation purposes, and the introduction of non-native fishes. Accordingly, both subspecies have been proposed by the Service for listing as Threatened (F.R. 9/18/87).

All habitats of both fishes are in Elko County on private lands used for ranching. The Clover Valley speckled dace survives at two sites and the Independence Valley subspecies is limited to one. Irrigation practices have relegated the fish to the springs, small downstream impoundments, and sections of the short spring outflows that connect them. Past use of herbicides on aquatic vegetation in the reservoirs also may have reduced fish numbers. Continued interest in controlling the growth of aquatic vegetation could lead to a resumption in the use of such chemicals.

Introductions of non-native species have been largely responsible for the decline and even extinction of some native western fishes, including the Independence Valley tui chub (*Gila bicolor isolata*). Springs inhabited by the two recently proposed speckled dace have been contaminated by smallmouth bass (*Micropterus salmoides*), rainbow trout (*Salmo gairdneri*), and bluegill (*Lepomis macirochirus*) that apparently were introduced for sport fishing purposes. These exotics are believed to prey on the native dace, keeping their numbers low.

If the two speckled dace subspecies are listed, the Service will seek agreements with the private landowners to allow for conservation and recovery activities. Specific management actions that might be negotiated include easements that would provide for sufficient water in springs and outflows during irrigation work, control of aquatic plants by means that would not harm the fish, and measures to control vandalism and further introductions of predatory fish.

Available Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; prohibitions against certain practices; the requirement for the Service to develop and implement recovery plans; the authorization to negotiate land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by

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Proposed Listings

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State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own laws against take of listed plants.

Protection is Approved for Eight Species

Final rules to list four animals and four plants as Threatened or Endangered species were published in the *Federal Register* during September 1987. Protection under the Endangered Species Act is now available to these taxa:

Bay Checkerspot Butterfly (*Euphydryas editha bayensis*)

A colorful, medium-sized butterfly, the bay checkerspot has a wingspan of up to 2¼ inches (56 millimeters). Its forewings have black bands that alternate with rows of bright red spots on yellow crescents, giving this butterfly a decidedly checkered appearance. The bay checkerspot depends on "islands" of serpentine grasslands that contain abundant growth of the butterfly's two larval foodplants, plantain (*Plantago erecta*) and owl's clover (*Orthocarpus densiflorus*).

Recorded historically from 16 areas on the San Francisco Peninsula and the adjacent outer Coast Range of central California, the bay checkerspot now is known to occur at only a few sites in the San Francisco Bay area. Much of its former habitat has been altered by drought, urban development, road construction, livestock overgrazing, and other land uses that altered native plant communities. A proposal to list the bay checkerspot as Threatened and to designate Critical Habitat for it was published in the September 11, 1984, *Federal Register* (see summary in BULLETIN Vol. IX No. 10). The final listing rule was published September 18, 1987, but a decision on the Critical Habitat designation was deferred in order to complete the required economic analyses.

Two Southern California Plants

Two rare plants native to southern California, the **slender-horned spineflower (*Centrostegia leptoceras*)** and **Santa Ana wooly-star (*Eriastrum densifolium* ssp. *sanctorum*)**, also are threatened with extinction because of habitat loss. Both occur on alluvial fan scrub lands within the Santa Ana River drainage. *C. leptoceras*, a small prostrate annual, has been reduced in range to 5 sites totalling less than 10 acres (4 hectares) in Riverside and San Bernardino Counties. *E. d.* ssp. *sanctorum*, a shrub that bears bright blue flowers, survives in scattered patches in San Bernardino County. Historical and continuing threats facing these plants include development within the floodplain, sand and gravel mining, livestock grazing, and competition from non-native plants. Both were proposed on April 9, 1986, for listing as Endangered (see BULLETIN Vol. XI No. 5), and the final rule was published September 28, 1987.

Pawnee Montane Skipper (*Hesperia leonardus montana*)

A small brownish-yellow butterfly, the Pawnee montane skipper is restricted to the South Platte River drainage in the Front Range of central Colorado. Within this region, the skipper inhabits open, dry, ponderosa pine (*Pinus ponderosa*) woodlands on steep slopes. Blue grama grass (*Bouteloua gracilis*), the larval food plant, and the prairie gayfeather (*Liatris punctata*), the primary nectar plant, are necessary parts of skipper habitat. Some habitat already has been eliminated by housing construction and other development, road building, and the Cheesman Reservoir. Construction of the proposed Two Forks Dam and Reservoir project, if completed as planned, also will affect the butterfly's habitat. After the Pawnee montane skipper was proposed on September 25, 1986, for listing as Threatened (see BULLETIN Vol. XI No. 10-11), the Fish and Wildlife Service began to confer with Federal land management and permitting agencies to achieve protection for the butterfly. The final listing rule was published September 25, 1987. Under Section 7 of the Act, these agencies are required to avoid any activities that are likely to jeopardize the butterfly's survival.

San Rafael Cactus (*Pediocactus despainii*)

This small, ball-shaped cactus shrinks below ground level during dry or cold seasons, and is noticeable only for a short time in spring when its bronze-tinted flowers are open. Two populations of the cactus are known, both of them on the San Rafael Swell, a large anticline or geological upwarp in Emery County, Utah. One of the populations is near a popular recreation area that is receiving heavy off-road vehicle use. Further, about half of the area occupied by both populations contains oil and gas leases as well as mining claims for gypsum and other minerals. The interest of some hobbyists in collecting wild specimens of rare cacti is another threat. A proposal to list the San Rafael cactus as an Endangered species was published in the March 27, 1986, *Federal Register* (see BULLETIN Vol. XI No. 4), and the final rule was issued September 16, 1987.

Blowout Penstemon (*Penstemon haydenii*)

Known only from the sandhills of Nebraska, this showy, blue-flowered perennial inhabits fresh blowouts (wind-scoured depressions in areas with sandy soils). The blowout penstemon was a common part of the sandhill vegetation early in this century, but efforts to stabilize active dunes have greatly reduced the amount of available habitat. Ten populations are known to survive in five counties, and slightly over half of the plants are on the Valentine and Crescent Lake National Wildlife Refuges. Nevertheless, the Service believes this species to be in danger of extinction. Because the populations are small, isolated, and apparently not vigorous, they are vulnerable to loss from localized environmental changes and natural vegetational succession. The blowout penstemon was proposed on April 29, 1986, for listing as an Endangered species

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Final Listings

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(see BULLETIN Vol. XI No. 5), and the listing was made final September 1, 1987.

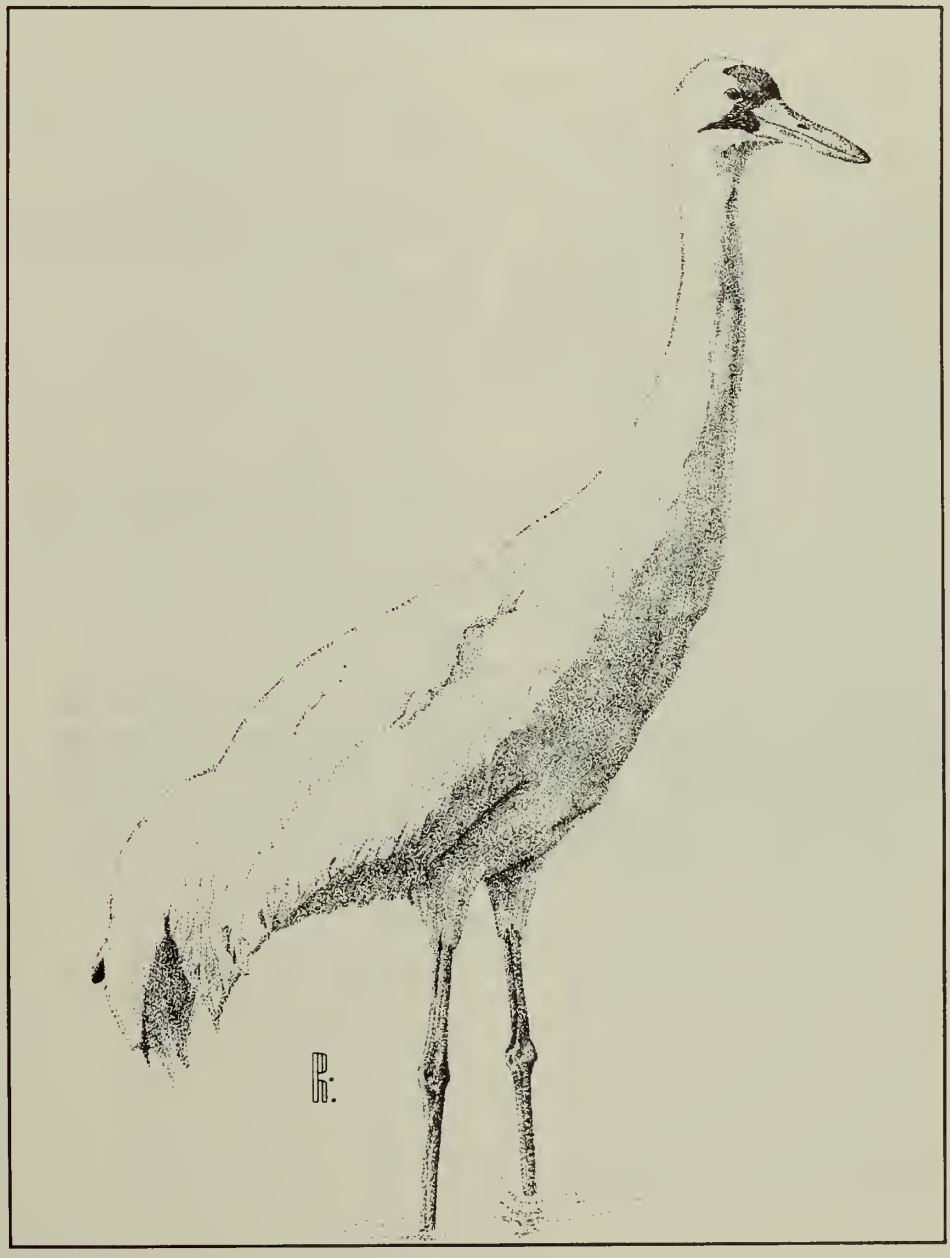
Little Colorado Spinedace (*Lepidomeda vittata*)

A small species in the minnow family, the Little Colorado spinedace is usually less than 4 inches (10 centimeters) in total length. It was abundant historically throughout the upper drainage of the Little Colorado River in Arizona, but it currently survives only in sections of five tributaries. Much of the species' free-flowing stream habitat was degraded or eliminated by impoundments, removal of water from the streams, channelization, grazing, road building, urban growth, and other activities. The introduction of non-native competing and predatory fish species, and the use of fish poisons to remove so-called "trash" fish, also contributed to the decline of the spinedace. Threats to this fish continue, and the Service proposed May 22, 1986, to list the Little Colorado spinedace as Threatened and to designate its Critical Habitat (see BULLETIN Vol. XI No. 6). The final listing rule, and a map of the 44 stream miles of Critical Habitat, were published in the September 16, 1987, *Federal Register*.

Cape Fear Shiner (*Notropis mekistocholas*)

Another rare fish, the Cape Fear shiner is restricted to three locations in the Cape Fear River drainage of eastern North Carolina. This species, which rarely exceeds 2 inches (5 centimeters) in length, inhabits free-flowing streams over rocky substrates. Reservoir construction flooded much of its former habitat, and deteriorating water quality is a continuing problem. The reduced range and low population levels increase the shiner's vulnerability to a single catastrophic event (e.g., a chemical spill). On July 11, 1986, the Service proposed to list the Cape Fear shiner as an Endangered species and to designate its Critical Habitat (see BULLETIN Vol. XI No. 8-9). The final listing rule, published in the October 25, 1987, *Federal Register*, contains a map of the approximately 17 river miles in four counties designated as Critical Habitat.

Possible Cause Identified in Deaths of Cranes at Patuxent Wildlife Research Center



Scientists suspect that a fungus-produced toxin that can occur naturally in feed grain is responsible for the illness that struck cranes at the Patuxent Wildlife Research Center at Laurel, Maryland, in September. Four birds belonging to Endangered species—three whooping cranes (*Grus americana*) and one Mississippi sandhill crane (*Grus canadensis pulla*)—were among the 16 cranes that died between September 19 and October 5. Quick action by Patuxent biologists and other scientists averted an even greater tragedy; over 110 other ill cranes responded well to treatment and are again healthy. No cranes have died at Patuxent since October 5.

A special response team from the Fish and Wildlife Service's National Wildlife Health Research Center in Madison, Wisconsin, was called in soon after the illness became apparent. Tests were conducted at Patuxent laboratories, at U.S. Department of Agriculture facilities in Ames, Iowa, and Beltsville, Maryland, and at the University of Maryland's Agriculture Department in College Park, Maryland. The sick birds were treated with fluids, antibiotics, and vitamins. After Patuxent biologists changed the food and water supply, the cranes began to act livelier and gain weight. The original water supply later was found to be safe.

Regional News

(continued from page 3)

The Bureau of Land Management, Forest Service, Fish and Wildlife Service, Colorado Department of Natural Resources, and Center for Conservation Biology at Stanford University in California are undertaking a study of the Uncompahgre fritillary butterfly (*Boloria acrocnema*). This candidate species is only known from two small isolated populations in southwestern Colorado. The larval food plant is the snow willow (*Salix nivalis*) and a variety of alpine plants serve as nectar sources for the adult. The flight season is usually from mid-July to early August and lasts approximately 2 weeks. Dr. Peter F. Brussard of Montana State University at Bozeman is conducting the study. He will assess the viability of the two existing populations and their continued existence by analyzing the species' distribution, habitat requirements, genetic variation in each population, and how that variation is distributed among the populations. The study is expected to be completed in March 1988.

Region 8 (Research) — A captive female Hawaiian crow or 'alala (*Corvus hawaiiensis*) died at the Olinda Endangered Species Propagation Facility on Maui June 10, 1987. Clinical history and necropsy done at the Service's National Wildlife Health Research Center in Wisconsin indicate that the bird was egg-bound and developed yolk peritonitis. There was a small fibrous mass on the wall of the oviduct that may have predisposed the bird to this problem. This death leaves eight Hawaiian crows in captivity and two known survivors in the wild.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	27	20	242	5	0	22	316	23
Birds	60	16	141	7	2	0	226	55
Reptiles	8	6	60	11	4	13	102	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	40	4	11	25	6	0	86	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	130	6	1	28	3	2	170	56
TOTAL	314	52	466	93	15	37	977	247**

*Separate populations of a species that are listed as Endangered and Threatened are tallied twice. Species thus accounted for are the gray wolf, bald eagle, green sea turtle, olive ridley sea turtle, leopard, and piping plover.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 213
Number of species currently proposed for listing: 19 animals
32 plants

Number of Species with Critical Habitats determined: 100
Number of Cooperative Agreements signed with States and Territories: 49 fish & wildlife
34 plants

September 30, 1987

The Patuxent Wildlife Research Center reported the first known case in which a wild male gray wolf (*Canis lupus*) in Minnesota successfully bred two females, both of which produced young. After breeding, the male spent all of his time with one female, while the other female became a single parent with a den about 14 miles (22.5 kilometers) away. On August 11, 1987, the male wolf was killed by a moose in the Superior National Forest, Minnesota. This is only the third known record of a wolf being killed by a moose.

One of the radioed wolves under study in the Superior National Forest, Minnesota, was killed when it wandered out of its territory and into the rendezvous site of an adjacent pack. The wolf was found with multiple bites to the throat, abdomen, and hind quarters.

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

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Endangered Species Staff in Washington is Reorganized

As part of a general reorganization within the U.S. Fish and Wildlife Service from use of a program management system to a line-staff system, the former Washington Office of Endangered Species now has a new name—the Division of Endangered Species and Habitat Conservation—and a wider range of responsibilities. This reorganization parallels one that has already taken place in the Service's Regional and field offices. The following summary should help to acquaint people outside the Service with the new organizational structure:

Fish and Wildlife Enhancement

The Assistant Director for Fish and Wildlife Enhancement (Enhancement), Ronald E. Lambertson (telephone 202/343-4646), provides staff support to the Director and the Regions on Service responsibilities in these areas: 1) Endangered and Threatened species listing, consultation, and recovery; 2) wetland and upland habitat protection, restoration, and conservation; 3) environmental contaminants; 4) wetlands mapping; 5) grants to the States; and 6) international activities involving protected species. Staff support responsibilities are primarily in the areas of coordinating with the Service's Regional offices, policy and budget preparation, and special issues. Under the Assistant Director for Enhancement are four divisions:

1. **Division of Endangered Species and Habitat Conservation**
   The former Office of Endangered Species and Division of Ecological Services have been combined to form the new Division of Endangered Species and Habitat Conservation. Robert Smith is acting Chief, and Ken Stansell is acting Deputy Chief (telephone 703/235-2771). This division provides staff support to the Assistant Director on 1) Endangered and Threatened species listing, consultation, and recovery policy; 2) wetland and upland habitat protection, restoration, and conservation; and 3) wetlands mapping. The new division consists of the following branches:

   A) **Listing and Recovery** (Janet Hohn, acting Branch Chief; 703/235- 1975) — As its name implies, this branch is responsible for most of the duties of the former Office of Endangered Species. Among its responsibilities are: developing policy and guidelines for listing actions, recovery plans, and economic analyses of Critical Habitat; tracking of listing actions, petitions, and recovery plans during their review in Washington; compiling Regional selections of listing candidates; coordinating the development of briefing material; and serving as a liaison to other agencies and organizations. The development of proposed and final listing rules, identification of listing candidates, evaluation of listing petitions, and preparation and implementation of recovery plans are responsibilities of the appropriate Regional Offices. Listings of foreign species, however, will be developed in the Service's Office of Scientific Authority.

   B) **Federal Activities** (Frank DeLuise, Branch Chief; 703/235-2418) — This branch develops regulations and policy to implement the Endangered Species Act (particularly Section 7 interagency consultations), Fish and Wildlife Coordination Act, National Environmental Policy Act, and other laws that give the Service specific authority. It works with such Federal agencies as the Army Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, Federal Energy Regulatory Commission, and the Minerals Management Service to help them avoid and mitigate losses of wildlife habitat resulting from their activities. At the request of the Director, the branch also alerts other agencies, development interests, and conservation organizations about habitat enhancement opportunities. Section 7 consultations and Biological Opinions, permit evaluations, and environmental impact statement reviews are delegated to the Regions. The Service's Office of Scientific Authority will issue Biological Opinions on foreign import permits.

   C) **Special Projects** (Robert Misso, Branch Chief; 703/235-2760) — Passage of laws popularly known as the Farm Bill, Omnibus Bill, and Emergency Wetlands Act presents new areas of opportunity for conserving wildlife habitat. The Special Projects branch develops approaches for making the most of these opportunities. Among the branch's other important responsibilities are conducting the National Wetlands Inventory and developing the Endangered Species Information System.

   D) **Technical Information and Support Services** (Jim Beers, Branch Chief; 703/235-2407) — This branch provides administrative and automatic data processing support for all Enhancement divisions, and develops budget material for all divisions but Federal Aid. Processing controlled correspondence and producing the *Endangered Species Technical Bulletin* are two of the branch's other primary responsibilities.

2. **Division of Environmental Contaminants**
   This division provides staff support to the Assistant Director and technical support to the Regional Offices on activities relating to a variety of environmental contaminants. Among its areas of involvement are: hazardous materials disposal sites; spills of oil and other toxic substances; herbicide and pesticide registration and application; contaminant considerations in Federal water resource development; management of contaminants on Service and

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Regional News

Endangered species regional staff members reported the following news for the months of October and November:

Region 1 - The Fish and Wildlife Service's Sacramento, California, Endangered Species Office presented testimony to the State Water Resources Control Board on two fishes of the Sacramento - San Joaquin Delta estuary, the Delta smelt (*Hypomesus transpacificus*) and Sacramento splittail (*Pogonichthys macrolepidotus*). Both species have been recommended as candidates for future listing proposals because of declines in their distribution and abundance.

* * *

A recent alternative from the California Department of Transportation for redesigning State Route 1 through Carmel will reduce impacts to the Hatton Canyon population of Hickman's onion (*Allium hickmanii*) by approximately two-thirds. Nearly 55 percent of the species' range occurs on the bluffs above Hatton Canyon. The Hickman's onion is a Category 1 listing candidate.

* * *

In response to recent findings, African clawed frogs (*Xenopus laevis*) will be trapped and removed from habitat of the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), an Endangered fish in Soledad Canyon (Los Angeles County). These non-native frogs are highly predacious and can have significant impacts on fish populations. The trapping effort is a short-term effort while biologists at California State University - Northridge seek to determine how severe an impact these frogs are likely to have on the stickleback population if they are not controlled.

* * *

A second population of the Endangered San Mateo thornmint (*Acanthomintha obovata duttonii*) has been discovered. This small population of 11 plants was observed on San Francisco Water Department property adjoining the Edgewood County Park on the west side of Interstate 280. The area is managed as natural open space; therefore, the population is considered relatively secure from development threats.

* * *

Efforts to save and recover the Owens pupfish (*Cyprinodon radiosus*) were set back by the contamination of its last refugium by largemouth bass (*Micropterus salmoides*). These introduced predators were recently discovered above the uppermost fish barrier at the Bureau of Land Management's spring refugium in Mono County, California. The California Department of Fish and Game suspects that the mode of access was an unauthorized fish transplant. Within the past year, largemouth bass have gained access to all four of the isolated spring habitats that were established in Fish Slough as pupfish refugia.

* * *

It was an excellent year for nesting bald eagles (*Haliaeetus leucocephalus*) in Idaho. Nine new nest territories were identified. There were 11 more occupied territories in 1987 than in 1986 and 15 more than in 1985. Successful nesting pairs have more than doubled since 1985 and increased 78 percent over 1986. The number of young produced in 1987 (60) doubled the 1986 figure of 30, and the

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Office of Management Authority*
(202-343-4968)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Dirrector;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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Regional News

(continued from previous page)

number of young fledged in 1987 (57) was more than twice the 26 fledged in 1986.

* * *

Representatives of the Service's Sacramento Office, the City of Sacramento, the Central Valley Regional Water Control Board, and the American River Flood Control District again examined the contaminated zone at the northern margins of the city's main landfill. It borders the southern edge of the American River approximately one mile above the confluence with the Sacramento River. Contaminants of some sort appear to be leaking out of the landfill toward the American River, killing all vegetation in their path, including some 100 elderberry plants. The elderberry plants, host for the Endangered valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), were being grown as part of a mitigation plan for work done by the Flood Control District at another location. More study is needed to determine the exact nature of the contaminants before remedies can be determined. Evidence of the valley elderberry longhorn beetle was found on a proposed riprap site on the Stanislaus River at the boundary of San Joaquin and Stanislaus Counties. This finding increases the eastern extent of the beetle's known range.

Region 2 - Six Mexican wolves (*Canis lupus baileyi*) have returned home to Mexico, approximately 10 years after one female and 3 males were imported from Mexico to start a captive breeding program in the U.S. The Mexican Government requested the three pairs of wolves in order to start its own captive breeding program. In the U.S., captive Mexican wolf numbers had increased to 30, with breeding being limited by a lack of holding facilities. The 30 wolves were held at 4 facilities: Rio Grande Zoological Park, Albuquerque, New Mexico; Alameda Park Zoo, Alamogordo, New Mexico; Arizona-Sonora Desert Museum, Tucson, Arizona; and the Wild Canid Survival and Research Center, Eureka, Missouri. The shipment of these six animals will allow space for additional breeding in U.S. zoos and establish three additional holding facilities to increase the number of Mexican wolves in captivity. In Mexico, the wolves are being housed at Colonia Cuauhtemoc, a park near Mexico City; San Juan de Aragon Zoological Park in Mexico City; and the Ecological Center of Sonora in Hermosillo. Three Mexican veterinarians spent several days in New Mexico prior to the wolf shipment, learning handling and breeding techniques from Kent Newton (Rio Grande Zoo and Mexican Wolf Propagation Committee leader) and Norma Ames (Mexican Wolf Recovery Team leader). Veterinarians Gerardo Lopez Islas, Carlos Contreras Loza, and Rene Hernandez then accompanied the wolves on the historic return trip to the land of their grandparents' birth.

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Progress on Gila Trout Recovery Leads to Reclassification Proposal

The Gila trout (*Salmo gilae*), native to relatively undisturbed mountain streams in the southwestern United States, once was a common game fish. Historically, it inhabited the Verde and Agua Fria River drainages in Arizona and the headwaters of the Gila River in New Mexico. Over the past century, however, deteriorating water quality and impacts from introduced fishes eliminated the Gila trout from most of its former range. By 1967, this fish survived only in sections of five small New Mexico streams, and the Fish and Wildlife Service listed it as Endangered. Fortunately, the habitat of these five populations is secure, and biologists have restored seven other populations on protected land. In recognition of the species' improved status, the Gila trout has been proposed for reclassification from Endangered to the less critical category of Threatened (F.R. 10/6/87).

Habitat conservation has played a vital role in recovery of the Gila trout. Ten of the eleven streams that contain populations of this species are in designated wilderness areas within Gila National Forest (New Mexico) and Prescott National Forest (Arizona). U.S. Forest Service regulations on wilderness protection will minimize or prevent water quality problems from logging, mining, and other watershed disturbances.

The Gila trout also is benefiting from efforts to control non-native trouts. When the Gila trout originally began to decline, non-native brown trout (*Salmo trutta*), rainbow trout (*Salmo gairdneri*), and cutthroat trout (*Salmo clarki*) were introduced to support sport fishing. These more adaptable trout overwhelmed the dwindling number of Gila trout and caused severe problems through hybridization, predation, and competition. Recovery actions initiated after the Gila trout was listed included chemical treatment of streams within its range to remove introduced fishes and construction of physical barriers to prevent reinvasion by the non-native trout.

As the habitats were secured, biologists with the U.S. Fish and Wildlife Service, U.S. Forest Service, New Mexico Department of Game and Fish, and New Mexico State University moved adult Gila trout from each of the last five successfully reproducing indigenous populations and released them into the closest suitable renovated stream. Securing and replicating the five ancestral populations to establish seven more fulfills the criteria established in the Gila Trout Recovery Plan (approved in 1984) for reclassifying the species to Threatened.

Currently, all stream reaches that contain Gila trout are closed to sport fishing. The reclassification proposal contains a special rule that, if approved, would allow the State of New Mexico to establish a regulated sport fishery for the Gila trout. Such an action would not interfere with the species' recovery; in fact, it was recommended in the recovery plan. Many of the reintroduced populations are now at or near the carrying capacity of their habitat. A sport fishing program, combined with angler education, would show that the Gila trout can provide the same recreational quality as the non-native trouts. Future recovery efforts will include renovation of larger streams and establishment of additional Gila trout populations.

photo by John N. Rinne

Gila trout

Red Wolves Return to the Wild

Warren Parker
Red Wolf Coordinator
Asheville, North Carolina, Field Office

After nearly a decade of effort, the red wolf (*Canis rufus*) has been placed back into the wild. A pair of red wolves was released onto Alligator River National Wildlife Refuge in northeastern North Carolina on September 12, 1987. Three other pairs were released on September 30. This marks the first time in North American history that a species considered to be extinct in the wild was released into the wild. In the early to mid-1970's, the species was saved by a carefully planned captive breeding project. The objective of this captive breeding effort has always been to place red wolves back into selected portions of their historical range.

The four pairs of wolves were brought to the refuge in November 1986 and were acclimated for 10 months in 2,500-square-foot holding pens on various portions of the refuge. Prior to their release, they were fed native prey species. The "soft" release consisted simply of feeding the animals and then securing the pen doors in an open position. They typically stayed in their pens for several days before venturing out on their own. Intensive monitoring of the wolves by radio telemetry permits field technicians to follow daily movements.

Public response to the release has been extremely rewarding, with refuge deer hunters and visitors reporting sightings of the animals on access roads. One male, following a canal, ventured into the outskirts of Mann's Harbor, a community of 700 people. He was tracked by his transmitter collar and quickly captured by refuge personnel. The incident actually enhanced local public interest and support for the project when the animal was returned to the refuge in an efficient manner.

photo by Steve Maslowski

red wolf

Unfortunately, two of the released female wolves died in December 1987. One fell victim to kidney failure apparently caused by an infection; tissues have been sent to the Service's National Wildlife Health Research Center in Madison, Wisconsin, for analysis. The second suffered injuries thought to have resulted from a fight with another wolf. On the brighter side, all of the other wolves are doing well. They have become so adept at catching their own natural food that they now weigh more than at any time in captivity.

On January 22, eight more wolves were brought from captive breeding facilities to acclimation pens at Alligator River. Two of them are unpaired adult females that have been placed in pens with the recently "widowed" males. The other six wolves include an adult pair and four young-of-the-year wolves that biologists will observe to see if natural pairing occurs. All will be released in the spring of 1988.

In the meantime, several "island projects" have been initiated by the Service. These entail the acclimation of a select pair of captive red wolves on an island, their release, and the eventual capture of their wild offspring for release at permanent reintroduction sites. Wild animals are greatly needed to enhance the opportunities for a successful recovery of this uniquely North American species.

The first island project is taking place at Bulls Island in Cape Romain National Wildlife Refuge, South Carolina. On November 19, an adult pair was placed in acclimation pens on Bulls Island for release in the spring of 1988.

California Sea Otter Translocation

Robert L. Brownell, Jr.
National Ecology Research Center
San Simeon, California

Between August 24 and October 30, 1987, U.S. Fish and Wildlife Service and California Department of Fish and Game biologists captured 108 southern sea otters (*Enhydra lutris nereis*) along the central California coast and released more than half of them into another part of the population's historical range. Sixty (13 males and 47 females) of these sea otters were released at San Nicolas Island off the coast of southern California after a short stay at the Monterey Bay Aquarium. The others, mostly excess males, were flipper-tagged and released at the capture sites. The Service expects that the translocated animals will establish themselves

(continued on page 11)

photo by Richard Bucich, courtesy of Friends of the Sea Otter

California sea otter

Listing Protection is Proposed for Seven Species

Four plants and three animals whose survival is in question due to habitat loss and other factors were proposed by the Fish and Wildlife Service recently for listing as Threatened or Endangered species. If the listing proposals are made final, the protection and recovery benefits offered by the Act will be available to these species:

Mohr's Barbara's-buttons (*Marshallia mohrii*)

A perennial herb in the sunflower family (Asteraceae), *M. mohrii* grows up to 2.3 feet (70 centimeters) high and bears heads of showy white to lavender flowers. This species is endemic to moist, prairie-like open areas in the southern Appalachian Mountains. It currently is restricted to 14 known sites; seven historical populations apparently have been extirpated. Because the remaining colonies are vulnerable to loss from habitat modification, the Service has proposed to list *M. mohrii* as Threatened (F.R. 11/19/87).

Thirteen of the surviving populations are in northern Alabama and one is in northwestern Georgia. Many of the plants grow along roadside rights-of-way. Road widening or certain roadside maintenance activities (e.g., herbicide applications, mowing during the flowering season) could jeopardize the *M. mohrii* colonies unless precautions are taken. The Alabama Highway Department, which has jurisdiction over some *M. mohrii* habitat, has agreed to work with the Service to protect the sites. Other populations of the species occur on privately-owned lands that could be drained and converted from native habitat to improved pastures or cropland. Efforts are under way to encourage conservation of *M. mohrii* sites by these landowners.

photo by Cary Norquist

Mohr's Barbara's-buttons

Mead's Milkweed (*Asclepias meadii*)

This perennial plant grows as a solitary stalk up to 16 inches (40 cm) tall lined with broadly ovate leaves and topped by a cluster of greenish to cream colored flowers. Historically, Mead's milkweed occurred throughout much of the virgin "tall grass" prairie of the midwest. Most of the original prairie upon which this species depends has been replaced by urbanization and agriculture, and only isolated pockets of tall grass habitat remain. Today, *A. meadii* is believed to be extirpated from Indiana and Wisconsin, but it survives in Kansas, Missouri, Illinois, and Iowa.

Although about 28 percent of the known *A. meadii* populations are on State and Federal lands, most occur on private property and lack legal protection. The Service has proposed to list Mead's milkweed at the Federal level as a Threatened species (F.R. 10/21/87). (It is listed already by the States of Illinois, Iowa, and Missouri.) Federal law does not prohibit the removal or destruction of listed plants on private lands, but the Service will seek to develop conservation agreements with the landowners.

Sandplain Gerardia (*Agalinis acuta*)

Another plant restricted to open, prairie-like habitat is the sandplain gerardia, an annual herb in the snapdragon family (Scrophulariaceae). This species currently is known to occur in sandy areas of coastal plain grassland in the northeast (Cape Cod, Massachusetts, and Long Island, New York—six sites each) and on

(continued on page 6)

photo by John Schwegman, Illinois Department of Conservation

Mead's milkweed

Photo by D. Daniel Boone

sandplain gerardia

Proposed Listings

(continued from page 5)

a serpentine barren in Baltimore County, Maryland (one site). Although *A. acuta* also was known historically from sites in Connecticut and Rhode Island, these colonies can no longer be found. Threats to the nine surviving populations have led the Service to propose listing the sandplain gerardia as an Endangered species (F.R. 11/19/87).

Construction of year-round residential developments, summer cottages, and marinas has eliminated a number of former *A. acuta* sites. Secondary impacts of this urbanization also have had serious impacts on the gerardia's habitat. The species appears to require periodic disturbance of its habitat to keep the sites open and free from the encroachment of dense woody vegetation. In the past, livestock grazing and extensive fires (often set intentionally) suppressed invading scrub oak and pitch pine forests; however, the shift from agriculture to urbanization has led to a decrease in grazing and an increase in fire suppression. As a result, competing vegetation has claimed many historical gerardia sites.

The *A. acuta* site in Maryland is at Soldier's Delight, an area of unusual vegetation protected as a State Natural Environmental Area. Most of the species' other known populations are on private lands. In addition to seeking management agreements with the landowners, the Service will investigate the possibility of reestablishing *A. acuta* colonies on protected sites within the species' historical range. Cooperation with The Nature Conservancy, which has done most of the recent survey work on the gerardia, and the State resource agencies, which have management authority for the species, will continue.

Erubia (*Solanum drymophilum*)

S. drymophilum, a tall evergreen shrub in the nightshade family (Solanaceae), is endemic to the island of Puerto Rico. One of this plant's distinguishing characteristics is the growth of whitish, star-shaped hairs that cover the leaves, young stems, and white flowers. Another is the presence of numerous stiff spines nearly one-half inch (1.25 cm) in length that armor the leaves and inflorescenses. Of the four populations documented by collections, only one survives, and the Service has proposed to list *S. drymophilum* as an Endangered species (F.R. 11/19/87).

The extensive clearing of Puerto Rico's montane forests undoubtedly contributed to the erubia's decline. Deliberate eradication efforts aimed at this species are another likely factor. *S. drymophilum* apparently is able to recolonize disturbed sites, such as pastures, but its spines are widely perceived to be a threat to livestock. Consequently, the species has been routinely cut when discovered on pastureland. The last known population, consisting of approximately 200 plants, occurs on 5 acres of privately owned land that is subject to commercial development.

Boulder Darter (*Etheostoma* sp.)

An undescribed species in the subgenus *Nothonotus* (a manuscript describing the species is in preparation), the boulder darter is a small fish known from the Elk River system of Tennessee and Alabama. It is restricted to stretches of fast-moving, deep water flowing over a boulder substrate—a specific type of habitat that already was limited in this region before reductions caused by reservoir construction. Further habitat loss or degradation could lead to the boulder darter's extinction, and the Service has proposed to list this fish as Endangered (F.R. 11/17/87).

Boulder darters survive in disjunct segments of habitat within about 25 miles (46 kilometers) of the Elk River and two tributaries in Giles County, Tennessee, and Limestone County, Alabama. No new impoundments are planned for this area; however, siltation from major land disturbances in the watershed, run-off of improperly used pesticides, chemical spills, or other factors that could degrade water quality are potential threats to the boulder darter in its reduced range. Water pollution is believed to be at least partially responsible for the loss of a population in Shoal Creek. Listing the boulder darter as an Endangered species could encourage efforts to preserve water quality.

The Service is working with the State of Tennessee to investigate a possible reintroduction site. Habitat improvement through the placement of boulder substrate at selected sites along the Elk River also will be evaluated as a recovery method if the darter is listed.

Stephens' Kangaroo Rat (*Dipodomys stephensi*)

Like other kangaroo rats, this rodent has a large head, external cheek pouches, and elongated rear legs used for jumping. Its habitat is usually described as coastal sage scrub or annual grassland. *D. stephensi* probably once occurred throughout much of the coastal sage scrub of the Perris and San Jacinto Valleys and up adjoining sandy washes in southern California. However, agriculture and urbanization have led to a severe reduction in native habitat. Much of what does remain consists of small, isolated pockets that probably will not support Stephens' kangaroo rat populations over the long term.

Within the overall remaining range of *D. stephensi*, only about 6 percent of the land is zoned for uses that are compatible with the species' survival, and not all of the habitat in that 6 percent is suitable for this kangaroo rat. Further complicating the picture is the fact that the species does not occupy all apparently suitable habitat, perhaps because of disturbance by off-road vehicle use (common in southern California) and application of rodent control chemicals. The Service has proposed listing the Stephens' kangaroo rat as an Endangered species (F.R. 11/19/87).

Most of the remaining habitat is privately owned, but the Service is not aware of any existing agricultural activities that would be restricted by a listing. Although Federal lands comprise only a small part of the kangaroo rat's current range, one significant population does occur on the Fallbrook Naval Weapons Annex, which adjoins Camp Pendleton. No conflicts between *D. stephensi* conservation and Federal activities at this or other sites are anticipated. Recovery activities for the Stephens' kangaroo rat, if it is listed, will concentrate on habitat protection and management. Measures to avoid poisoning this species during rodent control operations also will be addressed.

(continued on next page)

photo by Richard Biggins

boulder darter

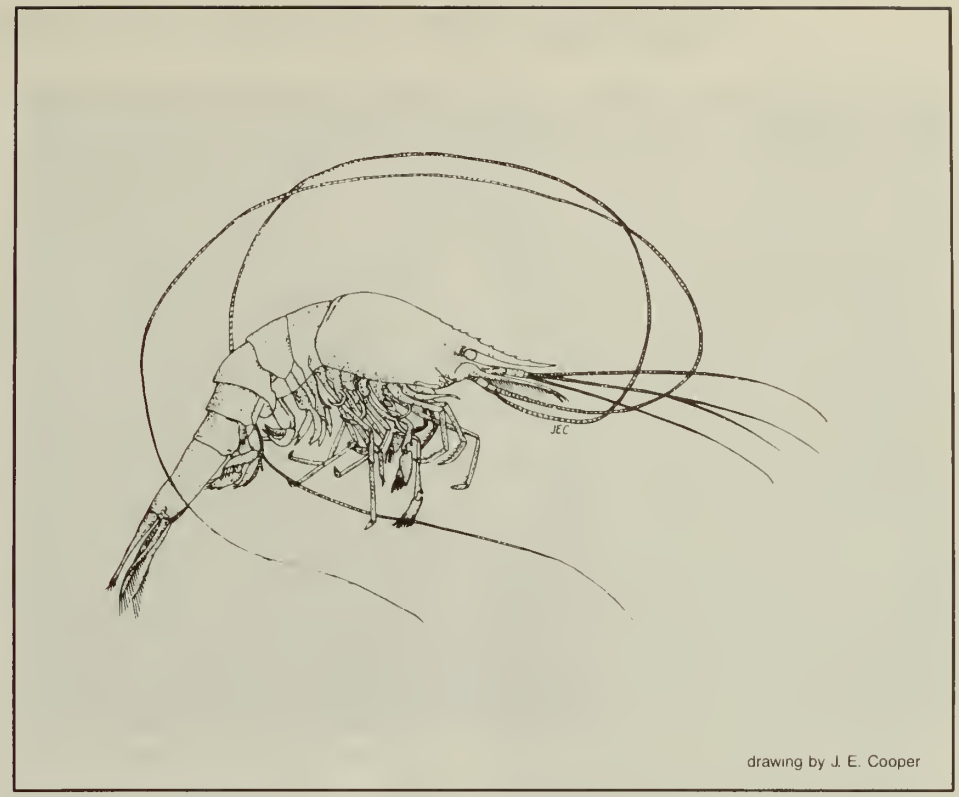
Proposed Listings

(continued from previous page)

Alabama Cave Shrimp (*Palaemonias alabamae*)

Groundwater pollution threatens the Alabama cave shrimp (*P. alabamae*), a nearly transparent freshwater crustacean that can reach up to 0.8 inch (20 millimeters) in total length. This species has been found at only two sites: Shelta Cave, which lies inside the city limits of Huntsville, and Bobcat Cave, located on the Redstone Arsenal. A search of over 200 caves in northern Alabama failed to turn up the species anywhere else. Both caves occupied by the shrimp are within a drainage contaminated by past manufacturing of the pesticide DDT. Because sinkholes can drain surface pollutants directly into the aquifer, groundwater contamination represents a continuing threat to cave-dwelling aquatic species.

The National Speleological Society, which funded initial status surveys on the Alabama cave shrimp, owns both entrances to Shelta Cave and has gated them to control human access. Biologists who have surveyed this cave regularly have not seen any shrimp there since 1985. A small population is believed to survive in Bobcat Cave, where only two or three shrimp have ever been observed at a single time. Access to this cave is restricted by the U.S. Army, which has jurisdiction over the Redstone Arsenal.



Alabama cave shrimp

Examples of recovery actions that may be pursued if the Alabama cave shrimp is listed are management agreements with Redstone Arsenal and the National Speleological Society to help ensure continued protection of the caves, studies to better understand groundwater recharge patterns, and attempts to control pollution of the aquifer.

Rediscovery of The Wyoming Toad

The Wyoming toad (*Bufo hemiophrys baxteri*), a small amphibian that occurs only in the Laramie Basin of Wyoming, was listed in 1984 as Endangered after serious declines were observed over a 10-year period. Last summer, a fisherman found a population of Wyoming toads at a private lake about 11 miles west of Laramie. These were the first Wyoming toads seen since 1983. This population was surveyed by biologists from the National Ecology Research Center in Fort Collins, Colorado, the Region 6 Endangered Species Office, the Wyoming Game and Fish Department, and the University of Wyoming on August 21 and September 1. An apparently healthy population of up to several hundred toads was present. Juvenile toads, including recently metamorphosed individuals, were present, indicating that this population had reproduced successfully in 1987 and the past several years. Two adult toads that were found dead from unknown causes on September 1 were collected for examination.

Research and management priorities were identified at a meeting held in Laramie on September 10 among representatives of the Fish and Wildlife Service, Wyoming Game and Fish Department, and the University of Wyoming. Better knowledge of Wyoming toad breeding biology and habitat requirements is needed, and the cooperation of two private landowners will be essential. Provided that reproduction is adequate in 1988, it was recommended that an attempt be made to establish a new population by transplanting eggs. The probable site would be the Hutton Lake National Wildlife Refuge, which is known to have had a population of Wyoming toads in the past.

photo P. Stephen Corn

Until last summer, the Wyoming toad had not been seen since 1984.

Final Listing Rules Approved for 10 Species

During October and November of 1987, final rules were approved to add 10 taxa—five animals and five plants—to the Federal lists of Endangered and Threatened wildlife and plants. The following now receive protection under the Endangered Species Act:

Black-capped Vireo (*Vireo atricapillus*) — This songbird, which is distinguished by its black or slate-gray crown, faces threats from habitat modification and nest parasitism by the brown headed cowbird (*Molothrus ater*). The vireo's once extensive breeding range has been reduced to sites within three small areas in central Oklahoma, the Edwards Plateau to Big Bend area of Texas, and northern Mexico. It is now listed as Endangered (F.R. 10/6/87).

Roseate Tern (*Sterna dougallii dougallii*) — This white, dove-sized sea bird is similar in appearance to most other tern species. Unlike many other species of terns, however, it nests only along marine coasts in small, localized colonies. The number of suitable breeding sites for this ground-nesting bird has greatly diminished due to oceanside development and human disturbance, competition from expanding numbers of large gulls, and predation. Accordingly, the Service has listed the roseate tern population of northeastern United States and adjacent Canada as Endangered and the Caribbean population (including Florida and the Bahama Islands), which is in a somewhat less critical condition, as Threatened (F.R. 11/2/87).

Hualapai Vole (*Microtus mexicanus hualpaiensis*) — A very rare, mouse-sized animal, the Hualapai vole is known to occur only in the Hualapai Mountains of northwestern Arizona. It has among the most restricted habitats of any North American mammal. Because the small patches of suitable habitat are threatened by livestock grazing, human recreation, and other factors, the Service has listed the Hualapai vole as Endangered (F.R. 10/1/87).

Sand Skink (*Neoseps reynoldsi*) and **Blue-tailed Mole Skink (*Eumeces egregius lividus*)** — Both of these small lizards are endemic to central Florida and depend on scrub habitat with sandy substrates. Urbanization and conversion of land from sandhill and scrub vegetation to citrus groves have eliminated much of the former habitat. Rapid development in this region clouds the future of the two skinks, and the Service has listed them as Threatened (F.R. 11/6/87).

Florida Bonamia (*Bonamia grandiflora*) — A perennial morning-glory vine, this plant produces sturdy prostrate stems about 3 feet long and vivid blue flowers. The bonamia, like many other plants and animals endemic to central Florida, is jeopardized by the loss of scrub habitat. A rule listing this species as Threatened was published in the November 2, 1987, *Federal Register*.

Welsh's Milkweed (*Asclepias welshii*) — An herbaceous perennial, Welsh's milkweed grows up to 40 inches tall and produces cream-colored flowers with rose-tinged centers. This plant is endemic to the Coral Pink Sand Dunes and nearby Sand Hills of southern Utah. The population in the Coral Pink Dunes is being disturbed by off-road vehicle recreation, and portions of the areas in which both populations occur are leased for gas and oil production. Included in the October 28, 1987, final listing rule was a designation of Critical Habitat (see the *Federal Register* for maps and details).

Heliotrope Milk-vetch (*Astragalus montii*) — The second of three recently listed Utah plants is the Heliotrope milk-vetch, an herbaceous perennial in the pea family. *A. montii*, which grows only 2 inches high, produces pink-purple, white-tipped flowers and inflated pods. It occurs only on limestone barrens along the timberline of the Wasatch Plateau, a region of active oil and gas exploration associated with the Overthrust Belt. The Service decided that listing Welsh's milkweed as a Threatened species would ensure that adequate care is taken to conserve *A. montii* habitat during energy development. A map of the designated Critical Habitat is included in the November 6, 1987, *Federal Register*.

Toad-flax Cress (*Glaucocarpum suffrutescens*) — The third recently listed Utah plant is the toad-flax cress, a perennial herb that sends out slender, simple stems and yellow flowers from its deep, woody root. It is endemic to small outcrops or "islands" of a single calcareous shale stratum in the Uinta Basin. Much of this limited habitat was degraded during collection of surface rock for building stones; oil and gas production; and (historically) livestock grazing. Energy development remains a threat, and the toad-flax cress has been listed as Endangered (F.R. 10/6/87).

Heller's Blazing Star (*Liatris helleri*) — Heller's blazing star, a compact perennial herb that produces showy spikes of lavender flowers, is endemic to a few peaks in the Blue Ridge Mountains of North Carolina. Most of the open summit areas on which the plant occurs have been, or are being, developed for commercial recreation purposes. Increasing use of other *L. helleri* sites by hikers and sightseers poses additional threats to the habitat from erosion, soil compaction, and trampling. In recognition of its vulnerable status, the Service has listed Heller's blazing star as Threatened (F. R. 11/19/87).

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against take of listed plants.

Developers Convicted in Bird Killings

Two Florida land developers have pleaded guilty and have been sentenced by the United States District Court for the Middle District of Florida for killing red-cockaded woodpeckers (*Picoides borealis*), a species listed as Endangered because of the disappearance of its habitat for development and agricultural uses.

Pursuant to a plea agreement, one of the defendants agreed to contribute $300,000 to the National Fish and Wildlife Foundation for red-cockaded woodpecker recovery projects. Jail terms were suspended but the developers were sentenced to 2 years of probation and their corporation received a 3-year term of probation and a $1,000 fine.

The indictment charged that the defendants were engaged in discussions of steps necessary to obtain a Florida Development of Regional Impact Order, required by Florida law to commence development of Oak Run, a residential housing development near Ocala, when they were informed that the land they sought to develop contained cavity trees characteristic of red-cockaded woodpeckers. The defendants then instructed their employees to remove the cavity trees used by the woodpeckers and hunted the woodpeckers with shotguns at the Oak Run Development site. Nearby developments that were found to have nesting red-cockaded woodpeckers had previously been required to set aside tracts of land to preserve habitat for this Endangered species.

Photo by Jerome A. Jackson

red-cockaded woodpecker

The case was jointly investigated by the Florida Game and Fresh Water Fish Commission and the U.S. Fish and Wildlife Service. U.S. Attorney Robert Merkle said that willful violations of Federal wildlife laws would be fully investigated and vigorously prosecuted, and in appropriate cases every available sanction under the law, including incarceration, would be sought.

Reprinted from *Fish and Wildlife News*

Regional News

(continued from page 3)

Efforts to reintroduce the Mexican wolf at White Sands Missile Range in southern New Mexico have been stopped. In a September 29, 1987, letter, Commanding General Joe Owens stated that it was not in the best interest of the Range to support the reintroduction program. As earlier agreed, the Service needed the support of State and land managing agencies in order to implement this controversial reintroduction effort.

* * *

The Service has funded ocelot (*Felis pardalis*) research in south Texas for the past 6 years, and information gained during this study is going to be used to begin developing recovery techniques. The collared ocelots are on or around the Laguna Atascosa National Wildlife Refuge, but five of them are trying to disperse from the refuge. Suitable habitat and travel corridors in the vicinity are limited, and 5 cats have been killed in the last 6 years on roads while attempting to disperse. The Region 2 Refuge Division is now funding work to develop translocation techniques for these cats. Part of the refuge is relatively isolated, mainly by water, but appears to be good ocelot habitat. An attempt will soon be made to capture a young male and female as they disperse and move them to the unoccupied refuge areas. The two cats being considered for translocation are both radio-collared and have been moving back and forth across a road. After the cats are moved, they will be monitored to determine how they react.

* * *

The Kemp's Ridley Sea Turtle Working Group met in the Albuquerque Regional Office October 28 and 29, 1987. The group is made up of representatives of the National Marine Fisheries Service, National Park Service, Mexico's Instituto Nacional de Pesca's Projecto de Tortugas Marinas, Texas Parks and Wildlife Department, and U.S. Fish and Wildlife Service. Fifteen sea turtle experts and managers attended the meeting. Past efforts were reviewed and current recovery actions arranged in priority. Future recovery activities were discussed in light of the fact that Mexico has protected the only Kemp's ridley (*Lepidochelys kempii*) nesting beach since 1966 and both nations have worked since 1978 to recover the species while the population of nesting females continues to decline at a rate of 3-4 percent per year. Full protection of nesting females (500) and enhancing hatching success were given top priority.

The group hopes that implementation of Turtle Excluder Device (TED) regulations (second highest priority) will turn around the trend seen at the nesting beach with an increase in recruitment to the adult population. The single largest identified source of mortality to juvenile and adult ridleys is the shrimping industry, and implementation of TED regulations should reduce deaths considerably.

* * *

An aerial survey on November 29 located 126 whooping cranes (*Grus americana*) on Aransas National Wildlife Refuge, Texas. This figure includes 103 adults and subadults and 23 young. Another family group was present in Nebraska on November 30 and a single young whooper has been south of Amarillo, Texas, since November 1. Twenty-five chicks fledged last August in Canada and, with all currently accounted for, we have again had good survival of the young during migration.

A juvenile whooping crane in the Grays Lake (Idaho) flock hit a powerline in the San Luis Valley of Colorado and died. A necropsy at the National Wildlife Health Research Center in Madison, Wisconsin, revealed that the bird had a severe case of avian tuberculosis. Because the infection had been in progress for an estimated 2 months, the bird would have become infected while at Grays Lake National

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Regional News

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Wildlife Refuge. Avian tuberculosis is caused by a bacterium that can persist in the soil for several years. Infected birds pass the bacteria with their droppings and thereby infect the soil or potential foods. Healthy birds then become infected when they ingest the bacteria while feeding.

* * *

The 93 percent survival rate for the 1985 reintroduction of Knowlton pincushion cacti (*Pediocactus knowltonii*) in northwestern New Mexico is very encouraging. Approximately half of the plants in the reintroduced population are flowering and fruiting, which suggests the presence of pollen vector(s) at the site. No new plants have been observed at the site but many plants have begun to form multiple stems and we hope to see new plants soon.

In addition to the 1985 population established from cuttings, an area adjacent to the reintroduction site was seeded in September 1987. The New Mexico Division of Forestry planted about 170 seeds at varying depths in the soil. This plot will provide valuable data on seed germination as well as comparative data on the two different reintroduction techniques. Overall, the prospects for recovering the species appear to be good.

* * *

In early October, the U.S. Forest Service coordinated a count of Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) middens or pine cone storage areas. About 60 people (including U.S. Fish and Wildlife Service and Arizona Game and Fish Department employees) helped with the count. Groups of 6 to 10 people spread out in a line and moved through the habitat in the Graham Mountains in an attempt to count all of the red squirrel middens. Because one squirrel uses one midden, the count can be used for estimating the population. The first such count was conducted in the spring of 1986. Based on this year's survey results, including middens found this year that were missed last year, the 1986 estimate was revised to 323 squirrels (up from 242). The fall 1987 estimate is 242 squirrels, down 25 percent. This decrease may be due to what appears to be a poor Engelmann spruce (*Picea engelmannii*) cone crop this year. Engelmann spruce seeds are one of the squirrels' main foods.

Region 4 - Hatchling surveys and nest counts conducted by the Florida Game and Fresh Water Fish Commission show that American crocodile (*Crocodylus acutus*) numbers have increased significantly since last year. Seventy-three hatchlings were tagged this season compared to only 60 last year. A total of 29 nests have been located so far, and more are expected. Eight nests have been discovered in 1987 on Key Largo. In 1986, six nests were found on Key Largo, but only three were producing young. Serious droughts in the Florida keys curtailed crocodile production in recent years, but ample rain has provided suitable nesting conditions this year. Road kills are a common problem since adequate underground culverts are not provided along the heavily traveled U.S. Highway 1 to the Keys. On the average, three crocodiles a year are killed on U.S. Highway 1.

* * *

The Service's Cooperative Fish and Wildlife Research Unit at Gainesville, Florida, has been conducting status surveys of the Wakulla seaside sparrow (*Ammospiza maritima junicola*) and the Smyrna seaside sparrow (*A. m. pelonota*), both of which are Category 2 listing candidates. Interim results indicate that the Wakulla seaside sparrow still occurs in large numbers on its salt marsh habitat on Florida's panhandle coast. However, the Smyrna seaside sparrow, formerly found in coastal salt marshes in northeastern Florida, appears to be extinct. Breeding seaside sparrows along Florida's east coast are now represented only by a small colony of the wide-ranging Macgillivray's seaside sparrow (*A. m. macgillivraii*) in Duval County. (This subspecies nests northward to Cape Hatteras, North Carolina.) The last known dusky seaside sparrow (*A. m. nigrescens*) died in June 1987 (see BULLETIN Vol. XII No. 5-6).

* * *

A biologist from the Jacksonville, Florida, Field Office testified at a Florida Department of Environmental Regulation hearing involving a project in DeBarry Bayou, Volusia County, Florida. The project involved the construction of a 98-wetslip marina for a multifamily development. A "no jeopardy" Biological Opinion had been written by the Jacksonville Office based on the project's expected impact on the manatee (*Trichechus manatus*) and other fish and wildlife. In the Opinion, the Service recommended that the project be reduced to 26 wetslips, which is equal to one powerboat wetslip per 100 linear feet of shoreline. The recommendation was rejected by the U.S. Army Corps of Engineers and the applicant.

* * *

Standard guidelines were established recently for surveying red-cockaded woodpeckers (*Picoides borealis*) in the southeast. The new policy stipulates that suitable habitat (pine and pine-hardwood over 60 years of age) within one-half mile of project impacts needs to be surveyed for colonies if any pine over 30 years of age will be affected. The reason is that colonies will forage up to one-half mile from the colony site.

* * *

An injured Arctic peregrine falcon (*Falco peregrinus tundrius*) is recovering at the Florida Raptor Rehabilitation Center in Maitland. Following its recovery, the bird may be released in Indian River County. The bird was found by workers on September 30 in a grove west of Vero Beach.

The testing of the "Morrison version" of a soft turtle excluder device (TED) has been completed by the University of Georgia's Marine Extension Service. The device consists of a deflector panel constructed from 8-inch stretched mesh webbing and it is installed on the inside of the shrimp trawl. Turtles and some bycatch are guided along the barrier to an escape hole in the trawl. A total of 42 turtles were caught in the control (non-TED) net, but none were retained in the Morrison version of the soft excluder device. If approved by the National Marine Fisheries Service, this 2- or 3- pound, inexpensive device (about $45 installed) will provide an acceptable option for the shrimp industry.

* * *

The Anastasia Island beach mouse (*Peromyscus polionotus phasma*) is a Category 2 listing candidate. Currently, the only known viable populations of this mouse are located on the north end of Anastasia Island on the Anastasia Island State Recreation Area (St. Johns County, Florida) and at the southern tip of the island on Fort Matanzas National Monument. A new bridge scheduled for construction across the Matanzas Inlet sometime in the early 1990's may adversely impact the mouse population at Fort Matanzas. Although beach mice are plentiful at Fort Matanzas, their available habitat is less than 25 acres. If the Anastasia Island beach mouse is listed as Endangered, the bridge problem will need to be resolved through the Endangered Species Act's Section 7 inter-agency consultation procedures before construction begins. The beach mouse population on Anastasia Island State Recreation Area remains low due to heavy human use of the area, competition from feral house mice, and predation by domestic cats.

* * *

A new population of the Endangered northern flying squirrel (*Glaucomys sabrinus fuscus*) has been found in North Carolina approximately 50 miles south of the nearest known population. The site is located on land administered by the National Park Service, which is working with the Fish and Wildlife Service to protect the animals and their habitat.

* * *

The Service's Asheville, North Carolina, Field Office assisted the American Cave Conservation Association in the construction of a gate at a Kentucky cave. The cave will be used in educational programs for teachers and students in the central Kentucky area. Education is an integral part of the efforts to protect caves inhabited by Endangered species like the Kentucky cave shrimp (*Palaemonias ganteri*), Ozark cave shrimp (*Amblyopsis rosae*), Alabama cave fish (*Speoplatyrhinus poulsoni*), Virginia big-eared bat (*Plecotus townsendii virginianus*), Ozark big-eared bat (*P. t. ingens*), Indiana bat (*Myotis sodalis*), gray bat (*M.*

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grisescense), and Madison cave isopod (*Astrolana lira*).

* * *

Region 7 - Although it is currently listed by the Service as a foreign species, the Endangered short-tailed albatross (*Diomedea albatrus*) was once so abundant in Alaska waters that it was an important food of resident Aleut Indians along the Aleutian Island Chain and Alaska Peninsula. With fewer than 400 short-tails remaining in the world, this species is now only rarely seen away from its breeding islands off Japan. Recently an immature short-tailed albatross was killed when it was accidently hooked by commercial fisherman setting halibut gear in the Gulf of Alaska. The bird was marked with both Japanese metal and plastic color leg bands. Dr. Hiroshi Hasegawa responded to an inquiry to the Bird Migration Research Center in Chiba, Japan, and informed us that the albatross was one of 53 fledgling short-tails he had banded on Torishima in April 1987.

* * *

Over 30 people participated in peregrine surveys and banding activities in Alaska in 1987. Biologists from the Fish and Wildlife Service, Bureau of Land Management, National Park Service, Alaska Department of Fish and Game, and numerous volunteers observed 190 nesting pairs, 23 unmated adults, and 345 young. These numbers reflect the continuing improving status of peregrines in Alaska. Current population figures and productivity levels are above those once considered to be historic baseline data, suggesting that peregrines in Alaska probably were already decreasing when biologists first conducted surveys in the 1950's and 1960's. When populations stabilize, we will have a better idea of true historic (pre-DDT) levels, assuming that no other factors have significantly influenced the population.

Over the years, more than 2,000 peregrines have been banded in Alaska, and recoveries have been reported from Alaska to Argentina. Through these banding studies, the Service has learned that Alaska peregrines migrate southward throughout the lower 48 States but principally west of the Mississippi River, and winter for the most part in Argentina and Brazil.

Of the 200 hatching-year peregrines banded in Alaska last summer, Don Morizot and Tim Maechtle of the University of Texas report that four, plus one 2-year-old bird banded in 1986, were captured at Padre Island, Texas, this fall. A total of 27 peregrines banded in Alaska have been trapped at Padre Island since 1979.

* * *

Region 8 - Kirtland's warblers (*Dendroica kirtlandii*) on their breeding range in Michigan nest at a small number of sites within a much larger region of apparently suitable habitat. In 1987, all actual and most potential breeding sites were photographed from the air at a scale (1 inch – 500 feet) that showed major habitat features in sharp detail. False infrared color prints of these areas have been received and will be used to provide an overview of the bird's entire breeding range. Habitat analyses of occupied and unoccupied areas will provide for a detailed understanding of habitat features critical to nesting.

Eleven Kirtland's warblers were caught during the week of September 14, indicating that good numbers remain in Michigan far longer in the season than previously believed. In addition, two territorial birds captured were undergoing wing molt; therefore, these birds probably remained in Michigan for at least another week. These data have important management implications in that activities potentially detrimental to Kirtland's warblers currently are allowed in their breeding colonies after August 15. Some examples of detrimental activities include rabbit hunting with dogs and shotguns, logging operations, and seismic surveys for petroleum.

* * *

Biologists with the Patuxent Wildlife Research Center's Mauna Loa, Hawaii, Research Station located and monitored 15 active palila (*Loxioides bailleui*) nests from February through August 1987 in a study area on Mauna Kea. Preliminary results indicated that palila nesting success for this period was only 20 percent. The cause of the low nesting success is uncertain; however, observations were made of nest desertion, possible predation, unexplained nestling death, exposure to inclement weather, and unexplained disappearance of eggs and nestlings. Techniques are being developed to better document and explain the factors responsible for nest failures in the study area.

* * *

Researchers at Patuxent's California Research Station have been actively evaluating potential sites for a proposed experimental, temporary release of Andean condors (*Vultur gryphus*) in California. The objectives of the research are to: (1) refine condor release techniques developed with black (*Coragyps atratus*) and turkey (*Cathartes aura*) vultures in Florida and Andean condors in Peru, (2) test the criteria currently being used to select California condor (*Gymnogyps californianus*) release sites, and (3) develop written protocols for the release of California condors. Researchers have also been trapping golden eagles (*Aquila chrysaetos*); blood samples of the eagles will be analyzed for contaminants as part of a study on the contaminant load of scavenger species within the traditional range of the California condor.

Reorganization

(continued from page 1)

Departmental lands and facilities; and point and non-point source pollution control. (Chief, John Rogers; 703/235-1904)

3. **Division of Federal Aid**
   Federal grants for State fish and wildlife conservation programs are authorized under the Federal Aid in Fish Restoration Act (Pittman-Robertson Act), Federal Aid in Wildlife Restoration Act (Dingell-Johnson Act), Anadromous Fish Conservation Act, and Endangered Species Act. The Federal Aid division provides staff support to the Assistant Director for implementing these grant programs. (Chief, Conley Moffett; 703/235-1526)
4. **Office of Management Authority**
   Formerly called the Federal Wildlife Permit Office, this office acts as U.S. Management Authority for implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (popularly known as CITES). In consultation with the Office of Scientific Authority, it carries out procedural aspects of listing and delisting animal and plant species on the CITES appendices. The Office of Management Authority also directs and controls Service permits for import, export, transshipment, and interstate commerce involving Federally-protected species, although issuance of permits to "take" listed species is now a responsibility of the Regional Offices. (Acting Chief, Marshall Jones; 202/343-4968

Sea Otter

(continued from page 4)

at the island and become the founding members of a new breeding colony. Blood and tissue samples were collected from each animal while at the aquarium so that genetic lineages can be followed as the population grows. The Service also has collected 8 years of baseline data on the macroinvertebrate and macroalgal populations (including commercially harvested species) in the nearshore community at San Nicolas Island and plans to monitor the effects of the introduced otters on this ecosystem. As the population grows, Service biologists will monitor the sea otters' activity.

The plan to reintroduce sea otters at San Nicolas Island is the result of many years of expert analysis and public review. (See feature article in BULLETIN Vol. XI No. 8-9 and No. 10-11.) Further news on the reintroduction program will appear in future editions of the BULLETIN.

New Publications

Inventory and Monitoring of Wildlife Habitat, compiled and edited by Allen Y. Cooperrider, Raymond J. Boyd, and Hanson R. Stuart, is an 858-page guidebook for professional wildlife biologists who plan or conduct inventories and monitoring studies of a variety of wildlife habitats. Specialists from government, academia, and the private sector have contributed chapters on the following topics: Planning (Problem Definition and Issue Identification, Study Design, and Review of Literature); Major Habitats (Critical Habitat Features, Classification Systems, and Inventory and Monitoring Systems); Species Groups (Correlation with Habitat Features, Population Measurement Techniques); Habitat Measurements (Field Measurement Techniques, Precision and Accuracy); Special Studies (Weather and Climate, Food Habits, and Movement, Migration, and Habitat Use); and Analysis and Presentation (Data Management, Economic Analysis, Data Analysis and Evaluation, and Presentation of Results). Copies of this book, which was produced by the Bureau of Land Management, are available for $38.00 from the Government Printing Office (stock number 024-011-00170-1). Address orders to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Candidate Threatened and Endangered Plants of Alaska, published by the University of Alaska Museum (Fairbanks), is a new illustrated publication summarizing rare plant information for Alaska. The 73-page booklet was cooperatively funded by the U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service, and U.S. Forest Service. Single copies are available free of charge from Michael Amaral, Endangered Species Specialist, U.S. Fish and Wildlife Service, Sunshine Plaza, Suite 2-B, 411 West 4th Avenue, Anchorage, Alaska 99501.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	28	20	242	5	0	22	317	23
Birds	60	18	141	7	3	0	229	55
Reptiles	8	6	60	13	4	13	104	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	40	4	11	25	6	0	86	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	131	6	1	32	3	2	175	56
TOTAL	316	54	466	99	16	37	988	263**

*Separate populations of a species that are listed as Endangered and Threatened are tallied twice. Species thus accounted for are the gray wolf, bald eagle, green sea turtle, olive ridley sea turtle, leopard, piping plover, and roseate tern.

**More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 223
Number of species currently proposed for listing: 17 animals
31 plants

Number of Species with Critical Habitats determined: 102
Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
36 plants

November 30, 1987

November–December 1987 Vol. XII No. 11–12

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

March 1989 Vol. XIV No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Chimpanzees Proposed for Reclassification to Endangered

The chimpanzee (*Pan troglodytes*) and the pygmy chimpanzee (*Pan paniscus*), closely related species currently listed by the U.S. Fish and Wildlife Service as Threatened, have been proposed for reclassification to the more critical category of Endangered (F.R. 2/24/89). This proposed rule would reclassify wild populations of *P. troglodytes*; however, captive animals of this species would remain classified as Threatened, and those in the United States would continue to be covered by a special regulation that allows current legal uses. In the case of *P. paniscus*, both wild and captive populations would be reclassified to Endangered.

The historical range of *P. troglodytes* encompassed all or parts of at least 25 countries from Senegal to Tanzania, a distribution that corresponds closely with the tropical forest belt of equatorial Africa. Indeed, the chimpanzee is usually dependent on areas of unbroken forest, although it apparently is not uniformly distributed throughout such areas. The related species, *P. paniscus*, is found only in the forests of central Zaire.

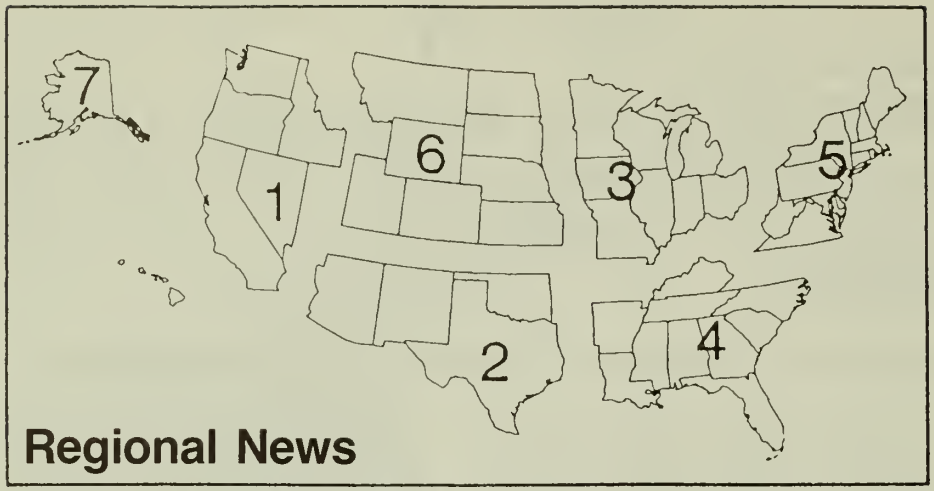
A petition to reclassify *P. troglodytes* as Endangered was submitted to the Service in late 1987 by the Jane Goodall Institute, World Wildlife Fund, and Humane Society of the United States. The petition, accompanied by a detailed report from the Committee for Conservation and Care of Chimpanzees, cited evidence that the status of this species has continued to decline since it was listed in 1976 as Threatened. (See feature in BULLETIN Vol. XIII, No. 4.) Massive destruction of forest habitat (primarily from logging and slash-and-burn agriculture), population fragmentation, excessive local hunting, and international trade are blamed for the deteriorating status of both species. Wild populations of *P. troglodytes* have been reduced to a small fraction of their original size, and the species has disappeared entirely from 5 countries. *Pan paniscus*, the rarer of the two chimpanzee species, faces threats similar to those that have decimated its relative. With Africa's burgeoning human population and the increasing accessibility of modern weapons, the outlook for survival of chimpanzees in the wild is uncertain.

The ways in which chimpanzees of the species *P. troglodytes* would be regulated by the Service if the reclassification is approved depends on whether the ani-

(continued on page 4)

photo by Geza Teleki, courtesy of World Wildlife Fund-U.S.

The proposal to reclassify chimpanzees in the wild as Endangered would recognize the continuing decline of these primates in their equatorial African forest habitat.



Regional News

Regional endangered species staffers have reported the following news from February:

Region 1 — At the urging of the Fish and Wildlife Service (Service), the Monterey (California) County Regional Park District recently acquired a key parcel of beach-sand dune habitat that supports the Endangered Smith's blue butterfly (*Euphilotes enoptes smithi*). It is hoped that continued cooperative efforts of local government, private landowners, and the Service can protect a major portion of the remaining sand dune ecosystem that is vital to the recovery of the species.

* * *

The California Department of Fish and Game has discovered a new population of the Endangered Owens tui chub (*Gila bicolor snyderi*) near Owens Lake in Inyo County, California. Service representatives have met with State biologists and the property owner, Anheiser-Busch, to develop a plan to protect the spring habitat. For the present, chubs will be removed to nearby holding ponds to increase their numbers. The State proposes to eradicate competing fish in the spring, after which the chubs will be returned.

* * *

Region 4 — Shelta Cave in Huntsville, Alabama, was once known as one of the most unique caves in North America because it supported such a diverse and complex assemblage of species. A survey of this cave was conducted recently to determine the presence of several aquatic species. The presence of the Endangered Alabama caveshrimp (*Palaemonias alabamae*), known only from this and one other site, could not be reconfirmed. However, a single specimen of a very small, undescribed crayfish under review as a listing candidate was observed. This troglodytic species is known only from Shelta Cave, and this observation is the only confirmed sighting since November 1973. The numbers of two other troglodytic crayfishes, *Cambarus jonesi* and *Orconectes australis australis*, were very low compared to studies done 15 years ago.

* * *

The intensive harvesting of freshwater mussels in Arkansas by commercial shellers during 1988 has increased concern for these animals. If the harvesting continues at its current level, mussel populations will be adversely affected. To help address this problem, the Arkansas Game and Fish Commission conducted a series of four workshops for Commission personnel. Workshop topics included: the mussel resource and harvest in Arkansas; the range of the Endangered fat pocketbook (*Potamilus capax*), pink mucket (*Lampsilis orviculata*), and speckled pocketbook (*Lampsilis streckeri*) mussels in Arkansas; how the Endangered Species Act listing, consultation, and recovery processes work; a discussion of endangered species law enforcement situations; and mussel life history and taxonomy.

* * *

Region 5 — The Service hosted a meeting of representatives and managers involved in the recovery effort for the Endangered Atlantic coast population of the piping plover (*Charadrius melodus*). The meeting was attended by over 75 representatives of Federal and State agencies, private conservation organiza-

(continued on page 4)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Susan Recce Lamson, *Acting Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief*,
Kenneth B. Stansell, *Deputy Chief*,
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief*,
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief*,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Regional 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Marvin Plenert, *Acting Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S Virgin Islands **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7:** Alaska. **Region 8:** Research and Development nationwide. **Region 9:** Washington, D.C., Office

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Implementing the African Elephant Conservation Act

Frank McGilvrey
Office of Management Authority
Washington, D.C.

Since passage of the African Elephant Conservation Act on October 7, 1988 (see BULLETIN Vol. XIII, No. 11-12), the Fish and Wildlife Service has been moving aggressively to fulfill its goal of perpetuating healthy wild populations of African elephants (*Loxodonta africana*).

Populations of the African elephant have fallen dramatically over the past decade, from an estimated 1.5 million in 1979 to no more than 750,000 today. The extensive illegal trade in ivory is blamed for much of this decline. African elephants are listed by the United States as Threatened, and the species is on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Special permits are available for limited import of African elephant ivory into the U.S. provided that certain conditions, as detailed in 50 CFR 17.40(e), are met.

On December 27, 1988, the Service published a notice in the *Federal Register* announcing a moratorium on all ivory imports into the U.S. from nations and other entities that are not parties to CITES, as required by Sections 2201 and 2202 of the African Elephant Conservation Act. The ban applies to all imports of raw and worked ivory from non-CITES countries, whether they are ivory producing nations (those within the range of the African elephant) or intermediary nations (those that trade in ivory originating in another country). The Act makes an exception for sport hunted trophies; their import is not prohibited from non-CITES nations, provided that these countries have established an ivory export quota with the CITES Secretariat in Switzerland.

The list of nations subject to the initial moratorium on commercial ivory imports includes:

Albania
Andorra
Angola
Antigua and Barbuda
Antilles
Aruba
Bahrain
Barbados
Bhutan
Brunei
Bulgaria
Burkina Faso
Burma
Cambodia
Cape Verde
Chad
Comoros
Cook Islands
Cuba
Czechoslovakia
Dijibouti
Dominica
Equatorial Guinea
Ethiopia
Fiji
Gabon
Greece
Grenada
Guinea-Bissau
Haiti
Iceland
Iraq
Ireland
Ivory Coast
Jamaica
Kiribati
North Korea
South Korea
Kuwait
Laos
Lebanon
Lesotho
Libya
Maldives
Mali
Malta
Mauritania
Mexico
Mongolia
Namibia
Nauru
Netherlands
New Zealand
Oman
Poland
Qatar
Romania
St. Christopher and Nevis
St. Vincent and the Grenadines
San Marino
Sao Tome and Principe
Saudi Arabia
Sierra Leone
Solomon Islands
Swaziland
Syria
Taiwan
Tonga
Turkey
Tuvalu
Uganda
United Arab Emirates
Vanuatu
Vatican City
Vietnam
Western Samoa
Yemen Arab Republic
Yemen, People's Democratic Republic of Yugoslavia

The ivory import moratorium was extended to the Democratic Republic of Somalia, and any country accepting ivory from Somalia, by an emergency rule published in the February 24, 1989, *Federal Register*. This rule, which took effect immediately, was the result of information in a petition filed by the World Wildlife Fund. The petition alleges that in the past 3 years, Somalia exported over 21,100 tusks. Somalia's 1986 annual report to CITES declares that in 1986 alone, it exported 16,986 tusks representing some 9,440 elephants. In its report and other

(continued on next page)

photo by Norman Myers, courtesy of World Wildlife Fund-U.S.

African elephant populations have fallen by more than 50 percent in the past decade.

Elephants

(continued from previous page)

statements, Somalia declared all tusks to be confiscated items and of Somali origin despite the fact that Somalia's native elephant population in 1987 was estimated to be no more than 4,500 animals and was no more than 8,600 in 1985. Somalia thus has declared exports of domestic ivory during the last 3 years representing roughly three times the number of elephants estimated to have been living in that country in 1987. Available information indicates that ivory is being imported into Somalia from Kenya and Ethiopia. Kenya prohibits the take of elephants and Ethiopia, which is not a party to CITES, allows only a very limited number of elephant trophy hunts.

In conjunction with this emergency notice, the Service asked for public comments on the information submitted by the World Wildlife Fund. Comments should be sent to the Office of Management Authority, U.S. Fish and Wildlife Service, Washington, D.C. 20240, by April 25, 1989. The import moratorium on Somalian ivory will remain in effect pending further review of the petition and subsequent comments.

In a related matter, the Service published a February 3 *Federal Register* notice requesting information on the African elephant conservation program of each ivory producing country. After the closing date of June 5, 1989, the Service will review all comments and determine whether each of the 34 ivory producing countries are in compliance with the Act. A moratorium on any further import of ivory will be enacted against any country not meeting the requirements of the Act. The Assistant Secretary of the Interior for Fish and Wildlife and Parks also is sending a letter, through the State Department, to each of the ivory producing countries asking for the necessary information.

A meeting of the CITES Standing Committee, chaired by the U.S., was held the last week of February. Among the major issues discussed was how to deal with over 30 tons of ivory confiscated by Burundi. Burundi agrees that if they are allowed to sell the ivory, all proceeds will go into conservation programs, as required by the Act.

Chimpanzees

(continued from page 1)

mals are in the wild or in captivity, where captive animals are being held, and whether or not they are still being taken from the wild. These chimpanzees would fall into one of four general management categories:

1) In the wild, chimpanzees would be listed as Endangered.

2) Chimpanzees held in captivity within the countries where wild populations still occur, and any chimpanzees removed from the wild after the effective date of the final rule (no matter where they are held), would be classified as Threatened *but* would be regulated by the Service as if they were Endangered. The same would apply to the progeny of such animals (except for the offspring of chimpanzees legally imported into the U.S.). Regulating these chimpanzees as if they were Endangered would prohibit their import into the U.S. except under Federal permit for approved scientific purposes or for enhancing the propagation or survival of the species (as detailed in 50 CFR 17.22). The regulations emphasize that such permits are available only for purposes that are consistent with the goals of the Act to conserve listed species and their habitats.

3) Chimpanzees that currently are held in captivity outside of their native range and outside of the U.S. would continue to be classified and regulated as Threatened species. Import of such animals would be somewhat less restrictive. The conditions under which these chimpanzees could be imported into the U.S. would be widened to include educational purposes, zoological exhibition, and other "special purposes consistent with the purposes of the Act." (See 50 CFR 17.32.) Again, however, import permits would be available only for purposes that comply with the conservation goals of the Act.

4) Those captive chimpanzees being held within the U.S. would remain classified as Threatened, and current legal uses of these animals would continue to be allowed under special regulation, as detailed in 50 CFR 17.40(c)(2).

In the U.S., there are groups of captive *P. troglodytes* large enough to be maintained independently over the long term. There has been no major legal importation of chimpanzees into the U.S. for about a decade, but some people have become concerned that the demand for these animals in biomedical research will soon increase.

Regional News

(continued from page 2)

tions, and universities, as well as Parks Canada and the Canadian Wildlife Service. Presentations covered preliminary results of ongoing research projects and summaries of major management efforts at several nesting areas, including the use of predator exclosures to protect piping plovers nests.

* * *

The National Fish and Wildlife Foundation has awarded a grant of $15,000 to Region 5 to develop an educational video on the piping plover. The video will highlight the problems faced by this species along the Atlantic coast, and describe the management and protection efforts being undertaken by the Service and other agencies and organizations.

* * *

The Service has contracted with The Nature Conservancy to conduct a 2-year study on the effects of vegetation removal and soil disturbance on germination of the sandplain gerardia (*Agalinis acuta*), a plant that was listed in September 1988 as Endangered. This species requires open habitat and the disruption of natural sources of disturbance, such as fire and grazing, is likely a major cause of the species' decline.

The New England Wildflower Society also has been contracted for 2 years to develop techniques to propagate the sandplain gerardia in a cultivated setting. It is hoped that this work will provide seed for further experiments on the effects of disturbance (thus reducing the need to risk experimentation with the few wild populations), furnish a source of seeds for seed banking, and enhance our understanding of this plant's biology.

* * *

Region 8 — Thirty-four Puerto Rican parrots (*Amazona vittata*) remain in the wild in the Caribbean National Forest. The count was made by the Puerto Rico Research Group and volunteers from the Student Conservation Association on January 18. Some parrots were observed near the Cacique nest site, a good indication that it will be selected again in 1989. Unfortunately, this site has been affected by predation in the past.

In the Luquillo Forest captive rearing facility, two pairs of Puerto Rican parrots recently laid clutches of eggs. One pair had three fertile eggs, while the second pair, which had fertile eggs last year, had four infertile eggs this year. The infertile eggs will be removed so that the second pair produces a second set of eggs. This year's egg production is much further along than in previous years.

The three fertile eggs were placed in the aviary incubator on January 8, and on January 16 the first Puerto Rican parrot of the 1989 breeding season hatched from this clutch. Two more chicks subsequently hatched, bringing 1989's production up to three birds as of March 5.

* * *

During early January in the Superior National Forest of northern Minnesota, male gray wolf (*Canis lupus*) number 6041 was killed by a neighboring wolf pack that had invaded the territory of its

(continued on page 8)

Four Species Proposed for Listing Protection

Four rare species—two animals and two plants—were proposed by the Fish and Wildlife Service in February for addition to the List of Endangered and Threatened Wildlife and Plants. If the listings are approved, these species will receive protection under the Endangered Species Act:

Pygmy Sculpin (*Cottus pygmaeus*)

This small fish, which rarely exceeds 1.8 inches (45 millimeters) in total length, is known only from Coldwater Spring and 500 feet (152 meters) of its outflow in Calhoun County, Alabama. The spring is impounded to form a shallow pool of over one acre (0.4 hectare) in size and serves as the primary water supply for the city of Anniston.

For the past 6 years, the pygmy sculpin has been protected under a conservation agreement between Anniston, which owns the pool and its outflow, and the Fish and Wildlife Service. However, several potential threats to the water quality of the Coldwater Spring system have been identified. Because of these additional threats and the species' extremely restricted range, the Service has proposed to list the pygmy sculpin as Threatened (F.R. 2/7/89).

The use and/or storage of toxic chemicals at the nearby Anniston Army Depot may be contaminating the spring recharge zone. Test wells at the depot have revealed high levels of trichloroethylene, and this substance has been detected in Coldwater Spring. Other pollutants present at the test wells also may be migrating through the aquifer. If the pygmy sculpin is listed, the Environmental Protection Agency and the Department of Defense will consult with the Service on any cleanup activities that may affect the species.

Another threat to the watershed is the proposed construction of a highway bypass from Interstate 20 to Anniston. The preferred route identified during early project planning would pass along the side of Coldwater Mountain immediately above and to the east of Coldwater Spring. Any accidental toxic spills from this proposed route could quickly contaminate the spring. Two alternate routes, though within the recharge area, would not pose as great a threat. If the pygmy sculpin is listed, the Federal Highway Administration will consult with the Service to ensure that the species' well-being is considered during route selection.

Because the water withdrawals by Anniston do not threaten the pygmy sculpin, a final listing rule would include a special provision allowing the city continued use of Coldwater Spring.

Cracking Pearly Mussel (*Hemistena (=Lastena) lata*)

This freshwater mollusk has a thin, elongated, brownish-green shell. It inhabits free-flowing streams where it imbeds itself in gravel riffles and feeds by filtering food particles from the water. Like most other mussels, this species has a complex reproductive cycle in which the mussel larvae parasitize fish. Because the cracking pearly mussel is so rare, its host fish and other aspects of its life history are unknown.

The cracking pearly mussel historically was distributed fairly widely in the Ohio, Cumberland, and Tennessee River systems within the States of Indiana, Illinois, Kentucky, Tennessee, Alabama, and Virginia. Today, however, it is known to occur only in a few shoals of the Clinch, Powell, and Elk Rivers in Virginia and Tennessee. It is possible that a few individuals also may survive in the Green River (Kentucky) and Tennessee River (Tennessee). All of the remaining populations are geographically isolated from each other, and it is likely that all but the Clinch River population have fallen below the size considered sufficient to maintain long-term genetic viability. Because this species is believed to be in danger of extinction, the Service has proposed to list it as Endangered (F.R. 2/17/89).

The decline of the cracking pearly mussel resulted from widespread modification and degradation of its clean, free-flowing aquatic habitat. Coal mining and other disturbances within the watershed caused many of the mussel shoals to become degraded by silt. Other riffle habitat has been flooded by impoundments and disturbed by dredging. At least two mussel die-offs were traced to toxic spills from riverside industrial plants. Because mussel larvae depend on fish hosts, often of a particular species, habitat problems that decrease the diversity and abundance of fish can indirectly harm mussels as well. These impacts are not restricted to the cracking pearly mussel; all of the sites inhabited by this species are shared with other mussels already listed as Endangered.

Palma de Manaca (*Calyptroma rivalis*)

An arborescent palm, *C. rivalis* can reach up to 40 feet (12 m) in height. This species is endemic to the island of Puerto Rico, where it grows along streambanks in the semi-evergreen seasonal forests of the northwestern karst region. Only two natural populations of fewer than 250 trees in total are known, although the species could have been more widely distributed prior to the conversion of many forests to agricultural lands. The Service has proposed to list *C. rivalis* as a Threatened species (F.R. 2/7/89).

Unless the *C. rivalis* sites are conserved, continued agricultural expansion could threaten the species' survival. Even the palms that are not destroyed during land clearing can be affected indirectly. Fires set in surrounding sugar cane fields in preparation for harvest have spread into *C. rivalis* habitat and burned some individuals. Also, cattle have been observed feeding and trampling on seedlings. Seedling establishment is further hampered by flash floods, which have increased in number and intensity after the deforestation of surrounding lands. Because the species is restricted to streamside habitat, it is particularly vulnerable to flooding.

The Puerto Rico Department of Natural Resources is concerned about the survival of *C. rivalis* and has introduced a small number of cultivated seedlings into Rio Abajo Commonwealth Forest. Although the transplant efforts appear to have been successful initially, it is not yet known if the palms will reproduce and colonize the area naturally.

Small-anthered Bittercress (*Cardamine micranthera*)

A perennial herb in the mustard family (Brassicaceae), the small-anthered bittercress grows up to about 16 inches (40 centimeters) high and produces small white flowers. It is endemic to moist sites along a few small streams in the piedmont region of North Carolina. The type localilty in Forsyth County was destroyed in the early 1960's by conversion of the site to a cattle pasture, and the species was believed for almost 30 years to be extinct. In 1985, however, a population of *C. micranthera* was discovered in Stokes County. Since then, intensive searches by Service and State biologists have located two additional populations, both of them also in Stokes County. *Cardamine micranthera* was proposed on February 1 for listing as Endangered.

All three populations are small in numbers of plants and extent of occupied habitat. The smallest population consists of only 3 plants and the largest, which numbers about 200 plants, is concentrated along less than 0.1 mile (160 m) of a streambank. The sites are privately owned and thus subject to changes in management. Threats to the species' survival include: conversion of habitat to improved pasture; habitat destruction and/or dessication associated with logging; encroachment by such aggressive nonnative species as the Japanese honeysuckle (*Lonicera japonica*); impoundment or channelization of the small stream corridors it inhabits; and scouring of streamside habitat by floods.

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Concern Grows For Light-footed Clapper Rail

James W. Wiley[1] and Richard Zembal[2]

The light-footed clapper rail (*Rallus longirostris levipes*) is a reclusive resident of dense marsh vegetation in coastal regions of southern California and northern Baja California, Mexico. In California, this Endangered bird currently occupies only a handful of remnant saltmarshes from Santa Barbara County south to the Tijuana Marsh on the U.S./Mexico border.

Historical accounts suggest that the rail once was common in southern California. Since early in the twentieth century, however, this subspecies has experienced a severe population decline. By 1972-1973, when Fish and Wildlife Service biologist Sanford Wilbur conducted the first extensive surveys, only 250-350 pairs of light-footed clapper rails remained in California. Despite additional rails found through improved censusing techniques and more complete coverage of populations in later years, the numbers of rails detected from 1980 to 1986 showed an average annual decline of 29.6 percent. From 1984 to 1985, the population plummeted 48.7 percent. In 1986, a total of 143 pairs of light-footed clapper rails survived within the United States.

Although the rail's decline has resulted from several environmental factors, all are ultimately linked to habitat destruction or degradation. In 1971, biologist John Speth estimated that 67 percent of California's coastal saltmarshes had been lost because of past and current land uses. Habitat loss has been most severe in southern California, where only about 25 percent of the coastal wetlands that existed in 1900 remain. The sites occupied by rails currently total only about 3,000 acres (1,215 hectares) or about 35 percent of the remaining coastal marshland. Light-footed clapper rails have been found in 21 southern California marshes in recent years. However, 88.1 percent of the State's rails inhabit only 6 marshes, and only 5 marshes were used by breeding rails in 1986.

In addition to the direct loss of coastal wetlands, several other threats face the light-footed clapper rail. The remnant marshes are vulnerable to storm-driven tides and runoff, which disrupt rail nesting habitat and probably reduce food supplies. High tides force rails into artificially-created dry edge areas where they can be killed by introduced predators, such as red foxes, cats, and dogs. A severe winter storm could damage remnant wetland areas and devastate their rail populations. Dredge and fill operations also have altered the remaining marshes, making the rails more vulnerable to predation. Another potential threat is the high concentration of environmental contaminants in some southern California marshes.

Research Needs

Largely through the efforts of Richard Zembal and Barbara Massey, substantial knowledge has been accumulated on light-footed clapper rail ecology and behavior, research techniques, and conservation needs. Before the species can be recovered, however, additional research is needed on habitat requirements, habitat restoration and creation, population dynamics, and environmental contaminants.

To reclassify the bird to Threatened, the Light-footed Clapper Rail Recovery Plan (as revised in 1982) sets a goal of 800 pairs in 20 secure marshes totalling 10,000 acres (4,050 hectares). A substantial amount of additional marshland must be protected, and many existing marshes enhanced, to achieve this goal. This marshland then will need to be identified and ranked according to its potential as rail habitat. Habitat components critical to rail foraging, roosting, and breeding have to be identified for use in setting priorities for acquisition and restoration of marshlands. Water and vegetation management techniques that would improve the quality of marshlands and, thereby, the health of light-footed clapper rail populations also need to be developed.

Floating nesting platforms could be a short-term solution to the relative lack of suitable nesting habitat observed at many marshes. Vigilance will be needed, however, to ensure that any predators drawn by the conspicuousness of the rafts do not destroy rail nests. Trials conducted by Zembal in 1987 resulted in substantially increased breeding success by clapper rails using such platforms. This suggests that rail population growth in these areas is indeed limited by the availability of suitable nesting sites.

Light-footed clapper rails have been found to disperse from natal marshes. The frequency and importance of these movements to the genetic diversity of the southern California populations is unknown. If there is substantial gene flow among the populations, conservation strategies to preserve such genetic interchange should be developed. Dispersal may also allow individuals to move from temporarily or seasonally unsuitable sites to more suitable marsh habitat. Studies of rail dispersion using radio-tagged and color-marked birds are needed to shed further light on this behavior. Such studies also would provide information for development of reintroduction and/or translocation strategies.

During recent surveys, some small populations of clapper rails were found to be composed of only males or females. The cause of this imbalance is unknown, as are the effects of losing these populations as breeders. However, the dynamics of the ecosystem should be investigated to determine if breeding populations can be reestablished in these areas.

Also of recent concern is the finding of elevated DDE (a metabolite of the pesticide DDT) levels in clapper rail eggs in southern California. The significance of these elevated contaminant levels on

(continued on next page)

Photo by David Ledig

light-footed clapper rail

embryo viability has not yet been determined.

Cooperative Research

As part of a new cooperative research project between the Service's Patuxent Wildlife Research Center-Endangered Species Research Branch and the Laguna Niguel, California, Field Office, biologists will examine several of the problems identified above. Ecological criteria for ranking the suitability of coastal marshes for light-footed clapper rail reintroductions and restoration will be developed through literature reviews, consultations with experienced biologists, and on-site evaluations of areas currently and historically used by rails.

Using these criteria, recommendations will be developed for specific marshland acquisitions and restoration. Sites that are still suitable for rails, or that could be enhanced or restored as rail habitat, will be ranked in order of their importance to the bird's recovery. An assessment of development pressures facing the sites will be included in the evaluation.

The rail's population characteristics, dispersal dynamics, and population parameters (age/sex-specific mortality, survival, seasonal movements) will be determined over a 3-year period. Habitat used by marked birds will be monitored and characterized for physical and vegetative elements. Radio telemetry and conventional color marking techniques should allow observers to monitor the movements of individual rails intermittently. Emphasis will be placed on determining dispersal dynamics of marked birds. This information is vital for determining the definition of a light-footed clapper rail population (i.e., What is the extent of gene flow among rails in disjunct marshes?). If radio-marked birds disappear from natal marshes, searches will be conducted at other sites.

The nature of chemical residues (substances and concentrations) in light-footed clapper rail eggs will be determined as part of a broader study on the hatching success of rail eggs in nature. The number of eggs collected within any year and/or location will be restricted by the size of the local breeding population and the level of reproductive success. Samples will be analyzed at Patuxent's Environmental Contaminants Laboratory for standard chemical contaminants and heavy metals. Eggshells of collected eggs will be measured for thickness and compared with measurements of eggshells collected before the chemical pesticide era (1947 to present).

1. U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Southwest Research Group, 2140 Eastman Avenue, Suite 100, Ventura, California 93003.
2. U.S. Fish and Wildlife Service, Laguna Niguel Field Office, 2400 Avila Road, Laguna Niguel, California 92677

Final Listing Rules Approved

Michael D. Rees
Division of Endangered Species and Habitat Conservation
Washington, D.C.

During February of 1989, Endangered Species Act protection was extended to two additional species:

Cooley's Meadowrue (*Thalictrum cooleyi*)

This small, rhizomatous, perennial herb in the buttercup family (Ranunculaceae) rarely exceeds 3.2 feet (1 meter) in height, has narrow, lance-shaped leaves, and small unisexual flowers that vary somewhat in color and lack petals. Cooley's meadowrue is endemic to the southeastern coastal plain, where it occurs on the edges of bogs and savannas. It depends on some form of periodic disturbance, such as fire, to maintain the open sites in which it occurs. Sixteen populations of the plant were reported historically from 7 counties in North Carolina and Florida; however, the species currently is known to occur in only 11 locations in North Carolina and 1 location in Florida. All 12 sites are in private ownership, with The Nature Conservancy owning part of one site in North Carolina.

Fire suppression and silvicultural and agricultural activities are believed largely responsible for extirpating one-fourth of the populations known historically. Other potential threats include mining, drainage, highway construction, and herbicide use. At least 11 of the remaining 12 populations are currently threatened by habitat alteration. All of the populations are small, which increases their vulnerability to extirpation. Cooley's meadowrue was proposed for listing as an Endangered species in the April 21, 1988, *Federal Register* (see BULLETIN Vol. XIII, No. 5), and the final rule was published on February 7, 1989.

Speckled Pocketbook Mussel (*Lampsilis streckeri*)

This freshwater mussel, about 3 inches (80 millimeters) in length, has a dark yellow or brown shell with chevron-like spots and rays. The mussel is found on coarse to muddy sand in streams up to 1.3 feet (0.4 meters) deep with a constant flow of water. It once occurred in the Little Red River and its tributaries in Arkansas, but is now limited to a stretch of about 6 miles (10 kilometers) in the Middle Fork of the Little Red River. Only a few hundred individuals are believed to remain in this stretch. Construction of an impoundment, cold water discharges from the reservoir, pollution, floods, and modifications of river channels for flood control have been implicated in the species' disappearance from other parts of the river system. The species remains vulnerable to water quality degradation. The low density of the existing population also decreases the likelihood of successful reproduction. The speckled pocketbook mussel was proposed for listing as an Endangered species in the July 25, 1988, *Federal Register* (see BULLETIN Vol. XIII, No. 8), and the final rule was published on February 28, 1989.

Listing Proposals

(continued from page 5)

Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are not legally binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal tresspass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

Regional News

(continued from page 4)

pack. The male wolf had been radio-collared and monitored since 1980, was at least 10 years old, had out-lived at least two mates, and had produced a litter with a third mate in 1988.

The National Wildlife Health Research Center at Madison, Wisconsin, has found heartworm larvae in two gray wolves from the Superior National Forest, making a total of three cases identified in the past year. Each infected wolf has been in a different pack, but with adjacent territories.

* * *

Two sites in Arizona have been evaluated as possible masked bobwhite (*Colinus virginianus ridgwayi*) propagation facilities. After years of effort, the wild population in Arizona, mainly at Buenos Aires National Wildlife Refuge, is around 200 individuals. An unknown but very low number still exists in Mexico.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	152	6	1	40	6	2	207	84
TOTAL	358	49	467	107	21	39	1041	284 **

Total U.S. Endangered **407**
Total U.S. Threatened **128**
Total U.S. Listed **535**

Recovery Plans approved: 242

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
March 31, 1989 36 plants

March 1989 Vol. XIV No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

1987 INDEX Vol. XII Nos. 1–12

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Washington, D.C. 20240

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Office of Endangered Species
by Nancy E. MacClintock

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Habitat Loss Threatens Two Midwestern Plants

Two species of plants endemic to small areas of the northern midwest were proposed by the Fish and Wildlife Service during December 1987 for listing as Threatened. Both grow only along lakeshores, lands that are in demand for development. If the proposals are made final, Endangered Species Act protection will be extended to the following:

Fassett's Locoweed (*Oxytropis campestris* var. *chartaceae*)

A perennial herb native to central Wisconsin, Fassett's locoweed is a member of the pea family (Fabaceae). It produces a rosette of pinnately compound leaves clustered at the base of the stem and attractive rose-purple flowers. The total known population of about 4,500 plants is concentrated at 6 sites in Portage and Waushara Counties.

Several historical populations of Fassett's locoweed were lost to lakeside construction and other modifications of the habitat. All of the remaining sites are on privately owned land open to additional development. Because of the species' vulnerability, the Service has proposed listing Fassett's locoweed as Threatened (F.R. 12/4/87).

Dwarf Lake Iris (*Iris lacustris*)

As suggested by its common name, this plant is small—less than 6 inches high—and grows along lakeshores. (It also occurs in the partially shaded areas of upper beach habitat.) Currently, about 70 known sites are found on the northern shores of Lake Michigan and Huron in Wisconsin and Michigan, and there are about a dozen more sites in Ontario, Canada.

Photo courtesy of Matthaei Botanical Gardens, University of Michigan

dwarf lake iris

Construction of lakeside housing and other development, which resulted in major losses of historical habitat, continues to be a threat. Most sites of the dwarf lake iris are on private property and are vulnerable to change. However, one dwarf lake iris site is on Federal land, a U.S. Coast Guard lighthouse station in Michigan, and several are on protected State lands.

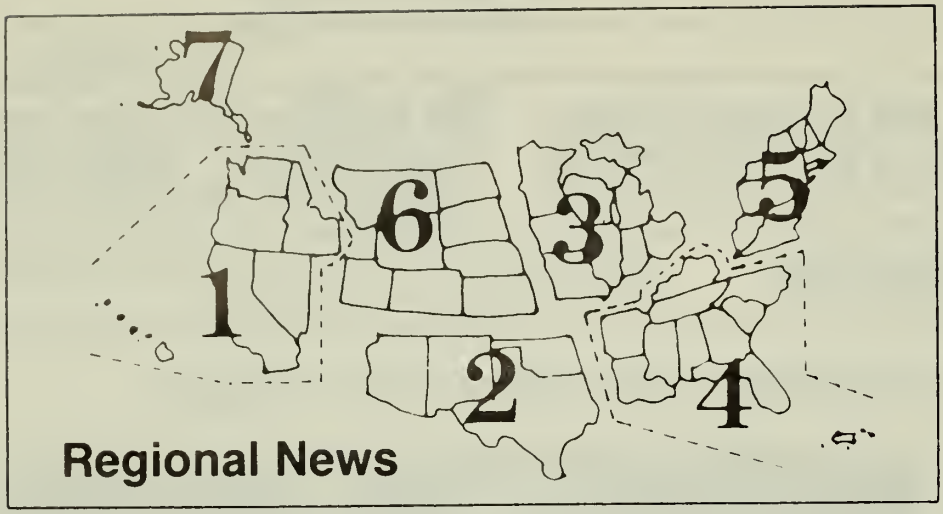
The Service has proposed to list the dwarf lake iris as Threatened (F.R. 12/4/87). A Federal listing under the Endangered Species Act would complement and reinforce the protection already given the species by Wisconsin and Michigan. Potential recovery activities include management of the habitat to reduce competition from other plants and transplanting irises to previously occupied sites (if any are found suitable).

Alabama Cavefish, Now Considered Nearer to Extinction, is Proposed for Reclassification

The Alabama cavefish (*Speoplatyrhinus poulsoni*) is a small, blind, colorless fish known only from Key Cave in Lauderdale County, Alabama. It was listed by the Fish and Wildlife Service as a Threatened species in 1977. Since that time, studies of 120 other caves in northeastern Alabama failed to locate any other *S. poulsoni* sites. The only known population is estimated to number fewer than 100 individuals, and its aquatic habitat is believed to be vulnerable to sewage and pesticide pollution. Because the Alabama cavefish is now considered in immediate danger of extinction, the Service has proposed to reclassify it from Threatened to the more critical category of Endangered (F.R. 12/4/87).

The quality of Key Cave's environment is directly influenced by what takes place above-ground in the drainage or recharge area. Contaminants can enter the cave through sinkholes or other water collecting depressions. Within the probable recharge area are two activities that could affect groundwater quality: 1) the use of pesticides and other agricultural chemicals on row crops and 2) a sewage sludge disposal operation developed by the Tennessee Valley Authority and operated intermittently by the City of Florence, Alabama.

The Fish and Wildlife Service is working with the Environmental Protection Agency in an attempt to control possible sources of water pollution in the area. In the meantime, however, the Service believes that the category of Endangered represents the true status of the Alabama cavefish.



Regional News

Regional endangered species biologists have reported the following news and activities for December:

Region 1—An Area of Critical Environmental Concern designation has been recommended for a 40-acre site at Walker Flat near McMinnville, Oregon. Such a designation would authorize the Bureau of Land Management to develop an interim habitat management plan for Nelson's checker-mallow (*Sidalcea nelsoniana*), a Category 2 candidate for a future listing proposal.

* * *

The Fish and Wildlife Service's Great Basin Complex Station at Reno, Nevada, met with the Bureau of Land Management and local landowners at Condor Canyon in Nevada's Lincoln County to observe grazing practices for effects on Big Spring spinedace (*Lepidomeda mollispinis pratensis*) habitat. It was found that current grazing practices in the area are not significantly affecting spinedace habitat. Next, there was an inspection of a proposed desert tortoise (*Xerobates agassizii*) relocation study site near Pahrump. The experimental project would involve moving tortoises away from an area near Las Vegas that is subject to being subdivided and developed.

* * *

Recently the Laguna Niguel Office issued a "no-jeopardy" Biological Opinion on the Devers Palo Verde-500 KV transmission line for effects on the Coachella Valley fringe-toed lizard (*Uma inornata*) and Yuma clapper rail (*Rallus longirostris yumanensis*). Compensation for disturbance of 12.8 acres in the Coachella Valley fringe-toed lizard mitigation fee area was in the form of a payment to The Nature Conservancy, as provided for in the Habitat Conservation Plan.

* * *

Recent research, using implanted radio transmitters, indicates that the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), once considered to be strictly an aquatic species, ranges at least 175 yards away from wetlands into adjacent upland habitats. In an ongoing study, at least six snakes were observed using rodent burrows on dry hillside grasslands, presumably as hibernation sites for the winter. These findings will be very timely for addressing effects from a number of upcoming major projects.

* * *

Sixty-five light-footed clapper rail (*Rallus longirostris levipes*) nesting platforms will be constructed at Point Magu, Carpenteria Marsh, and the Kendall-Frost Reserve in California. These platforms are designed to ride up and down with the tides to minimize possible flooding and loss of the nests. Moreover, they can be placed to reduce the likelihood of egg predation by land-based predators. Similarly designed platforms, recently installed at the Anaheim Bay National Wildlife Refuge, were used extensively by rails during the 1986 breeding season.

Region 2—Aerial surveys in early December confirmed that 134 whooping cranes (*Grus americana*) had reached

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Office of Management Authority*
(202-343-4968)

TECHNICAL BULLETIN Staff
Michael Bender, *Editor*
Denise Henne, *Assistant Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* William F. Shake, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* Marshall P. Jones, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* John D. Green, *Assistant Regional Dirrector;* Barry S. Mulder, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Robert E. Gilmore, *Regional Director;* Jon Nelson, *Assistant Regional Director;* Dennis Money, *Endangered Species Specialist.*

Region 8 (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director; Endangered Species Staff;* Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the Virgin Islands. **Region 5:** Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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Regional News

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Texas. The 109 adults and subadults that departed northward in April and the 25 young that fledged in Canada had all returned to their southern wintering areas. One hundred and thirty-three of the birds were on the Texas coast and one juvenile was in the Texas panhandle. The last time all spring migrants returned safely in fall was in 1976, when the population (57) was less than half its current size. The Rocky Mountain whooping crane population is estimated at 18-20 birds wintering in New Mexico and Mexican State of Chihuahua.

In the summer of 1986, plant, animal, and sediment samples were collected at the three main refuges used by the Rocky Mountain whoopers. The samples from Bosque del Apache (New Mexico), Alamosa/Monte Vista (Colorado), and Grays Lake (Idaho) National Wildlife Refuges are to be analyzed for contaminants. Only the data from Alamosa/Monte Vista are available at this time. Heavy metals (chromium, arsenic, mercury, copper, zinc, and lead) were unusually high in some samples. For example, while copper levels of 21 to 40 parts per billion are toxic to bluegills (*Lepomis macrochirus*), levels sampled in carp (*Cyprinus carpio*) at the refuge were 564 parts per billion. These high levels in the environment are believed to be a result of almost a century of silver and gold mining activities in the mountains surrounding the San Luis Valley where the Alamosa/Monte Vista Refuge is located. Whooping cranes spend 6 to 12 weeks within the valley each year.

* * *

On November 28 and 29, nine Sonoran pronghorn (*Antilocapra americana sonoriensis*) were captured and radio-collared in southwestern Arizona. A net was fired from a gun in a low-flying helicopter to catch the animals. Blood samples, as well as other data, were collected before the pronghorn were released. The radio-collared animals will be monitored biweekly from the air and weekly from the ground. Funding for this study was obtained by the Arizona Game and Fish Department.

Region 4—Range extensions were reported recently for two listed Florida plant species. Carter's mustard (*Warea carteri*) has been sighted on a county recreational complex on a barrier island near Melbourne. The site is oak scrub. This is the first time this Endangered species has been found outside Polk and Highlands Counties in central Florida since the 1930's. The discovery shows that special searches for the plant during its fall flowering season are probably justified. A second report, not yet verified but from an

(continued on page 4)

Protection Approved for Puerto Rican Plant

Crescentia portoricensis, or Higuero de Sierra, is an evergreen, vine-like shrub or small tree endemic to the mountains of southwestern Puerto Rico. Only 42 individuals of this species are known to survive. Although all six known populations are on forest lands owned and managed by the Commonwealth of Puerto Rico, deforestation of surrounding lands has led to erosion and flash flooding of *C. portoricensis* habitat. A proposed U.S. Army Corps of Engineers flood control project may add to this threat if it includes an impoundment that floods *C. portoricensis* habitat in Maricao Commonwealth Forest.

The Service proposed January 14, 1987, to list *C. portoricensis* as Endangered (see story in BULLETIN Vol. XII No. 2), and the final rule was published in the December 4, 1987, *Federal Register*. This species is now eligible for all protection and recovery benefits authorized for listed plants under the Endangered Species Act. In accordance with Section 7 of the Act, if formal planning for the flood control project is initiated, the Corps of Engineers will consult with the Service on ways to avoid jeopardizing *C. portoricensis*.

Amistad Gambusia is Removed from List

The Amistad gambusia (*Gambusia amistadensis*), a small fish known only from a single Texas spring, was removed by the Service from the Federal list of Endangered wildlife on December 4, 1987. All available data indicate that this species is extinct.

Goodenough Spring, a tributary of the Rio Grande in Val Verde County, is the only site at which the Amistad gambusia has ever been found, despite extensive searches of other springs in the region. This fish was not recognized as a distinct species until well after its required spring habitat was permanently inundated by the rising Amistad Reservoir in 1968. By the time the species was formally described (1973), the Amistad gambusia survived only in captive propagation facilities. Since that time, all known captive populations have died or have been eliminated by hybridization with, or predation by, the related but common mosquitofish (*Gambusia affinis*).

Service Decides Not to List Spotted Owl at This Time

The Fish and Wildlife Service has announced its decision that listing of the northern spotted owl (*Strix occidentalis caurina*) as Threatened or Endangered is not warranted at this time. This finding came in response to listing petitions that cited habitat destruction from logging as a threat to the owl's survival. A formal notice of the Service's decision was published in the December 23, 1987, *Federal Register*.

An estimated 4,000–6,000 individual birds occur through western Washington and Oregon to northern California. Most have been found in old-growth or mature forests. Approximately 70 percent of suitable northern spotted owl habitat is administered by the U.S. Forest Service, which has signed an agreement with the Fish and Wildlife Service for coordinated research and monitoring. This agreement requires production of an annual report by both agencies on the owl's status. The Fish and Wildlife Service hopes to establish similar interagency agreements with the National Park Service and Bureau of Land Management, which administer other areas of northern spotted owl habitat.

The Forest Service is preparing a final Supplemental Environmental Impact Statement concerning its management of the northern spotted owl. The preferred alternative identified through this document will guide the agency's owl management efforts. Individual forest plans are to be brought into compliance with the preferred alternative.

The Fish and Wildlife Service has hired a person to coordinate all of the agency's activities regarding the spotted owl. His duties will include reviewing draft forest management plans for spotted owl concerns and pursuing (and implementing) additional interagency agreements.

Correction

Both photographs of the Hinckley oak (*Quercus hinckleyi*) in BULLETIN Vol. XII No. 10 should have been credited to A.M. Powell. We regret the error.

Regional News

(continued from page 3)

extremely reliable source, indicates that the Miccosukee gooseberry (*Ribes echinellum*) is present on private land in Gadsden County, Florida. This would be the third known locality for this Threatened plant, which also occurs at Lake Miccosukee in Jefferson County, Florida, and at Stevens Creek in South Carolina.

* * *

The population of Endangered mussels in the Tombigbee River continues to decline. A recent survey, conducted at the Gainesville Bendway in Alabama, yielded only a few scattered common mussel species. None of the four listed species were found. Dr. Paul Yokley, who conducted the survey, reported that the water has too little flow, is accumulating some silt, and possibly does not provide suitable habitat for host fish species. A gradual 4-year accumulation of sediment also threatens mussel populations on the East Fork. The siltation appears to be caused by the alteration of water flows from Bull Mountain Creek by the Tennessee-Tombigbee Waterway. Immediate action is warranted on both the East Fork and the Gainesville Bendway. The entire population of Curtus' mussel (*Pleurobema curtum*) is restricted to the East Fork, and the Gainesville Bendway is the only known remaining habitat for Marshall's mussel (*Pleurobema marshalli*). Also, the loss of the Gainesville Bendway and the East Fork would confine the stirrup shell (*Quadrula stapes*) and penitent mussel (*Epioblasma penita*) to the Sipsey and Buttahatchie Rivers, respectively.

* * *

The American Cave Conservation Association, in cooperation with the city of Horse Cave, Kentucky, and others interested in cave conservation have obtained a $250,000 grant to begin work on establishing a national center on cave and karst resources. The Fish and Wildlife Service will actively participate in the center's development. The museum associated with the center will provide an excellent opportunity for the Service to present information on, and gain public support for, listed cave-dependent organisms.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

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Fishes	39	4	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	134	6	1	30	3	2	176	56
TOTAL	318	51	468	96	19	39	991	263 **

Total U.S. Endangered 369
Total U.S. Threatened 115
Total U.S. Listed 484

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Recovery Plans approved: 223
Number of species currently proposed for listing: 17 animals
32 plants

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
36 plants

December 31, 1987

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

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The Farm Bill (Food Security Act) and Endangered Species

K. Bruce Jones
Division of Endangered Species
and Habitat Conservation
Washington, D.C.

The Food Security Act of 1985, popularly known as the Farm Bill, was passed to help reverse the declining economic environment on the American farm. As part of this legislation, Congress recognized a need to more effectively manage the physical environment upon which American farmers depend. Several conservation provisions were included in the Farm Bill that, in addition to providing a better long-term economic base for America's farmers, present an unparalleled opportunity to conserve and restore millions of acres of wetlands and other habitat for migratory birds, anadromous fish, and species that are federally listed as Endangered or Threatened (or proposed for listing). One of the principal conservation goals of the Farm Bill is to reverse the loss of wetlands in the United States. Only 45 percent of our Nation's original wetlands remain and a large majority of converted wetlands (greater than 80 percent) have been lost due to agricultural activities.

The Service is playing a major role in realizing wildlife conservation benefits associated with the Farm Bill. The Service's principal responsibility is to support and assist the U.S. Department of Agriculture in implementing the conservation provisions of this act. There are five major provisions that provide opportunities to conserve, restore, and enhance wildlife habitats, including those of Endangered and Threatened species. These provisions are known as "Swampbuster," "Sodbuster," the Conservation Reserve Program, Section 1318 conservation set-aside easements, and Section 1314 conservation easements. The principal opportunities for Endangered and Threatened species under the Farm Bill are in recovery (e.g., restoration of habitat) and habitat protection (e.g., protection of existing habitats).

Swampbuster

Swampbuster is a special wetland conservation provision that discourages the conversion of wetlands to agricultural production. Under Swampbuster, any person who produces an agricultural commodity on wetlands that are converted after December 23, 1985, becomes ineligible for most Federal agricultural subsidies. The restriction applies to the year such production occurs and to all lands, including non-wetland, under control of that person. The Service's principal responsibility in this area is to provide technical support (e.g., providing updated lists of plants that occur on wetlands and assisting in wetland determinations) to the Soil Conservation Service and the Agricultural Stabilization and Conservation Service. This provision of the Farm Bill should have a positive effect on proposed and listed species that depend upon wetlands. For example, the whooping crane (*Grus americana*) requires wetlands for overnight resting and foraging along its entire migration route, including wetlands on private lands. Therefore, Swampbuster should help to conserve vital whooping crane habitat on private lands.

Sodbuster

Sodbuster is a provision of the Farm Bill that reduces erosion and the loss of topsoil from agricultural lands by reducing the conversion of highly erodible lands to agricultural production. Under this provision, any person who produces an agricultural commodity on highly erodible lands (as determined by the Soil Conservation Service) after December 23, 1985, becomes ineligible for most agricultural subsidies, unless they farm such lands under a Conservation Plan that has been approved by the local Soil Conservation Service Soil and Water Conservation District or by the Secretary of Agriculture. This provision will affect approximately 227 million acres of highly erodible rangeland, pasture, and forest. Although the Service does not participate directly in Sodbuster, this program should help improve the quality of streams and rivers by reducing silt loads, especially in watersheds with farms. Many Endangered and Threatened species would benefit from reduced silt loads in streams and rivers (e.g., clams, fish).

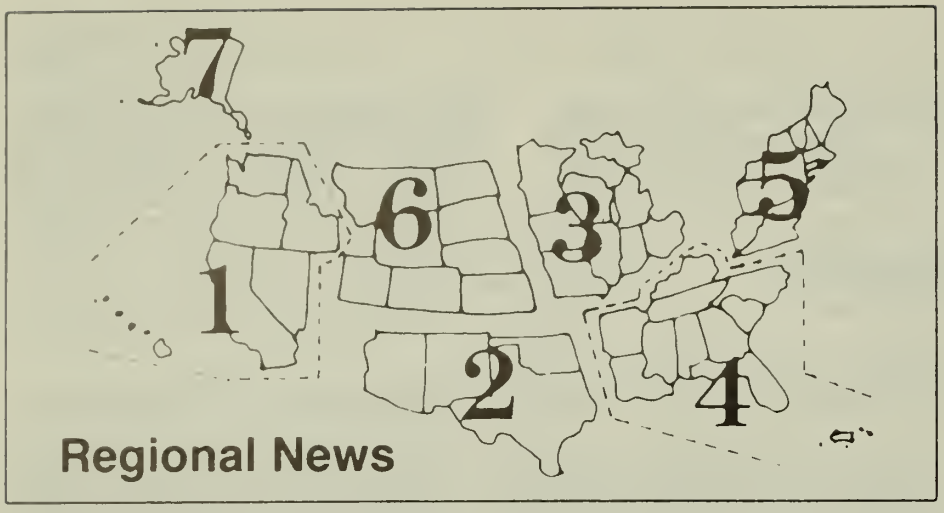
Conservation Reserve

The Farm Bill's Conservation Reserve Program provides an opportunity for farmers to enter into a 10-year contract

(continued on page 5)

FWS photo

Progressive land use practices can allow agriculture and wetland wildlife to coexist in the prairie pothole region and elsewhere.



Regional News

Endangered species regional staff members have reported the following recent activities:

Region 2 — Under contract with the Fish and Wildlife Service, Dr. Barbara Phillips and Dr. Art Phillips of the Museum of Northern Arizona established four monitoring plots through the range of the Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*), an Arizona plant listed in 1979 as Endangered. Data collected in 1987 indicate that significant seedling germination occurred from mid-August through mid-October, when approximately 100 seedlings were discovered during an intensive inventory.

Seedlings 2 millimeters in diameter and 3 mm tall are beet red with many spines on top. Within a month, the seedlings turn green as they develop their chlorophyll, and they double their height while maintaining their original diameters. Most of the seedlings are found within 2 centimeters of the parent plant: however, a few have been found as far as 1.5 meters away.

Prior to this field season, it was believed that Peebles Navajo cacti germinated in the spring following winter stratification. The plants flower in late April, with seeds ripening and falling to the ground in June. However, this is the height of the arid foresummer in Arizona, when soil temperatures reach 110° F for 8 hours per day and there is no moisture for the seeds to absorb. Summer rains usually arrive in July and ameliorate the hot soil temperatures, providing favorable environmental conditions for germination.

Museum of Northern Arizona personnel will monitor the plots again in April 1988 and check for seedling survival. It has been observed that *Pediocacti* are very sensitive to rot, and it is expected that a fair proportion of seedlings will not survive the winter snows that cover them for fairly long periods. The data gathered during these studies will be extremely useful in planning for the reintroduction and recovery of the Peebles Navajo cactus.

* * *

The New Mexico ramshorn snail (*Pecosorbis kansasensis*) was originally described as a Pliocene fossil from Kansas. Discovery by Dwight W. Taylor of live populations in the Pecos River Valley in New Mexico prompted the State to add the New Mexico ramshorn to its own endangered species list and the Service to place it in Category 2 of the notice of review of invertebrate candidates for Federal listing. A status survey of the species was jointly funded by the Service, the U.S. Forest Service, the New Mexico Department of Game and Fish, and the Bureau of Land Management. A final report of this survey by Richard A. Smartt and Artie L. Metcalf indicates that the New Mexico ramshorn was found alive at 48 of the 123 localities examined. The positive localities were distributed across seven New Mexico counties. Accordingly, New Mexico has removed this species from the State endangered list, and the Service is placing it in Category 3C of its invertebrate notice to reflect that it is no longer being considered for listing. Although the New Mexico ramshorn is more widespread and abundant than formerly believed, it remains of historical and geological significance because its fossil distribution is much greater than that of living populations.

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U.S. FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

Frank Dunkel, *Director*
(202-343-4171)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert P. Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Acting Chief, Office of Management Authority*
(202-343-4968)
Clark R. Bavin, *Chief Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director*; David F. Riley, *Assistant Regional Director*; Wayne S. White, *Endangered Species Specialist*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director*; Conrad A. Fjetland, *Assistant Regional Director*; James Johnson, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director*; John S. Popowski, *Assistant Regional Director*; James M. Engel, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; John I. Christian, *Deputy Assistant Regional Director*; Marshall P. Jones, *Endangered Species Specialist*.

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director*; Ralph Pisapia, *Assistant Regional Director*; Paul Nickerson, *Endangered Species Specialist*.

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director*; Robert E. Jacobsen, *Assistant Regional Director*; Larry Shanks, *Endangered Species Specialist*.

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director*; Rowan Gould, *Assistant Regional Director*; Ron Garrett, *Endangered Species Specialist*.

Region 8, (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director, Endangered Species Staff*; Clarence Johnson, *fish and crustaceans* (202-653-8772); Bettina Sparrowe, *other animals and plants* (202-653-8762).

U.S. Fish and Wildlife Service Regions

Region 1 California, Hawaii, Idaho, Nevada, Oregon, Washington, and Pacific Trust Territories. Region 2 Arizona, New Mexico, Oklahoma, and Texas Region 3 Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Region 4 Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands. Region 5 Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia Region 6 Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming Region 7 Alaska. Region 8 Research and Development nationwide.

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Manatee Research Efforts Under Way on Florida's East Coast

Thomas J. O'Shea
Sirenia Project Leader
National Ecology Research Center
Gainesville, Florida

The West Indian manatee (*Trichechus manatus*), a member of the mammalian order Sirenia, reaches its northern range limits in the southeastern United States. This aquatic mammal occurs elsewhere in the Caribbean, Central America, and northern South America, but its range outside of the United States has become fragmented and populations have been reduced by hunting of the animal for its meat. The manatee is listed throughout its range as Endangered.

Florida harbors the only significant year-round population of manatees in the United States, and the Florida subspecies (*T. m. latirostris*) is considered distinct. The current distribution of the Florida manatee is similar to that in the past. A physiological inability to persist outside of warm tropical or subtropical waters sets the distribution limits for this unique aquatic herbivore. Even in Florida, most manatees must seek out sources of warm water during winter, and significant aggregations occur at discharge sites for heated power-plant effluents and at natural warm-water springs like the Crystal River on Florida's Gulf Coast. At least 1,200 manatees have been accounted for at wintering areas in Florida.

The major problems faced by manatees in Florida are increasing mortality due to accidental collisions with boats and accelerating modification of habitat by development. The annual number of boat-killed manatees recovered during carcass salvage operations has doubled in the past 3 years. Prodigious human population growth in Florida has resulted in an increase in the number of boats registered in those counties where people share waters with manatees, rising from about 300,000 a decade ago to nearly 450,000 today. Florida is now the fastest growing State, with hundreds of new residents moving in every day. New housing developments and boating facilities in manatee habitat result in an increasing number of accidental manatee deaths. The U.S. Fish and Wildlife Service, Army Corps of Engineers, and State agencies must grapple with decisions on how permits related to such development might affect manatees, all too often with an insufficient data base. This problem has become increasingly critical in eastern Florida.

Until recently, the most intensive field research efforts on manatee biology and habitat requirements had focused on the Gulf Coast. The population that winters at Crystal River was monitored in detail through aerial surveys and recognition of individual animals based on boat propeller scar patterns. The latter technique also provided the first information on manatee reproductive traits through long-term field studies, which emphasize resighting known females every winter. Manatees give birth to one offspring every 2 to 3 years (although some females breed less frequently), and females typically do not successfully raise calves until they are 5 to 8 years old. These reproductive traits suggest that the species has a low potential rate of population increase, which makes the population more susceptible to decline from an increasing number of boat-kills. On the positive side, research at Crystal River has led to intensified recovery efforts in that region, and increased protection and management are at least partially responsible for a noteworthy increase in the Crystal River winter population size, from about 50 manatees 20 years ago to over 200 today.

Development of radio-telemetry techniques for manatees also took place in the Crystal River region. The major obstacle in using telemetry on manatees was the salt water barrier to radio-signal transmission. A newly-developed floating transmitter connected by a stiff tether to a belt attached around the narrow peduncle above the manatee's tail, allowing the signal to be broadcast in the air, was developed by Sirenia Project researchers working at Crystal River. Telemetry and aerial surveys in the Crystal River region have better defined summer habitat, which has subsequently come under increased protection. Aerial surveys and telemetry techniques were later applied to manatees in the lower Caloosahatchee River on the Gulf Coast in southwestern Florida, where over 300 have been counted at a power plant effluent discharge site near Fort Myers. This work is ongoing, and is providing a growing data base for management decisions in this region.

Work in eastern Florida has lagged behind that on the Gulf Coast because of limited resources. This is unfortunate

(continued on page 4)

West Indian manatee and calf

photo by Galen Rathbun

Captive California Condors Produce Their First Egg

The first fertile egg ever produced by a captive pair of the critically endangered California condor (*Gymnogyps californianus*) was laid March 3 at the San Diego Wild Animal Park. In accordance with scheduled protocols, the egg was removed and placed in an incubator, where biologists hope it will hatch between April 28 and May 3.

Taking the egg away at an early point may lead the pair to lay another egg this year, possibly around the first week in April; indeed, the pair resumed mating activity the next day. The male bird, at 7 years of age, is in his first breeding season. His mate was first observed in the wild as an adult, so her age is unknown.

Condors in the wild have shown the ability to produce up to three eggs in a season to replace ones that are lost. By inducing multiple clutches, biologists may hasten the day when the captive breeding population is large enough to furnish young condors for release into the wild.

Manatee

(continued from page 3)

because development is growing in eastern Florida, and earlier in the research and recovery program it was recognized that the number of boat-killed manatees was much higher in the east than on the Gulf Coast despite an approximately equal number of animals. In the past 2 to 3 years, however, the effort in eastern Florida has expanded due to a cooperative effort involving researchers from the National Ecology Research Center's Sirenia Project (Fish and Wildlife Service); the Marine Research Laboratory (Florida Department of Natural Resources); and the Beaufort Laboratory (National Marine Fisheries Service.) Significant involvement and support to the program also have been provided by the Marine Mammal Commission, U.S. Army Corps of Engineers, Florida Power and Light Company, Florida Audubon Society, Eckerd College, Bionetics Corporation, the Fish and Wildlife Service's Jacksonville Field Office, and the Hobe Sound and Merritt Island National Wildlife Refuges.

Current research involves telemetry (including the highly successful use of satellite-monitored transmitters), aerial surveys, expanded monitoring of individuals at winter aggregations through use of scar patterns, food habits analysis, and determination of the effects of increased boat traffic on the seagrass used by manatees as a food base.

The retrieval and necropsy of manatee carcasses in eastern Florida by the State and its cooperators have remained a significant part of the effort.

Data on local habitat use are quickly made available to managers who must meet deadlines on permit decisions under the Section 7 interagency consultation requirements of the Endangered Species Act. Over a longer term, the steady accumulation of information on basic biology will provide the key to the integrated approach that is necessary for manatee recovery in eastern Florida.

photo by Robert Bonde

After netting this manatee, biologists with the Fish and Wildlife Service's Sirenia Project quickly attached a radio transmitter so that the animal's movements can be tracked.

photo by James Reid

Signals from the radio transmitter trailed by this manatee are tracked by sattelite.

Initial research results show that some movement and seasonal habitat use patterns in eastern Florida are radically different from those on the Gulf Coast. Movements are much more extensive, and seasonal migrations of 530 miles (850 kilometers) have been documented. Telemetry has shown, however that extensive movements also occur within seasons. In summer, some individuals have spent considerable time in southern Georgia or in the vicinity of Merritt Island National Wildlife Refuge on the central Atlantic coast of Florida, frequently switching between these areas but using little of the intervening 155 miles (250 km) of coastal waterways. Manatees seem to find and favor quiet areas, and some large bodies of water where boats are prohibited, such as the Kennedy Space Center on the Merritt Island National Wildlife Refuge, show increasing use by manatees as outside waters show increasing use by boats. In winter, research is beginning to reveal the locations of important feeding areas for the manatees that use power plant warm-water effluents. Manatees are versatile in their food habits, and in summer the same individuals can feed in regions where the predominant items are marine seagrasses or in different areas where saltmarsh grasses at high tide are the only available forage. Preliminary findings, however, suggest that turbidity caused by boat wakes may limit seagrass abundance in manatee feeding areas.

Although the eastern Florida research program has only recently expanded and the results are preliminary, some encouragement can be found in the initial findings. Certain areas needing better protection are being revealed, and manatees are clearly showing that they will find and use sanctuaries if provided. Areas where boat traffic is reduced or slowed could provide increased safety from collisions and could promote the growth of underwater vegetation. Intensive work will be needed over the next several years to shed more light on these possibilities and thereby secure a future for the manatee along Florida's east coast.

Farm Bill

(continued from page 1)

with the Department of Agriculture. Under this contract, the farmer takes specified highly erodible land out of annual crop production and receives annual rental payments for applying soil conservation procedures and prescriptions, such as the planting and maintenance of trees for wildlife. The farmer also receives Federal cost-sharing benefits to help defray the expense of establishing permanent vegetative cover on his land. Currently, there are 23 million acres of land signed up for the Conservation Reserve Program in 44 States. Of this total, 1.5 million acres of trees and over 6 million acres of native grasses are to be planted. The Service's role in this program is to provide technical expertise and assistance to the Department of Agriculture in developing cover types beneficial to wildlife. Currently, it is unknown how many proposed and listed species will benefit from the Conservation Reserve Program, although there should be opportunities to restore or enhance habitats of these species on Conservation Reserve lands.

Conservation Set-aside (Section 1318)

One of the two other major conservation provisions that involve working with the Farmers Home Administration, the farm debt restructure and conservation set-aside provision (Section 1318), allows the Secretary of Agriculture to grant partial debt relief to a current borrower (farmer) in exchange for a not-less-than 50-year conservation easement on selected lands held by the borrower. This provision is intended to help borrowers in debt to the Farmers Home Administration regain a positive cash flow by allowing them to place selected lands in a conservation easement status while continuing to farm more productive lands. A number of habitat conservation and enhancement easements can be adopted through this provision of the Farm Bill. Currently, no debt restructure easements have been adopted, and a final rule to implement this provision has not yet been published. The Service will, based on the law, serve as a technical consultant to the Farmers Home Administration in recommending and enforcing a wide range of Section 1318 conservation easements. This provision may provide some benefits for the recovery of listed species. On sites with listed species, it might be possible to include measures that will secure or enhance existing habitat. In addition, on lands adjacent to areas with listed species, it may be possible to include measures that would restore listed species' former habitat. In this manner, the range of certain listed species could be expanded.

photo by E. LaVerne Smith

Bushy Lake

State and Federal agencies are cooperating under the Farm Bill to protect and restore wetlands at the Bushy Lake State Natural Area in eastern North Carolina. This site is considered one of the Nation's best remaining pocosin-dominated Carolina bays. Concentrated on the coastal plain of the Carolinas and Georgia, the Carolina bays are oval wetland depressions of mysterious origin with a sand, peat, or clay substrate. They are the strongholds of pocosin vegetation, an unusual, shrub-dominated plant community found only in the southeastern U.S. Among the species associated with Carolina bays are carnivorous plants and other rare flora. At least one plant listed federally as Endangered, the roughleaf loosestrife (*Lysimachia asperulaefolia*), occurs at Bushy Lake.

In recent years, most areas in which Carolina bays occur have experienced widespread drainage and conversion of their wetlands for such uses as agriculture and tree farming. At Bushy Lake, private land was partially cleared and a large drainage ditch was dug. When the farm later went bankrupt, the foreclosed property transferred to the Farmers Home Administration. Although the farming attempt was abandoned, the ditch continued to drain water from the bay. Recognizing the opportunities opened by the Farm Bill, the North Carolina Natural Heritage Program worked with Federal and State agencies, along with the North Carolina Nature Conservancy, to develop a habitat restoration plan. In August 1987, the Fish and Wildlife Service assembled personnel and equipment from several national wildlife refuges to construct a 200-foot-long earthen plug that has effectively stopped the drainage and is restoring water levels in the wetlands. Also, the North Carolina Division of Parks and Recreation has joined the Service in asking the Farmers Home Administration to apply stringent deed restrictions on the foreclosed property and to grant a conservation easement for protection of the adjacent 1,200-acre Bushy Lake State Natural Area.

—information provided courtesy of the North Carolina Natural Heritage Program

Conservation Easements (Section 1314)

Another conservation easement provision of the Farm Bill, Section 1314, addresses lands acquired by the Farmers Home Administration from farm foreclosures and voluntary conveyance (inventory lands). This section allows the Secretary of Agriculture to grant or sell easements, restrictions, development rights, or the equivalent thereof to a local or State government or a private nonprofit organization for conservation purposes. These actions would precede resale of Farmers Home Administration inventory lands. Federal agencies cannot be assigned enforcement or management responsibilities under this provision of the Farm Bill (but see below relative to the Wetlands Executive Order). Currently, very few conservation easements under this provision of the Farm Bill have been adopted. Potential benefits to listed species under this provision would be similar to those under Section 1318 conservation easements.

Related Conservation Opportunities

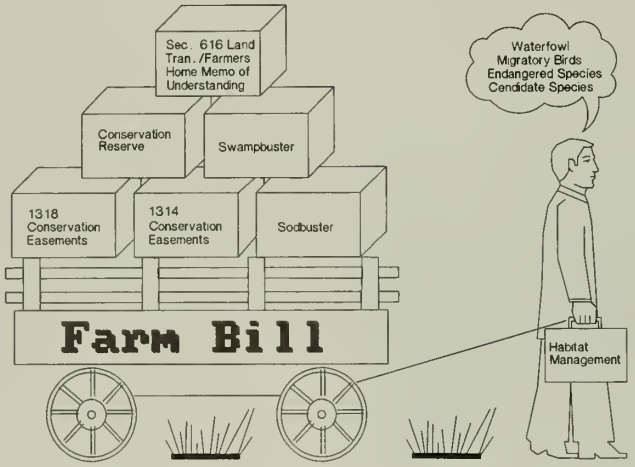
Three other legislative authorities are related to, and enhance, the Service's opportunities under the Farm Bill. The Service and Farmers Home Administra-

(continued on next page)

tion have signed a Memorandum of Understanding that will provide significant opportunities to protect and restore wetlands, principally through the Executive Orders on the Protection of Wetlands (E.O. 11990) and Floodplain Management (E.O. 11988). The Farmers Home Administration has concluded that it has an affirmative responsibility to protect and enhance wetlands and floodplains in conjunction with its property (inventory lands) disposal process. Consequently, the Service has been given an opportunity to recommend deed restrictions on inventory lands prior to resale. Unlike the case with conservation easements under Section 1314, the Service or a State agency may be the enforcement authority on these deed restrictions. In addition to recommending deed restrictions to protect, enhance, or restore wetland values, the Farmers Home Administration has given the Service an opportunity to recommend and enforce deed restrictions to protect or enhance other high priority resources, such as listed, proposed, and candidate species. The deed restrictions may even be enforced under provisions of the National Wildlife Refuge System Administration Act.

FWS photo

Crop production in and immediately adjacent to wetlands increases silt loads and destroys cover. Providing a small buffer zone around this wetland could enhance wildlife values without significant inconvenience to farm operations.



There are currently 1.7 million acres of inventory lands, and the Service is gearing up its field offices to provide the Farmers Home Administration with recommendations for deed restrictions on a large number of inventory lands throughout the country. When listed species occur on inventory lands, the Service will recommend deed restrictions to protect and enhance these species' habitats. The Service also will recommend deed restrictions on inventory lands with habitats that have a potential for recovery of listed species, even though the species may not currently occupy the inventory land. This program should assist in the recovery of certain listed species, especially those that have declined because of agricultural development.

Finally, Section 616 of the Agricultural Credit Act of 1987 provides an opportunity for the Service to secure, at no cost, Farmers Home Administration inventory lands if the Secretary of Agriculture determines that the property is suitable or surplus and: (1) has marginal value for agricultural production; (2) is environmentally sensitive; or (3) has special management importance. Although the Farmers Home Administration has not yet promulgated implementing regulations, this legislation should provide a mechanism whereby the Service can secure and bring into its management system inventory lands with important wildlife values, including those lands with listed species.

* * *

The Farm Bill and related legislation and programs (e.g., the Memorandum of Understanding between the Service and Farmers Home Administration) discussed in this article should help the Service's efforts to secure and enhance habitat of listed, proposed, and candidate species. However, these programs are not intended to supersede, or substitute for, the Endangered Species Act. All provisions of the Endangered Species Act will continue to apply to all Federal activities, including those of the Department of Agriculture. However, the Service believes that the Farm Bill and associated legislation and programs will be valuable tools in protecting and recovering certain listed species, especially in areas with small amounts of public land.

Questions or comments on the Service's role concerning various aspects of the Farm Bill and associated programs should be directed to the following Regional Farm Bill Coordinators:

Office/Region	Coordinator	Phone Number
Region 1	Dennis Peters	(503)-231-6154
Region 2	Warren Hagenbuck	(505)-766-2174
Region 3	Bob Lange	(612)-725-3570
Region 4	Ronnie Haynes	(404)-331-6343
Region 5	Dick Dyer	(617)-965-5100
Region 6	Ralph Fries	(303)-236-8148
Region 7	Stephen Wilson	(907)-786-3467
National Coordinator	David Smith	(703)-235-2760

For the address of each Regional Office, see the insert on page 2 of the BULLETIN.

The Vaquita: Can It Survive?

Robert L. Brownell, Jr.
National Ecology Research Center
San Simeon, California

The vaquita (Spanish for "little cow"), or Gulf of California harbor porpoise (*Phocoena sinus*), has the most limited range of any marine cetacean and is probably the rarest. It has been caught incidentally in gill nets set commercially for totoaba (*Totoaba macdonaldi*), large fish that were over-exploited in the upper Gulf of California until they, too, were endangered. In 1975, the Mexican Government announced a total indefinite closure on fishing for totoaba. Between the time this porpoise was described as new to science (1958) and its listing by the U.S. Fish and Wildlife Service as Endangered (early 1985), the vaquita was known from only 26 confirmed records (partial remains found on beaches) and a few sightings of live animals. (Note: the vernacular name "cochito" was cited when this animal was listed, but biologists have since learned that "vaquita" is the term used by most local fishermen.) The *Endangered Species Technical Bulletin* story about its listing (see BULLETIN Vol. X No. 2) said the species was on the brink of extinction "if it still exists."

In the spring of 1985, the Mexican Government conducted experimental fishing operations to assess the population status of totoaba in the upper Gulf of California. During these fishing operations and some illegal gill-net sets for totoaba by regional fishermen, at least 13 vaquitas were captured and killed accidentally in the gill nets. Because these specimens were collected when fresh, scientists were able to examine the external appearance of this species for the first time (Brownell, *et al.*, 1987). They found that the most striking features of the coloration are the large black eye patches and the upper and lower lip patches. The most striking morphological feature distinguishing vaquitas from the other two species of *Phocoena* is the proportionately higher dorsal fin. Total lengths of these 13 vaquitas ranged from 70.3 centimeters (a neonate) to 143 cm (an adult female).

During the spring of 1986, Silver (In press) conducted an extensive survey in the northern Gulf of California in an attempt to find live vaquitas and better understand their distribution. He was successful in finding these animals on only 12 occasions. These sightings are thought to represent approximately 31 individuals. Also during the spring of 1986, some additional (and continued illegal) experimental gill net fishing for totoaba was conducted and at least a few porpoises were again taken (Findley, pers. comm.). Illegal and limited experimental fishing continued in the spring of 1987 but it is unknown whether or not any more vaquitas were taken. Silber (pers. comm.) also returned to the upper Gulf of California to search for the vaquita and again he found small numbers of them in the same general area as in 1986. What does the future hold for these porpoises?

Several threats to the species, such as habitat degradation and destruction, effects of organochlorine pollutants, and reduction of its food supply from overfishing, were discussed when it was listed as Endangered. However, the major problem faced by the vaquita is still the continuation of experimental, illegal, or commercial fishing for totoaba and its sale on the black market. Any other fishing operations (e.g., shark and manta ray) that involve gill nets also may affect the recovery of these porpoises.

Barlow (1987) reviewed the factors affecting the possible recovery of *P. sinus* and concluded that, given the available data and the inadequacy of current survey techniques for accurately determining the population size of this species, it will be many years before scientists will be able to determine whether the population is increasing or decreasing. It is quite possi-

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photo by Alejandro Robles

The vaquita's most distinctive markings are the black eye patch and the upper and lower lip patches. Pseudo-stalked barnacles (Xenobalanus globicipitis) can be seen attached to the flipper of this specimen.

photo by Alejandro Roble.

This vaquita was captured in a gill net that was set for totoaba.

Vaquita

(continued from page 7)

ble, therefore, that the vaquita could become extinct before scientists have clearly documented a decline in its population or learned much more about its natural history.

References

Barlow, Jay. 1986. Factors affecting the recovery of *Phocoena sinus*, the vaquita or Gulf of California harbor porpoise. NMFS Admin. Report LJ-86-37. La Jolla. 19 pp.

Brownell, Robert L., Jr., Lloyd T. Findley, Omar Vidal, Alejandro Robles, and Silvia Manzanilla N. 1987. External morphology and pigmentation of the Vaquita *Phocoena sinus* (Cetacea: Mammalia). Mar. Mamm. Sci., 3(1):22-30.

Silber, Gregory K. (In press) Recent sightings of the Gulf of California harbor porpoise, *Phocoena sinus*. J. Mamm.

Pesticide Labeling Program Delayed

The Environmental Protection Agency announced in early January that it is deferring implementation of its pesticide labeling program (which was intended to protect Endangered and Threatened species) until 1989. Although the program had been scheduled for implementation on February 1, 1988, the Agency determined that more time is needed to improve the accuracy and public awareness of the program.

The main purpose of the program is to preclude the exposure of certain sensitive listed species to a group of toxic pesticides registered for use on corn, cotton, soybeans, sorghum, small grains, rangeland, forestland, and mosquito larvae. Deferring the implementation will give affected Federal and State agencies, user groups, and conservation organizations time to improve the program's accuracy and lessen its impacts on pesticide users.

Listing Proposal Withdrawn

A proposal to list a Utah plant, the spreading wild buckwheat (*Eriogonum humivagans*), as an Endangered species has been withdrawn (F.R. 1/25/88). New information received since the April 7, 1986, proposal led the Service to conclude that the plant is not taxonomically distinct from *Eriogonum lonchophyllum*, which is not in danger of extinction. As a plant population rather than a distinct taxon, it is not legally eligible for Endangered Species Act protection.

Peregrine Falcon Exhibit Tours Region 5

Ron Joseph
Concord, New Hampshire, Field Office

One of the tasks identified in the revised Eastern Peregrine Falcon Recovery Plan is to attain greater public support for, and understanding of, peregrine falcons (*Falco peregrinus*) through information and education. As a means of contributing to the plan's public education objective, the Service's Concord, New Hampshire, Field Office developed a "Take Pride in Peregrines" exhibit. The exhibit has been on loan to libraries, museums, and other educational centers almost every month since August 1986. An estimated 35,000 to 45,000 people have viewed the exhibit in such places as the Boston Museum of Science, Forsyth National Wildlife Refuge, and Acadia National Park. The theme of the exhibit is the gradual recovery of the species in the Northeast where, prior to the mid-1940's, over 100 pairs of falcons nested in the States of Pennsylvania, New York, Vermont, Massachusetts, New Hampshire, and Maine.

The peregrine is gradually recovering to reoccupy former breeding sites in the East. Over 850 young peregrines have been released by The Peregrine Fund, Inc., in conjunction with many private, State, and Federal agencies. Since the celebrated arrival of the first wild cliff-nesting peregrines at Franconia Notch, New Hampshire, in 1981, the recovering population now numbers a minimum of 18 nesting pairs in the Northeast. An additional 38 breeding pairs occur in the mid-Atlantic and southern States. In short, the species has come a long way since 1965 when Dr. Joseph Hickey convened the first international conference to investigate the reasons for the extirpation of the eastern "rock" peregrine and seriously depleted races worldwide.

Exhibit visitors of all ages learn of the combined work of many agencies, organizations, and individuals in restoring this magnificent and noble bird to the eastern United States. Foremost among them is The Peregrine Fund, Inc., which celebrated the release of its 2,000th peregrine last summer. The exhibit also portrays the new challenge facing peregrines in the east, particularly the potential threat rock climbers pose to nesting birds.

Individuals or organizations interested in borrowing the exhibit for a month should contact Ron Joseph of the Fish and Wildlife Service, 22 Bridge Street, Concord, New Hampshire 03301; (603) 225-1411.

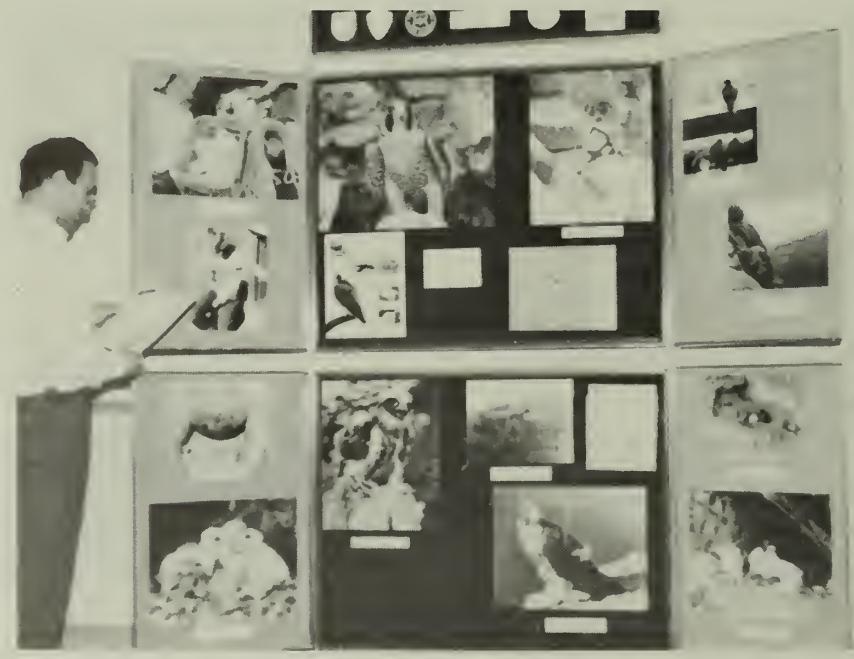


photo by Ron Joseph

Public education is important for the recovery of the peregrine falcon, as well as for other listed animals and plants.

We Need Your Help

To make this *your* BULLETIN, as well as ours, we need your help. Please send the Editor any comments for improving the format, ideas for articles, photographs, and reports on current research and management activities.

Recovery Plans Approved in 1987

Recovery plans for the following Endangered and Threatened species were approved during calendar year 1987:

Common Name	Scientific Name	Date Approved
Tar River spiny mussel	*Elliptio steinstansana*	01/16/87
Borax Lake chub	*Gila boraxobius*	02/05/87
black lace cactus	*Echinocereus reichenbachii* var. *albertii*	03/18/87
Tobusch fishook cactus	*Ancistrocactus tobuschii*	03/18/87
Beautiful goetzea	*Goetzea elegans*	04/28/87
Vahl's boxwood	*Buxus vahlii*	04/28/87
Florida mints		07/01/87
longspurred mint	*Dicerandra cornutissima*	
scrub mint	*Dicerandra frutescens*	
Lakela's mint	*Dicerandra immaculata*	
Texas snowbells	*Styrax texana*	07/31/87
Nashville crayfish	*Orconectes shoupi*	08/12/87
Gulf Coast beach mice		08/17/87
Alabama beach mouse	*Peromyscus polionotus ammobates*	
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	
Navajo sedge	*Carex specuicola*	08/19/87
Blue Ridge goldenrod	*Solidago spithamaea*	10/28/87
Minnesota trout lily	*Erythronium propullans*	12/16/87

As of December 31, 1987, a total of 223 recovery plans covering 263 species had been approved by the Fish and Wildlife Service. (See BULLETIN Vol. XII No. 1 for a list of those plans approved prior to 1987.) Some species have separate recovery plans covering different parts of their range (e.g., the bald eagle), and some plans cover more than one species. Recovery plans also are revised and updated as needed.

Copies of recovery plans are available for purchase about 6 months after they are approved. Requests can be sent to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852, or call toll-free 800/582-3421. (In Maryland, dial 301/770-3000.)

Regional News

(continued from 2)

Regional Office representatives from Regions 1, 2, and 6 met in Las Vegas, Nevada, to discuss eradication of a nonnative fish, the red shiner (*Notropis lutrensis*), from a reach of the Virgin River in Utah. Since 1984, when it was first found in the Utah portion of the river, this species has almost completely replaced an Endangered native fish, the woundfin (*Plagopterus argentissimus*). The Washington Fields Irrigation Diversion Dam is the only structure currently preventing the red shiners access to the last uncontaminated reach of woundfin habitat. Based on previous red shiner success at eliminating woundfin from the lower reaches of the river once the exotic species gains access to the upper reach, it will only take a few years to completely replace the woundfin.

A plan was adopted to construct a fish barrier and then eradicate all fish between the barrier and the dam. Each Region committed resources to the project, which will be conducted jointly with the States of Arizona, Nevada, and Utah. In addition, the Washington County (Utah) Conservation District showed strong support for the project by pledging both funds and assistance.

Region 4 — In December 1987, the U.S. House of Representatives voted on two proposed Endangered Species Act amendments to modify the National Marine Fisheries Service's Turtle Excluder Device (TED) regulations. One of the amendments would have prevented implementation of these regulations in the Gulf of Mexico for 2 years, but it was defeated. The other amendment, however, did pass the House. It would delay implementation of the regulations in all inshore waters for 2 years and stipulate that the National Marine Fisheries Service must conduct a comprehensive investigation of sea turtle biology and conservation in inshore waters. This amendment, however, awaits further consideration in the Senate. TED regulations have been used successfully in Cape Canaveral, Florida, waters since October 1, 1987.

Region 5 — A team has been appointed to draft a recovery plan for the northeastern United States population of the roseate term (*Sterna dougalii dougalii*), which was listed recently as Endangered (F.R. 11/2/87). Ralph Andrews of the Service's Region 5 office is the team leader. Other members represent State and private interests.

* * *

Cooperative Agreements with several northeastern State conservation agencies, authorized under Section 6 of the Endangered Species Act, were approved recently. An agreement with Vermont covering listed animals was signed November 19, 1987, and a plant agreement with Maryland was signed December 17, 1987. (Maryland now has Section 6 agreements for both animals and plants.) As of February 1, 1988, all 13 of the States in Region 5 had approved agreements for animals and 10 had agreements for plants.

Region 6 — One of the 25 black-footed ferrets (*Mustela nigripes*) housed in the Wyoming Game and Fish Department's Sybille captive breeding facility died January 25 of a "nasal carcinoma." The 4-year-old female named Willa was captured in fall 1985 near Meeteetse, Wyoming. She had not produced offspring while in captivity and is unrelated to other captive ferrets, so her death is a loss, both genetically and physically, to the captive breeding program.

* * *

In May 1987, the Fish and Wildlife Service initiated efforts to establish an interstate coordinating committee to address general issues and problems relating to recovery of the black-footed ferret. Members of the committee include staff biologists from each of the Service's affected Enhancement State Offices, State biologists from each State participating in ferret recovery, a representative of the Service's National Ecology Research Center, and a member of the Captive Breeding Specialist Group of the International Union for the Conservation of Nature. State and Service biologists serving on this committee are responsible for organizing working groups to provide a Statewide representation of disciplines with influence and responsibilities for ferret recovery actions in their respective States. Other specialists will be invited, as needed, to provide input.

The interstate committee held its first meeting in Billings, Montana, in July 1987. This meeting resulted in recommendations to:

1. develop an interstate cooperative agreement to conduct black-footed ferret searches and administer a national ferret reward fund.
2. develop contingency plans for ferrets located in the wild outside of the Meeteetse, Wyoming, ferret area;
3. develop minimum criteria for evaluating potential reintroduction sites for ferrets;
4. develop and recommend a funding strategy plan for ferret recovery; and

(continued on page 10)

Regional News

(continued from page 9)

5. develop and recommend draft policy for management of potential ferret habitat outside potential reintroduction areas identified by each State working group over the next 5 or more years.

The next meeting of the committee is scheduled for March 1988 in Denver, Colorado. This session will attempt to bring together preliminary maps of prairie dog distribution and discuss final recommendations for criteria and standards to be applied to potential ferret reintroduction sites.

* * *

In summer 1986, the Montana Department of Fish, Wildlife and Parks began a Statewide ferret reward program sponsored by Wildlife Conservation International (WCI), a division of the New York Zoological Society. Persons submitting photographs or information that result in the verification of one or more live black-footed ferrets will be awarded $5,000 by WCI. The Montana Department of Fish Wildlife and Parks designed and circulated new reward posters, sighting report mail-in forms, and a sighting ranking guide.

In fall 1987, the National Ecology Research Center began working with WCI on an expanded reward program in most of the States that still have adequate ferret habitat. Participating States will send reports to the Service's Ferret Search Coordinator at the Center in Fort Collins, Colorado. Service personnel at the Center have conducted searches throughout the former range of the black-footed ferret and were principal investigators of the Meeteetse site. They are equipped to respond to the most promising reports with on-site investigations.

At present, Montana, Wyoming, Utah, Colorado, Oklahoma, and South Dakota are participating in the reward program. Reward posters are being displayed throughout the participating States, and State and local organizational newsletters will assist in publicizing the reward program. Contingency plans are being formulated in each State in the event a new population of black-footed ferrets is located.

* * *

Colorado's peregrine falcon (*Falco peregrinus*) population is recovering more rapidly than the State had originally anticipated. The official recovery goal had been 31 effective breeding pairs by 1995. It now appears that this goal may be reached as soon as 1988. For the 1987 season, there were 24 pairs; 23 of these pairs laid eggs and 22 pairs successfully fledged at least 55 young. The Colorado Division of Wildlife removed 17 eggs for transfer to The Peregrine Fund; of the 17, 12 hatched. Seventeen young were returned to five sites, and all but one fledged. In addition, 22 peregrines were released from 5 hack sites, with 19 reaching independence.

Wyoming had four known pairs of peregrines in the 1987 season. One of the two hack sites in Yellowstone National Park fledged three young, but the second pair failed to raise young. Several weeks after young peregrines were released from a new site on lands administered by the U.S. Forest Service, a banded adult was sighted. Five days later, the adult was back, accompanied by an unbanded, immature peregrine that kept screaming at the adult for food. The young peregrine must have been one of the offspring from a successful nesting in the area. Five hack sites were used in Wyoming, and 25 peregrines were released, with 21 reaching independence.

Four of five known pairs in northern Utah are nesting on hack towers constructed by the Utah Division of Wildlife Resources and Utah Power and Light Company. All of the pairs on towers produced eggs and three of the four pairs produced seven young (of which at least two fledged successfully). The pair at the Hotel Utah was successful and fledged two young. Nineteen peregrines were released from four hack sites, with sixteen reaching independence.

In southern Utah, personnel from The Peregrine Fund and National Park Service conducted a survey and found 19 occupied territories. Twelve pairs were successful in producing at least three young. Fifty occupied territories have been identified over the past 2 years in southern Utah.

Region 8 (Research) — A juvenile whooping crane (*Grus americana*) was fatally injured during fall migration when it struck a powerline bordering Monte Vista National Wildlife Refuge. Necropsy at the National Wildlife Health Research Center in Madison, Wisconsin, indicated the bird, although not emaciated, was suffering from an advanced case of avian tuberculosis. Of 16 whoopers necropsied at the Center over the past decade, 6 were found to have avian tuberculosis, an unusually high prevalence in a wild population.

* * *

More than 150 brown pelicans (*Pelecanus occidentalis*) were found dead in October in the San Luis Obispo and Monterey, California, areas. Two of the birds, necropsied at the Center, were found to be infected with *Erysipelothrix rhusiopathiae*, a bacteria common on the surface of fish and marine mammals. Four additional pelicans from a later, smaller die-off also were necropsied. *Erysipelothrix* was again found to be the cause of death. Collaborative investigations by the California Department of Fish and Game, The Health Center, and the University of California at Davis are attempting to locate the source of the infection.

Photo by Thomas C. Maurer, USFWS

brown pelican

Recovery Efforts Initiated for Humpback and Right Whales

Gloria Thompson
National Marine Fisheries Service

The National Marine Fisheries Service has initiated recovery efforts under the Endangered Species Act for the humpback whale (*Megaptera novaengliae*) and the right whale (*Balaena glacialis*), both of which are listed as Endangered. Under the Act, the agency has responsibility for developing and implementing recovery plans for most listed marine species.

During reauthorization hearings for the Act in April 1987, Dr. William E. Evans, the agency's Assistant Administrator, committed it to develop recovery plans for these Endangered whales. Subsequently, the agency set up recovery teams comprised of scientists and managers knowledgeable in matters concerning the two whales to review and comment on the recovery plans that are being prepared by the agency's Office of Protected Resources and Habitat Programs (with assistance from the agency's five regional offices). Draft plans will be made available for public review in May 1988 for the humpback whale and in July 1988 for the right whale.

For further information, please contact Gloria Thompson for the humpback whale plan and Bob Ziobro for the right whale plan at the Office of Protected Resources and Habitat Programs, National Marine Fisheries Service (202) 673-5348).

photo by Tracey McKenzie

humpback whale breaking the ocean surface

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	23
Birds	60	15	146	7	3	0	231	55
Reptiles	8	7	59	14	4	14	106	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	39	4	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	134	6	1	30	3	2	176	56
TOTAL	318	51	468	96	19	39	991	263 **

Total U.S. Endangered 369
Total U.S. Threatened 115
Total U.S. Listed 484

Recovery Plans approved: 223
Species currently proposed for listing: 17 animals
31 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
36 plants

January 31, 1988

February 1988 Vol. XIII No. 2

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

March 1988 Vol. XIII No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Help Is On the Way for Rare Fishes of the Upper Colorado River Basin

Sharon Rose and John Hamill
Denver Regional Office

On January 21-22, 1988, the Governors of Colorado, Wyoming, and Utah joined Secretary of the Interior Hodel and the Administrator of the Western Area Power Administration in signing a cooperative agreement to implement a recovery program for rare and endangered species of fish in the Upper Colorado River Basin. The recovery program is a milestone effort that coordinates Federal, State, and private actions to conserve the fish in a manner compatible with States' water rights allocation systems and the various interstate compacts that guide water allocation, development, and management in the Upper Colorado River Basin.

The Colorado River is over 1,400 miles long, passes through two countries, and has a drainage basin of 242,000 square miles in the United States, yet it provides less water per square mile in its basin than any other major river system in the United States. Demands on this limited resource are high. The Colorado River serves 15 million people by supplying water for irrigation, hydroelectric power generation, industrial and municipal purposes, recreation, and fish and wildlife enhancement.

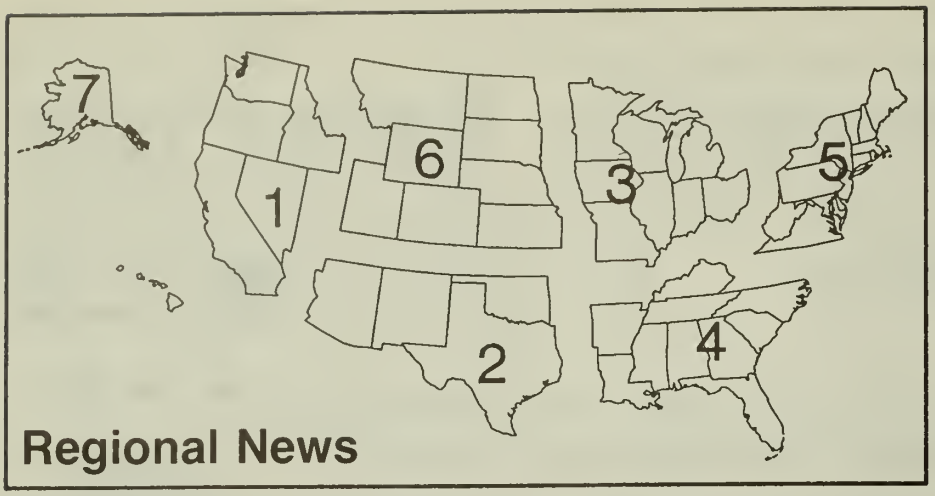
The headwater streams of the Upper Colorado River originate in the Rocky and Uinta Mountains. Downstream, the mainstem river historically was characterized by silty, turbulent flows with large variations in annual discharge. The native warmwater fishes adapted to this demanding environment; however, to meet man's ever increasing demands for water, impoundments were constructed that radically changed the ecological characteristics of the river.

Some native warmwater species endemic to the Colorado River Basin, including the Colorado squawfish (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*), were unable to adjust to the modifications of their environment. Changes in streamflow and water temperature, direct loss of

(continued on page 6)

photo by Tom Lytle

Upper Cross Mountain Canyon on the Yampa River historically was habitat for the Colorado squawfish, humpback chub, razorback sucker, and bonytail chub. The first three can still be found in this stretch, but the bonytail's presence is unknown because the species' numbers are so low. This section of the Yampa River may be a suitable site for restocking of these rare native fishes.



Regional News

Endangered species regional staff members have reported the following news:

Region 3—With the use of a Federal grant authorized under Section 6 of the Endangered Species Act, the State of Iowa has purchased a 13-acre site near St. Olaf that contains habitat for the largest known population of the northern wild monkshood (*Aconitum noveboracense*). The site, with over 10,000 monkshoods, will be fenced this summer.

U.S. Fish and Wildlife Service
Washington, D.C. 20240
Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert P. Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Acting Chief, Office of Management Authority*
(202-343-4968)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)
TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* David F. Riley, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* Tom Olds, *Assistant Regional Director;* John I. Christian, *Deputy Assistant Regional Director and acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8, (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrowe (202-653-8762), *Endangered Species Specialist.*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2**: Arizona, New Mexico, Oklahoma, and Texas. **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the U.S. Virgin Islands. **Region 5**: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7**: Alaska. **Region 8**: Research and Development nationwide.

The ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

Region 4—A Conservation Agreement has been established between the Fish and Wildlife Service and The Nature Conservancy to protect one of the two remaining populations of the Endangered Alabama leather flower (*Clematis socialis*). This population is located on The Conservancy's Virgin's Bower Preserve in St. Clair County, Alabama. Under the terms of the agreement, the Service will assume management responsibility for the site.

* * *

In the past, up to 50,000 Indiana bats (*Myotis sodalis*) hibernated at Long's Cave in Mammoth Cave National Park, Kentucky. At present, however, only 2,500 to 7,000 bats remain. One reason for this serious decline is the presence of a poorly designed gate, located at the entrance, that restricts air flow and bat movement into the cave. The National Park Service plans to replace the gate with a new angle-iron bat gate in FY 1988 or FY 1989. Biologists from the Service's Asheville, North Carolina, Field Office have been gathering baseline data on temperature and humidity levels in the cave. The information, which is being collected before and after gate replacement, will help the Service to better predict the results of future modifications to the entrances of bat hibernation caves.

* * *

Region 6—The Peregrine Partnership, which includes the Colorado Division of Wildlife, Colorado Wildlife Federation, and Denver Museum of Natural History, is planning to place up to six American peregrine falcon (*Falco peregrinus anatum*) chicks in a hack box on the 23rd floor of a building in downtown Denver. The high-rise habitat is similar to that in other cities where peregrines have been successfully hacked. The city's large populations of pigeons and starlings will be prey for the urban falcons. Similar programs have been successful in Milwaukee, Wisconsin; Salt Lake City, Utah; Albany, New York; and Baltimore, Maryland.

* * *

The final recovery plan for the Wright fishhook cactus (*Sclerocactus wrightiae*) has been printed and distributed. The plan calls for the establishment of two self-sustaining populations of 10,000 individuals each before the species will be considered for downlisting to Threatened status. A third such population must be established before the species can be delisted. The Wright fishhook cactus, listed in 1979 as Endangered, is currently known from a limited number of small populations in Emery and Wayne Counties, Utah.

The final recovery plan for the spineless hedgehog cactus (*Echinocereus triglochidiatus* var. *inermis*) has been printed. This En-

(continued on page 8)

Loss of Wetlands Threatens Four Plants

Four species of plants in the eastern United States were identified during February as vulnerable to extinction because of a decline in their freshwater wetland habitat. In order to make them eligible for protection under the Endangered Species Act, Endangered or Threatened listings were proposed for the following:

Mountain Sweet Pitcher Plant (*Sarracenia rubra* ssp. *jonesii*)

Carnivorous plants, or plants that trap and consume insects, have long fascinated many people. Although the Venus flytrap (*Dionaea muscipula*) is the best known example, carnivorous plants take a number of other forms. Pitcher plants, for example, produce clusters of erect, trumpet-shaped leaves that form roughly tubular "pitchers" covered by a chordate hood. Insects are attracted to nectar secreted by glands near the pitcher orifice or to the plant's showy coloration, and some crawl or fall into the pitchers. Just inside the mouth of the pitcher tube is a very smooth surface, which offers no footholds to most insects, and below that the interior is lined with stiff downward-pointing hairs that further hamper escape. Those insects that cannot get away are eventually digested by enzymes in the fluid secreted inside the pitchers.

The mountain sweet pitcher plant is a subspecies endemic to a few mountain bogs and streamsides in southwestern North Carolina and northwestern South Carolina along the Blue Ridge Divide. Of the 26 populations known historically, only 10 remain. The others were eliminated by drainage of boggy habitats; flooding by impoundments; conversion of the sites to agricultural and grazing land; collection; and various forms of development. Eight of the ten surviving populations are on private property where they may face threats from habitat alteration and collectors of carnivorous plants. Two occur on State of South Carolina lands, but even these populations are vulnerable to illegal take and, in one case, impacts from recreation.

In light of these threats, the Service has proposed to list *Sarracenia rubra* ssp. *jonesii* as Endangered (F.R. 2/10/88). Comments on the proposal should be sent to the Asheville Field Office, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801, by April 11, 1988.

photo by Julie Moore

South Carolina Natural Heritage Program photo

The mountain sweet pitcher plant is an herbaceous perennial that grows up to 29 inches (73 centimeters) in height. Its pitchers are a waxy green, usually lined with maroon-purple veins. The uniquely showy and fragrant flowers have recurving sepals, are borne singly on erect scapes, and are usually maroon in color.

Decurrent False Aster (*Boltonia decurrens*)

Endemic to the wet floodplains of the Illinois and Mississippi Rivers, the decurrent false aster is known only from the States of Illinois and Missouri. This impressive perennial herb in the family Asteraceae grows up to 79 inches (2 meters) in height. It produces clusters of attractive aster-like flowers with yellow disks and white to (more commonly) purple rays. The flower heads, which are about the size of a quarter-dollar, are borne in small clusters on branched inflorescenses.

Destruction or modification of native floodplain habitat has significantly reduced the distribution of *B. decurrens* from historical levels. Extensive surveys by State botanists from 1980 to 1985 located a total of 12 surviving populations in Illinois. There are another two populations known in Missouri. Drainage of marshes and wet prairies for agricultural development has been a problem for the species, but the main continuing threat is thought to be siltation. As a result of extensive row crop agriculture within the watershed and the alterations of natural water flow cycles by numerous levee systems, heavy loads of silt—up to 3 inches (76 millimeters) in a year—are deposited in the floodplains, preventing seed germination. Because of these threats, the Service has proposed to list the decurrent false aster as Threatened (F.R. 2/25/88).

Four of the populations known to remain occur on public lands, three of them on Illinois State property and one on land administered by the U.S. Army Corps of Engineers in St. Charles County, Missouri. Management plans are being developed for the *B. decurrens* populations in Illinois, and the Corps of Engineers may soon enter into a cooperative management agreement with the Missouri Department of Conservation. Because of the habitat siltation, certain agricultural practices and other means of soil manipulation may be helpful to conserve current populations and to establish new ones. It has been observed that the species does grow in some disturbed alluvial deposits.

Comments on the proposal to list *B. decurrens* as a Threatened species should be sent to the Regional Director, Region 3 (address on page 2 of the BULLETIN), by April 25, 1988.

(continued on next page)

Wetland Plants

(continued from page 3)

Harperella (*Ptilimnium nodosum*)

Named after Dr. Roland M. Harper, who discovered this plant in 1902, the harperella is an annual in the parsley family (Apiaceae). This species grows up to 39 inches (one meter) in height and produces small white flowers in heads not unlike those of the Queen Anne's lace (*Daucus carota*). It occurs in Alabama, Georgia, the Carolinas, West Virginia, and Maryland.

Another wetland-dependent plant, the harperella is always found on saturated substrates and it readily tolerates periodic, moderate flooding. It occurs in two specific habitat types: 1) the shoals and margins of clear, swift-flowing streams, and 2) the edges of shallow, intermittently flooded ponds and wet meadows on the coastal plain. The species' tolerance of flooding may be of key importance because few potential competitors are adapted to such water fluctuations. However, the amount and frequency of flooding is critical; prolonged or extensive floods can wash away the seed bank, while insufficient flooding can lessen the species' competitive edge over other plants.

More than one-half of the historically known harperella populations have disappeared. Extensive surveys by The Nature Conservancy and State Natural Heritage Programs have documented only 10 remaining populations. Because *P. nodosum* has such specific ecological requirements, it can easily be extirpated from an area even by seemingly minor alteration of the habitat. Wetland drainage, water quality degradation, siltation, and various forms of development threaten the harperella's habitat. In West Virginia, approximately 10,000 plants were destroyed by the construction of a vacation home development in 1984.

P. nodosum is not known to occur on any Federal lands. Some populations are found on State lands, along streams over which States have jurisdiction, or on preserves owned by The Nature Conservancy. State Natural Heritage Programs, particularly in South Carolina and West Virginia, have been actively pursuing easements and voluntary protection agreements with landowners. Such agreements, while potentially very useful in protecting the plants, have no legal authority; accordingly, the Service has proposed to list the harperella as Endangered (F.R. 2/25/88).

Comments on the listing proposal should be sent to the Ecological Services Field Office, U.S. Fish and Wildlife Service, 1825 Virginia Street, Annapolis, Maryland 21401, by April 25, 1988.

(continued on next page)

photo by John Schwegman

Among the distinguishing characteristics of* Boltonia decurrens *are its decurrent (downwardly curved) leaves and attractive, aster-like flowers.

photo by Judy Jacobs

The harperella's small white flowers may appear from May to frost.

(continued from page 4)

Swamp Pink (*Helonias bullata*)

Another plant threatened by the loss of wetland habitat is the swamp pink, a perennial in the lily family (Liliaceae). This plant, characterized by attractive pink to purplish flowers, represents the only species in its genus. Historically, it occurred in swamps, bogs, spring seepages, meadows, and streams edges from New York to Georgia.

The widespread drainage and development of eastern wetlands eliminated the swamp pink from many former habitats. For example, the species has been extirpated from New York, and the number of reported sites in New Jersey has declined from approximately 100 historically to 35-40 today. Other colonies remain in Virginia (eight sites), North Carolina (seven sites), Delaware (six sites), and Maryland, Georgia, and South Carolina (one site each). Most of these populations are on private lands where they are vulnerable to further losses of wetland habitat.

Collecting, though not as great a danger to the swamp pink as habitat loss, is a significant threat. This species is referred to in a number of wildflower books and field guides as one of the most beautiful plants in the eastern United States, a description that attracts many garden hobbyists and curiosity seekers. Plants have frequently been taken from the wild, often without the consent of the landowners. Commercial trafficking in wild *H. bullata* does not appear to be serious at this time; a few nurseries do sell swamp pinks cultivated from seed.

A few swamp pink populations occur on Federal or State lands, where they receive some protection from collecting and habitat degradation. However, these sites are not enough to ensure the species' long term survival. On February 25, the Service proposed to list *H. bullata* as a Threatened species.

Comments on the listing proposal should be sent to the Regional Director, Region 5, by April 25, 1988.

photo by D.B. Snyder, New Jersey Natural Heritage Program

The swamp pink, a very distinctive plant, is named for its wetland habitat and the strikingly attractive pink to purplish flowers. The flower clusters are borne at the end of a hollow stem up to 2 feet (60 centimeters) in height that grows from a basal rosette of lance-shaped, evergreen leaves.

* * *

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. (See *Code of Federal Regulations*, Title 50, Part 17.) For plants, the prohibition against collecting applies only to listed taxa found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against the take of listed plants.

Protection Approved for Six Species

A freshwater mussel and five plants were listed during February as Threatened or Endangered species. The protection authorized by the Endangered Species Act is now available to the following:

- **Louisiana Pearlshell (*Margaritifera hembeli*)**—This freshwater mussel or clam is endemic to a single drainage, the Bayou Boeuf, in Louisiana. Reservoir construction, pollution, and siltation from land disturbances in the watershed have degraded the pearlshell's aquatic habitat and reduced its range to only a few headwater streams. Most of the remaining habitat is within Kisatchie National Forest, and the Fish and Wildlife Service will work with the U.S. Forest Service to design logging operations that will produce less harmful runoff. The final rule listing the Louisiana pearlshell as Endangered was published in the February 5, 1988, *Federal Register*.
- **Aleutian Shield-fern (*Polystichum aleuticum*)**—One of the rarest ferns in North America, *P. aleuticum* apparently is restricted to two mountain sites in the Aleutian Islands of Alaska. Only one population, consisting of six individual plants, is known to survive. The Service will work with the U.S. Navy, which holds development rights to the island (Adak) on which the population was discovered, to conserve the plant's naturally harsh alpine habitat. Surveys will be conducted at potential sites in an effort to locate other populations. The Aleutian shield-fern is now listed as Endangered (F.R. 2/17/88).
- **Baricao (*Trichilia triacantha*)**—This evergreen shrub or small tree is native to low elevation semideciduous forests in southwestern Puerto Rico. A total of 18 individuals remains at 5 sites, all within Guanica Commonwealth Forest. Its range may have been considerably broader before the widespread deforestation of Puerto Rico in past years. The remaining populations are in ravines where they are vulnerable to damage or destruction by flash-floods. Any illegal cutting of these trees, which have wood of desirable qualities, would also threaten the species with extinction. For these reasons, the Service has listed *T. triacantha* as an Endangered species (F.R. 2/5/88).
- **Black-spored Quillwort (*Isoetes melanospora*), Mat-forming Quillwort (*I. tegetiformans*),** and **Little Amphianthus (*Amphianthus pusillus*)**—All three of these small aquatic plants are endemic to pools on the surface of granite outcrops in Georgia, Alabama, and South Carolina. Many of these outcrops are subject to quarrying, heavy recreational use, dumping, and other activities dangerous to the plants. Both *Isoetes* taxa have been listed as Endangered (F.R. 2/5/88). *A. pusillus* occurs over a somewhat wider range than the other two species; therefore, it was listed as Threatened.

Colorado River Fishes

(continued from page 1)

habitat due to inundation by reservoirs, blockage of migration routes, and interactions with introduced, non-native fish species (predation and competition) are primarily responsible for the decline of these native fish species. Due to their low numbers and inadequate recruitment, three of the fishes—the Colorado squawfish, humpback chub, and bonytail chub—have been federally listed as Endangered. A fourth, the razorback sucker, is a candidate for Federal listing.

Since 1978, the Service has issued over 100 Biological Opinions (pursuant to Section 7 of the Endangered Species Act) on water development projects in the Upper Colorado River Basin, all of which concluded that the cumulative effects of water depletions from the Upper Colorado River system were likely to jeopardize the survival of the endangered Colorado River fishes. In 1984, the Service also produced a draft conservation plan that specified minimum flows for the listed fishes throughout the Upper Basin. Several States and water development organizations responded that the Service's position on water depletions and minimum streamflows was in direct conflict with State water rights systems, Interstate Compacts, and related Supreme Court decrees. The result was that a major controversy threatened to develop and embroil the various State, Federal, and private interests in a confrontation over endangered species protection and water resource development. These parties recognized that such a confrontation was unlikely to result in progress toward the recovery of the listed fishes and could lend a measure of uncertainty to water development in the Upper Basin. As a result, in August 1984 the Service formed the Upper Colorado River Basin Coordinating Committee to provide a forum for discussion and negotiation. Members of the Coordinating Committee included the Service, Bureau of Reclamation, and States of Colorado, Utah, and Wyoming. In addition, private water development interests actively participated in the process.

The Coordinating Committee's formal charge was a narrow one. Recognizing that earlier inter-agency consultations under Section 7 of the Endangered Species Act had found that new water projects would be likely to jeopardize the listed fish species, this committee was to identify reasonable and prudent alternatives that would conserve the species while permitting new water development to proceed. However, during their discussions the parties concluded that both the biological requirements of the four species and the hydrology and management of the Upper Colorado River Basin were exceedingly complex. As a consequence, they agreed that a comprehensive program for implementing a broad range of conservation measures was needed.

photo by John Hamill

tracking radio-tagged Colorado squawfish

After nearly 4 years of intense discussions, data analysis, and negotiations, the Coordinating Committee produced "The Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin." The Recovery Program agreement, which was signed in January 1988, also created a 10-member Recovery Implementation Committee that will oversee the program's implementation by the Service. The Recovery Program established five basic recovery elements:

1. Provision of instream flows. Instream flow needs for the four rare fishes will be identified for all the major rivers in the Upper Basin. The Recovery Program anticipates that the needs of the fish in major portions of the Colorado and Green Rivers can be provided through refinement and protection of releases from Federal reservoirs, such as Flaming Gorge and Blue Mesa. In addition, in unregulated systems like the Yampa and White Rivers, the program calls for water rights to be acquired, converted into instream flows, and administered pursuant to State water law. The program further recommends funding of $10 million for water rights acquisition. In Fiscal Year 1988, $1 million were appropriated by Congress to initiate the acquisition of water for instream flows.

2. Habitat development and maintenance. Fish habitat will be developed or maintained through potential habitat management techniques, such as the creation of backwaters for nursery and feeding habitat and the construction of jetties to provide over-wintering habitat.

3. Native fish stocking. A hatchery rearing and stocking program will be evaluated as a means to augment the endangered fish populations, although the Recovery Program recognizes that this

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will not be a complete solution to the problem. Manmade areas, such as gravel pits along the Colorado River, can be used as rearing areas for native fishes.

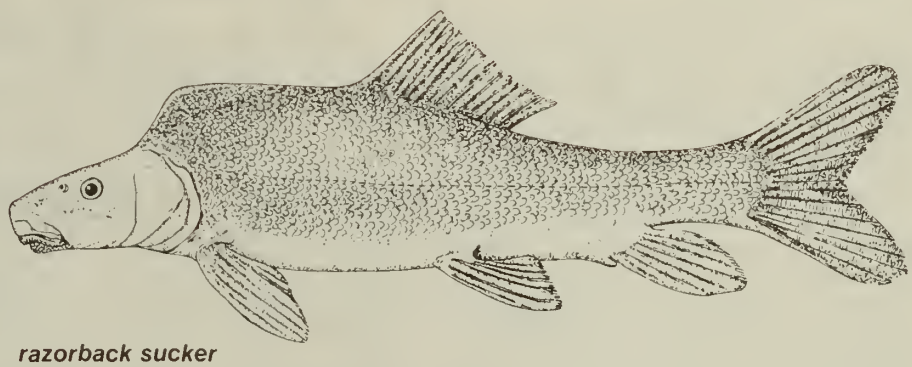
4. Management of non-native species and sportfishing. Certain introduced fish species are suspected to prey on, or compete with, the endangered fishes. In addition, anglers have been known to capture endangered fishes frequently in some areas. These potential problem areas will be monitored and controlled where necessary and feasible through a cooperative effort between State wildlife agencies and the Service.

5. Research, monitoring, and data management. Detailed study plans will identify criteria needed for recovery, test the effectiveness of management and recovery strategies, and evaluate the life history and habitat of each of the four species. Monitoring will track population status and trends and evaluate the overall success of the program. Timely analysis and reporting of monitoring and research data will be accomplished by a cost-effective data management system. This centralized system will serve as an information resource for directing management strategies and recovery activities.

The program's recovery goals for the Colorado squawfish and humpback chub are to maintain and protect self-sustaining populations and sufficient natural habitat to support these populations. Due to the particularly critical status of the bonytail chub, the immediate goal is to prevent its extinction, while the ultimate goal is to protect self-sustaining populations and natural habitat. Although the razorback sucker is not currently listed as Endangered or Threatened, its precarious status makes it desirable to provide for its future using the same goals established for the Colorado squawfish and humpback chub.

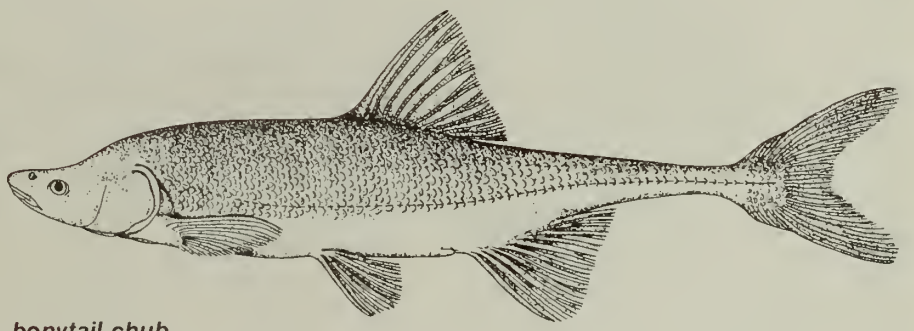
Funding of the Recovery Program is a cooperative responsibility. Expenditures are divided into two areas, the annual operating budget and capital funds. The projected annual budget for the recovery program is $2,300,000. Sources for both funds will include Federal and State governments, power and water users, and private donations. (The Fish and Wildlife Service is currently contributing approximately $600,000 per year toward this annual cost.) Two capital funds are needed through congressional appropriations. One of the funds (approximately $10 million) will be for the purchase of water rights to establish instream flows. In addition to the flow acquisition fund, $5 million will be needed to initiate other recovery construction elements, such as hatcheries, additional fish passages, habitat modification, and other projects. Contributions by proponents of non-Federal water projects will provide an additional source of funding, offsetting depletion impacts by contributing $10 per acre-foot (adjusted annually for inflation) based on the average annual depletion of the project.

This Recovery Agreement represents a major effort to satisfy a group of highly divergent interests. If successful, it will demonstrate that, with cooperation and careful planning, development and the needs of native fishes in the Upper Colorado River Basin can be compatible.

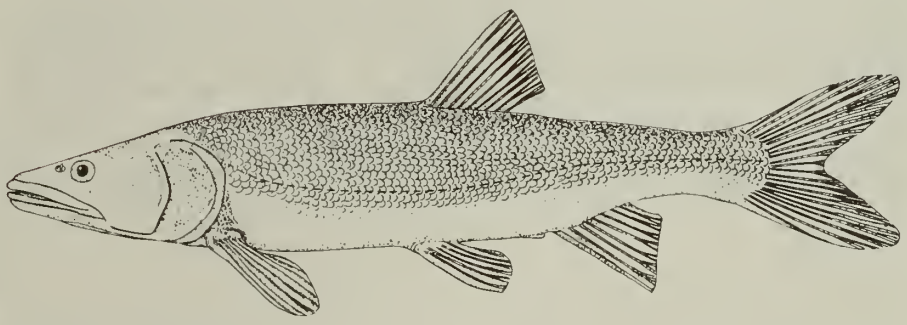


razorback sucker

humpback chub



bonytail chub



Colorado squawfish

drawings by Dr. Robert J. Behnke

Regional News

(continued from page 2)

dangered cactus occurs within a 75-mile area in Colorado and Utah. Threats to the species include collecting and potential habitat disturbance. The plan calls for protection of existing populations and research on the plant's taxonomic status, as well as an inventory of potential habitat.

Both plans are available for purchase by writing to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852; or call toll-free at 800/582-3421. (In Maryland, call 301/776-3000.)

* * *

Region 8 (Research)—The Patuxent Wildlife Research Center reports that nine volunteer nest watchers began working on the Puerto Rican parrot (*Amazona vittata*) research project in mid-February to watch, guard, and collect data during daylight hours on the active Puerto Rican parrot nests in the wild. The volunteer nest watcher program is a cooperative venture between the Service, the National Audubon Society, and the Student Conservation Association. This is the second year that the nest watcher program has been conducted. Volunteers will remain on the project until early June.

* * *

A radio telemetry study on the 'oma'o or Hawaiian thrush (*Myadestes obscurus*), a surrogate test species for the Endangered palila (*Loxioides bailleui*), is proceeding on schedule at Patuxent's Hawaii Research Station. Transmitter attachment techniques have been refined, receiving systems tested under operational conditions, and personnel trained in tracking methodology. Since December 28, four Hawaii thrush have been captured in mist nets in the Hawaii Volcanoes National Park, fitted with radio transmitters, and tracked daily.

* * *

The National Fisheries Research Center-Seattle has recently completed a 3-year study on the life history and habitat requirements of the Moapa dace (*Moapa coriacea*) so that suitable habitat can be provided at Moapa National Wildlife Refuge in southern Nevada, the first refuge ever created for a fish. Research in support of the goal of species recovery has been completed, and results and recommendations have been passed on to Region 1, which has management responsibility.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	23
Birds	61	15	145	7	3	0	231	55
Reptiles	8	7	59	14	4	14	106	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	41	2	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	29	0	2	0	0	0	31	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	139	6	1	31	3	2	183	56
TOTAL	327	49	467	97	19	39	998	263 **

Total U.S. Endangered 376
Total U.S. Threatened 116
Total U.S. Listed 492

Recovery Plans approved: 223
Species currently proposed for listing: 17 animals
31 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive Ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
March 31, 1988 36 plants

March 1988 Vol. XIII No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

California Sea Otter Translocation: A Status Report

Robert L. Brownell, Jr., and Galen B. Rathbun
National Ecology Research Center
San Simeon, California 93452

As late as the 19th century, sea otters (*Enhydra lutris*) were found from northern Baja California to Alaska. By the early 20th century, however, they had been extirpated from Baja California and most of California by fur hunters. Because of isolation and protection, a small population in the Big Sur area of central California survived and slowly expanded its range to about 200 miles of coastline along the center of the State. Because this small, restricted population is vulnerable to a single catastrophic event, such as an oil spill from a tanker accident, the U.S. Fish and Wildlife Service listed the California sea otter on January 14, 1977, as Threatened.

On August 11, 1987, the Service published a final rule to establish an experimental population of California sea otters at San Nicolas Island, one of southern California's Channel Islands, about 70 miles west of Los Angeles. The purposes of this reintroduction were to: 1) implement a primary recovery action for this animal; 2) obtain background information for assessing sea otter reintroduction and containment techniques; 3) gather data on population dynamics and ecological relationships of sea otters with their nearshore community; and 4) evaluate effects on the donor population of removing otters for the reintroduction. Related to the reintroduction project was the designation of a "no otter" management zone in southern California south of Point Conception and including all the Channel Islands except San Nicolas. (See BULLETIN Vol. XI Nos. 8-9 and 10-11 for details leading up to the reintroduction.)

Personnel from the Service and the California Department of Fish and Game worked during periods of good weather between late August 1987 and the end of March 1988 to capture the sea otters. Three techniques were used: dip netting, underwater traps operated by SCUBA divers, and floating tangle nets. By March 1988, 113 otters had been caught along the central California coast. Nearly half of these were immediately released at their capture site because of sex and size limitations. Sixty-eight of the otters were transported by truck to the Monterey Bay Aquarium, tagged on the rear flippers, screened for health abnormalities, and prepared for shipment to San Nicolas Island. Four died while at the Aquarium, and a fifth animal was returned to its original capture site and released. The remaining 63 sea otters (14 males and 49 females) were flown to San Nicolas Island in eight groups of one to 24 animals.

California sea otter

photo by Richard Bucich, courtesy Friends of the Sea Otter

Censusing the otters at the island has been difficult because of poor weather and sea conditions, access limitations, and the difficulty of seeing the color-coded flipper tags. Censuses have not only been hampered by winter storms, including one of the worst on record for southern California, but also by closures of the island during weapons tests. (The island is part of the U.S. Navy's Pacific Missile Test Center at Pt. Mugu.) When surveys are possible, each animal is observed until the unique color combination and position of the flipper tags is determined. This can take up to 2 hours if sea conditions are poor or if the animal is further than about a half mile from shore. Some otters have gone unidentified for extended periods of time. For example, one animal observed in October was not seen again until January, despite intensive efforts to individually identify otters at the island.

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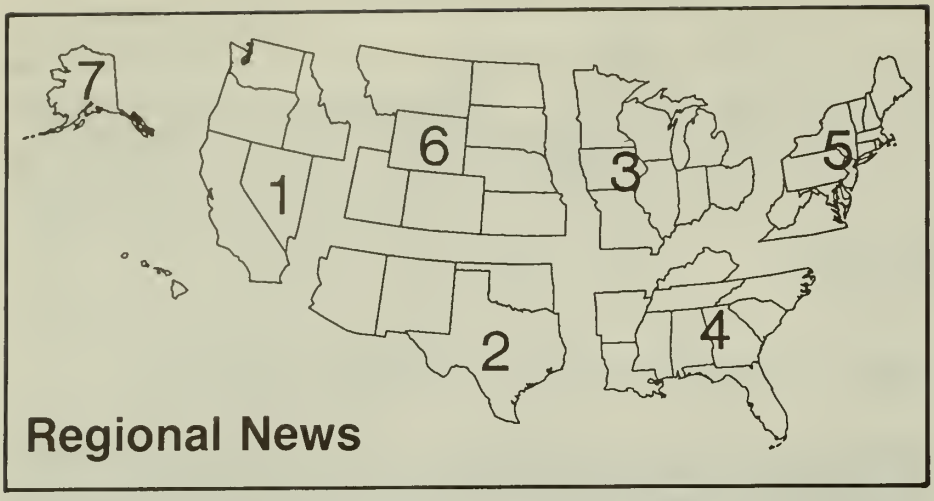

Regional News

Regional endangered species biologists have reported the following news and activities for March:

Region 1 — Fourteen woodland caribou (*Rangifer tarandus caribou*) were released in the panhandle of Idaho. The animals were captured from a herd near Williams Lake in British Columbia, Canada. A total of 24 animals have been moved from Canada this year to join 24 animals translocated to Idaho in 1987 to supplement the Endangered southern Selkirk Mountain herd of woodland caribou. The State of Idaho considers this year's translocation to be a success. Most animals have stayed in the vicinity of the release site. One caribou died during the capture effort this year for a total of only three known mortalities in 2 years. A final translocation of animals is planned for 1989.

* * *

At the request of the Hawaii State Board of Land and Natural Resources, the Fish and Wildlife Service's Honolulu Field Office prepared a detailed list of high quality streams in Hawaii that deserve special protection from flow and channel alteration. Selection criteria included habitat for Endangered waterbirds and migratory waterfowl, riparian wetlands, anadromous fish habitat, National and State parks, wilderness areas and natural area reserves, and streams listed on the Nationwide Rivers inventory.

* * *

Biologists recently discovered a new population of the California jewelflower (*Caulanthus californicus*) on the southern Carrizo Plain, California. This plant is a Category 2 candidate for a future listing proposal. The discovery doubles the number of known natural populations of this species. One introduced stand of the California jewelflower occurs on The Nature Conservancy's Paine Wildflower Memorial Preserve.

* * *

Staff from the Service's Laguna Niguel, California, Field Station accompanied U.S. Navy and California Fish and Game personnel to San Clemente Island for a San Clemente sage sparrow (*Amphispiza belli clementeae*) survey. Results of the survey indicate that the population of this Threatened bird appears to be stable.

* * *

Region 2 — In early March, two ocelots (*Felis pardalis*), a male and a female, were translocated within the Laguna Atascosa National Wildlife Refuge on the southern coast of Texas. The female has remained in the relocation area but the male has moved about 5 miles north of the release site (still on the refuge). These Endangered cats were moved from areas where their risk of being hit by motor vehicles was high to an area of suitable habitat on the refuge that was unoccupied by ocelots. Five ocelots have been killed by motor vehicles on or near the refuge in recent years.

* * *

As part of a 1988 joint special project with the Oklahoma Department of Wildlife Conservation, the Service's Tulsa Field Office will implement recovery measures for the interior population of the least tern (*Sterna antillarum*). This population of the

(continued on page 7)

U.S. Fish and Wildlife Service
Washington, D.C. 20240
Frank Dunkle, *Director*
(202-343-4717)
Ronald E. Lambertson
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Robert P. Smith, *Acting Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Acting Chief, Office of Management Authority*
(202-343-4968)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)
TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* David F. Riley, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* Tom Olds, *Assistant Regional Director;* John I. Christian, *Deputy Assistant Regional Director and acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Howard Larson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8, (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrowe (202-653-8762), *Endangered Species Specialist.*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2**: Arizona, New Mexico, Oklahoma, and Texas. **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the U.S. Virgin Islands. **Region 5**: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7**: Alaska. **Region 8**: Research and Development nationwide.

The ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

Approved Recovery Plans

Carla W. Corin
Division of Endangered Species and Habitat Conservation
Washington, D.C.

Tobusch Fishhook Cactus

The Tobusch fishhook cactus (*Ancistrocactus tobuschii*), listed as Endangered, was first described in 1952 from a specimen collected a year earlier on the G. W. Henri Ranch east of Vanderpool, Texas. At the time of listing (1979), fewer than 200 plants were known.

This cactus grows as solitary stems up to 3.5 inches (9 centimeters) in diameter and nearly as tall. It is named for its discoverer, Herman Tobusch, and for the reddish-tipped fishhooked spine that extends laterally from the three to five central spines arrayed on each areole, which is surrounded by seven to nine radial spines. Yellow flowers 1.2 to 1.5 inches (3.0 to 3.8 cm) in diameter, each lasting nearly a week, appear from mid-February to mid-March. Most flowering is over by early April, and the green fruits ripen during the last half of May.

Historically, the Tobusch fishhook cactus has been recorded in the Edwards Plateau area of south-central Texas in Kerr, Bandera, Real, Kimble, and Uvalde Counties. Surveys in 1985 found a total of six populations in all but Kerr County. The Henri Ranch population originally discovered in 1951 has been extirpated, probably during land clearing in the 1960's. Most of the sites are on private land, but one is on a State highway right-of-way and another is on State land administered by Texas Tech University.

The Tobusch fishhook cactus grows in gravelly soils on streambanks where dominant vegetation is juniper, oak, and sycamore. In this habitat, the plants are subject to flooding, which may destroy the plants and their habitat. Many specific details of the habitat requirements of this cactus are unknown. Threats to its survival include real estate development, trampling by livestock, flooding and erosion of its habitat, and collection by cactus fanciers. Cacti are generally prized by collectors, and when the rarity of a species is known, it becomes even more of an attraction. Many of the locales inhabited by this species are well known to collectors through earlier literature.

The prime objective of the Tobusch Fishhook Cactus Recovery Plan (approved by the Fish and Wildlife Service on March 18, 1987) is to establish 4 safe populations of 3,000 plants each. At this level, which is expected to take at least 5 years, there would be sufficient genetic diversity and a buffer against catastrophic reduction or loss of one or more of the populations, and the Tobusch fishhook cactus could be considered for reclassification from Endangered to Threatened.

drawing by Linda Ashling

***Tobusch fishhook cactus* (Ancistrocactus tobuschi)**

When reclassification is accomplished, the plan will be reevaluated and criteria for attaining full recovery can be determined. Specific steps in the recovery plan are to:

1. remove immediate human threats by protecting known populations from collecting and habitat destruction;
2. establish a permanent living collection at a botanical garden or university;
3. minimize long-range threats by development of biological information relevant to recovery;
4. establish a 5-year survey program to more precisely determine the distribution of the species;
5. develop a comprehensive trade management plan for all cacti;
6. develop a program to provide propagated plants and seeds to commercial markets; and
7. develop public awareness, appreciation, and support for the preservation of this species.

These recovery steps will require the cooperation of the private landowners and government land managing agencies on whose land the cactus is found. Working together, all parties can help save this unique plant.

Three Florida Mints

The Recovery Plan for Three Florida Mints was approved by the Fish and Wildlife Service on July 1, 1987. These Endangered plants, all inhabitants of sandy scrub communities, are threatened by ever-expanding development in peninsular Florida.

These congeneric mints are perennials with a woody base and non-woody flowering shoots. They are aromatic, with a strong minty odor, and all three inhabit bare sand exposed to sunlight. Lakela's mint (*Dicerandra immaculata*) grows to 1.3 feet (40 cm) in height and has lavender-rose to purplish flowers which bloom from September to November. It is endemic to a narrow strip of the Atlantic Coastal Ridge between Vero Beach and Fort Pierce. All known sites are on private land, mostly in residential lots, where it grows in well-drained sand at the margins of sand pine scrub.

Scrub mint (*D. frutescens*), with white or pale pink flowers spotted with dark reddish-purple, grows up to 1.6 feet (49 cm) high and blooms in September and October. It inhabits a limited area of the Lake Wales Ridge in Highlands County. One of its four known sites is the Archbold Biological Station, where it has been able to persist indefinitely in fire lanes through the sand pine scrub. Two other localities have recently been sold or partially destroyed. A remaining locality is in a subdivision and is susceptible to development.

The longspurred mint (*D. cornutissima*) also grows to 1.6 feet (49 cm), and its purple-rose flowers also are spotted with reddish-purple. It is found southwest of Ocala on the Sumter Upland in Marion County, and formerly occurred also in Sumter County. This species inhabits the margins of scrub vegetation. Its largest populations are in residential subdivisions, frequently along street rights-of-way, where it tends to be eliminated as homes are built. None of its known populations are in protected areas, although the Cross-Florida National Conservation Area (in the planning stages) will include suitable habitat for the mint.

The major threats to the survival of these species have been loss of habitat due to development (commercial, residential, and sand mining) and depletion of the gene pool because of small population sizes.

According to the recovery plan, any of the three species can be considered for reclassification to Threatened when 10 separate, self-sustaining populations are established at secure sites in peninsular Florida. Delisting can be considered when a species reaches 20 separate, self-sustaining populations. These goals are subject to change depending on any new information discovered during the recov-

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Approved Plans

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ery process, including new interpretations of the systematics of this genus.

To attain these recovery goals, it will be necessary to protect and manage existing populations through means such as conservation easements, lease agreements, or acquisition of sites by Federal, State, or local agencies. Protection may require emergency actions where habitat destruction is imminent, possibly including removal of plants from such sites if they can be used elsewhere to aid in the recovery effort. Protected habitats will need to be managed to prevent excessive vegetational succession. Prescribed burning may be the best tool in some instances to prevent encroachment of trees and shrubs into the open sites needed by the three mint species.

Conservation of germ plasm is another important part of the recovery process. Research on seed storage and plant propagation is needed, and collections need to be established. One commercial nursery, Woodlander, Inc., in South Carolina, has successfully propagated all three species from cuttings. Work on propagation by seed is proceeding at other institutions.

Establishment and management of new populations in protected sites with suitable habitat is necessary. Preferred areas are where the plants are native: Sumter Upland for longspurred mint, Lake Wales Ridge for scrub mint, and the Atlantic Coastal Ridge from Vero Beach to Stuart for Lakela's mint.

drawing by Bruce Edward Tatje

***Lakela's mint* (Dicerandra immaculata)**

Nashville Crayfish

The Nashville crayfish (*Orconectes shoupi*), listed in 1986 as Endangered, is found only in the Mill Creek drainage in Davidson and Williamson Counties, Tennessee. There are also records from Richland Creek in Davidson County, but none have been recaptured there and *O. shoupi* may have been displaced at that site by a related species of crayfish.

This 7-inch (18-cm) crustacean has been found in a wide range of environments in Mill Creek, including gravel-cobble runs, pools with up to 4 inches (10 cm) of settled sediment, and under limestone slabs and other cover. Molting individuals and females carrying eggs or young tend to seek out large slabrocks for protection.

The Nashville crayfish has probably never been widespread. The most urgent threat to its survival is water quality degradation. The lower portion of Mill Creek runs through metropolitan Nashville, Tennessee, and the upper reaches are affected by runoff from agricultural areas. Studies have found that water quality has already been affected by pollution from these sources. The presence of a high proportion of its population in an urban area makes the crayfish vulnerable to a single catastrophic event, such as a chemical spill. Another threat is competition from the related, more abundant, and apparently more adaptable crayfish *Orconectes placidus*, which is suspected to have displaced *O. shoupi* from the Richland Creek drainage.

The Nashville Crayfish Recovery Plan was approved on August 27, 1987. To consider this crayfish for reclassification from Endangered to Threatened status, three goals should be accomplished. First, there should be two viable populations: the existing population and another that is either reintroduced or discovered during further surveys. The second reclassification step is for the reintroduced or discovered population to: a) be self-sustaining for at least 10 years without augmentation; b) represent a significant portion of the crayfish fauna of the creek; and c) be stable or increasing in range. (This would help preclude displacement by more competitive species.) The third part of the goal is to sufficiently protect the species and its habitat from both human-related and natural threats likely to cause extinction in the foreseeable future.

Ways to achieve these goals include protecting the existing Mill Creek population through strict enforcement of State and Federal laws regarding Endangered species, water quality, and stream modification. There is also a need to identify current and foreseeable impacts on the Mill Creek habitat and to implement pro-

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photo by Dick Biggins

***Nashville crayfish* (Orconectes shoupi)**

Status Reviews Initiated for Chimpanzees

The chimpanzee (*Pan troglodytes*) and pygmy chimpanzee (*P. paniscus*) are listed by the Fish and Wildlife Service as Threatened species. Pursuant to a petition filed by three wildlife conservation organizations, the Service has initiated a status review for both species to determine whether or not they should be proposed for reclassification as Endangered.

The petition, submitted jointly by the Jane Goodall Institute, World Wildlife Fund, and Humane Society of the United States, was received by the Service on November 4, 1987. It contained information indicating that the status of *P. troglodytes* has deteriorated substantially since it was originally listed as Threatened in 1976. Among the threats this primate is said to face are massive habitat destruction, fragmentation of populations (and associated vulnerability to disease), excessive hunting and capture by people, and inadequate national and international controls. International trade in chimpanzee infants for the biomedical research market is also considered to have a significant impact on the species in the wild.

After examining the petition, the Service concluded that it contains "substantial information indicating that the requested action may be warranted." Accordingly, a status review was begun. Because the related pygmy chimpanzee also inhabits the tropical forests of Africa, it may face the same increased threats; therefore, the Service is including this species in the review. Comments, information, and questions should be sent to the Office of Scientific Authority, Mail Stop 527, Matomic Building, U.S. Fish and Wildlife Service, Washington, D.C. 20240, by July 21, 1988. After considering the information received by that time, the Service will decide whether or not to propose reclassification of both species from Threatened to Endangered.

photo by Geza Teleki, courtesy of World Wildlife Fund

Chimpanzees are thought to be in greater danger than ever before because of widespread habitat loss, excessive take by people, and other threats.

A decision to reclassify the chimpanzee and/or the pygmy chimpanzee as Endangered would remove the applicability of the special rule for primates [50 CFR 17.40(c)] to these chimpanzee species. Therefore, the Service is interested in comments as to what, if any, effect the removal of current trade exemptions might indirectly have on the wild populations of these chimpanzees. If the reclassification were warranted but removal of the special rule might impact the wild population, the Service would consider alternative procedures to alleviate restrictions adversely affecting the wild populations.

Riparian Systems Conference

On September 22–24, 1988, University Extension at the University of California—Davis will host the second "California Riparian Systems Conference." This event will report on issues surrounding the destruction of streamside lands and on progress made in learning to manage these resources since the first conference in 1981. Also discussed will be new concerns for restoration of riparian habitats along disturbed river and creek banks throughout the State.

The conference schedule includes professionally-oriented daytime programs for Thursday and Friday and seminars to bring professionals, activists, and the general public closer together on riparian issues for the evenings and Saturday. For more information, contact Dana Abell at (916)752-3098.

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tective measures. Research into the life history of the Nashville crayfish must be conducted to efficiently plan any reintroduction activities. Public education is in progress with the development of a slide-tape program for distribution to schools in the Nashville area. This program emphasizes the need to protect environmental quality in Mill Creek, the only known habitat of the Nashville crayfish. Development of this program was a cooperative venture among the Tennessee Department of Conservation; the U.S. Army Corps of Engineers, Nashville District; Tennessee Wildlife Resources Agency; and the Service. In any public education program, it is imperative not to identify specific locations inhabited by these animals in order to protect them from take for food and for use as fishing bait.

The goals of the plan may be reevaluated as data are generated during the recovery effort. At present, it is considered that complete removal from the protection of the Endangered Species Act is not likely because of the limited population and the threats to the habitat. It is hoped, however, that through these recovery efforts reclassification to Threatened status may be feasible in the future.

* * *

Copies of these and all other recovery plans are available for purchase about 6 months after they are approved. Requests should be sent to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852, or call toll-free 800/582-3421. (In Maryland, dial 301/770-3000.)

Sea Otter

(continued from 1)

As of March 31, we know that 18 sea otters are no longer at San Nicolas Island. Eight of them left the island and returned to the donor population. When another was found in the "no otter" management zone in late December 1987, she was caught and moved back to her original capture site in central California. All nine of these otters are doing fine along the mainland. On the other hand, three males died at San Nicolas from stress related to their capture and transportation. Two females were found dead on beaches in southern California. (One of these had been shot by someone and the other died of undetermined causes.) At least one other translocated otter drowned after becoming entangled in fishing gear, and it is suspected that another three met the same fate. This leaves a theoretical population of 45 animals at the island. Between February 28 and March 28, 1988, 21 of these 45 sea otters were identified at the island.

The other twenty-four animals are considered "missing", including six that were never sighted after their release at the island. The eight that returned to the parent population also were considered missing for periods of time between 26 and 208 days until they were sighted on the mainland. These eight otters represent 25 percent of the 32 otters that at one point or another have been considered missing. We had anticipated that more of the sea otters would stay around San Nicolas Island. It is, however, premature to assume that the 24 animals that are still missing are dead. We are continuing to search for these otters and are optimistic that we will find some of them back in the parent population. However, some may have lost their flipper tags, thus making it impossible to identify them.

By comparing the weights of animals that have remained at San Nicolas Island with those of the otters that have returned to the mainland, we found that small (juvenile) otters are more likely to remain at the island than large (adult) animals. Based on this information, we will be even more selective when choosing otters for transport to San Nicolas Island in the future.

photos by Jeff Foott

Dip nets (above) and underwater traps operated by SCUBA divers (below) were two of the methods used to capture California sea otters for translocation.

Now (late March), more than 7 months after the new colony of sea otters was created, about a third of the reintroduced animals are routinely sighted around the island. It is still too early to say anything about the success of the translocation; however, as a comparison, it is useful to review the history of another reintroduction effort. Fifty-nine sea otters from Alaska were released during 1969 and 1970 along the State of Washington's coastline. At least 16 of the 29 released in 1969 died within 2 weeks. No data are available on deaths after the second release of 30 sea otters in 1970. Very few data on the reintroduced animals were recorded until 1977, when Service biologists conducted the first intensive survey. At that time, only 19 otters, including 4 pups, were observed. Population surveys during the 1980's suggest that the Washington population has been slowly increasing. Total counts in 1981, 1983, 1985, and 1987 were 36, 52, 65, and 94, respectively. Thus, barring any disasters, it appears that the sea otter population off Washington is established and should continue to grow.

If the Washington reintroduction can be used as an example, it could take at least 5 years before the new colony at San Nicolas Island shows evidence of growth. However, for the San Nicolas Island reintroduction, the Service has the option to move up to 250 otters from the parent population to assist in this effort. By moving additional smaller sea otters to San Nicolas Island, we hope to establish a self-sustaining colony there in less than 5 years. If the reintroduction is a long-term success, it will be a giant step toward the recovery of the California sea otter.

Marine Mammal Report Available

The Fish and Wildlife Service has issued its annual report for calendar year 1986 on administration of marine mammals under its jurisdiction, as required by section 103(f) of the Marine Mammal Protection Act of 1972. The report contains accounts on eight mammals: the polar bear (*Ursus maritimus*), walrus (*Odobenus rosmarus)*, dugong (*Dugong dugon*), West Indian manatee (*Trichechus manatus*), Amazonian manatee (*T. inunguis*), West African manatee (*T. senegalensis)*, marine otter (*Lutra felina*), and sea otter (*Enhydra lutris*). [The southern sea otter (*E. l. nereis*), marine otter, dugong, and all three manatees also are listed under the Endangered Species Act.]

Administrative actions discussed in the report include Endangered and Threatened species (particularly the West Indian manatee and the southern sea otter in California), marine mammals in Alaska, law enforcement, scientific and public display permits, research, Outer Continental Shelf environmental studies, international activities, and appropriations.

Copies of the report are available by writing to the Publications Unit, U.S. Fish and Wildlife Service, 148 Matomic Building, Washington, D.C. 20240.

Regulations Proposed for Incidental Take of Marine Mammals

In the March 15, 1988, *Federal Register*, the U.S. Fish and Wildlife Service (Department of the Interior) and the National Marine Fisheries Service (Department of Commerce) jointly published regulations to implement recent amendments to the Endangered Species Act and the Marine Mammal Protection Act (MMPA). These amendments provide a legal mechanism for allowing certain incidental takings of Endangered, Threatened, or "Depleted" marine mammals. Previously, incidental take of marine mammals designated as Depleted was not allowed under the MMPA. The amendments were designed to make the two laws more consistent, and the proposed changes in the regulations would implement these amendments.

A discussion providing background and details on this issue was published with the proposal. Comments on the proposed changes should be sent to the Director, Office of Protected Resources and Habitat Programs, National Marine Fisheries Service, Washington, D.C. 20235, by May 16, 1988.

Regional News

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tern was listed by the Service in 1985 as Endangered due to declining numbers. River modification resulting from such activities as dam construction, channelization, navigation and hydropower projects, and water withdrawals for irrigation, has caused loss and degradation of tern breeding habitat. Least terns nest on barren to sparsely vegetated beaches, including salt flats, sand and gravel bars, spits, and islands. High quality breeding areas with adequate food available are in short supply, and terns frequently must compete with people who use the remaining beach space for recreation. Human-related disturbances at tern colonies can be devastating. Unattended eggs and chicks overheat in the sun or are crushed by people, their vehicles, pets, and livestock.

The joint recovery project will focus on increasing public awareness of least terns. In addition to encouraging television and newspaper coverage of terns during the breeding season, and enlisting the help of Scout Troops in building and placing chick shelters at tern colonies, recovery project members will develop a pamphlet and narrated videotape on the tern. The pamphlet and video should be available for distribution by the end of Fiscal Year 1988. Anyone wishing to receive copies of the pamphlet and a loan of the video should contact Laura Hill at the Tulsa Field Office, U.S. Fish and Wildlife Service, 222 S. Houston Avenue, Suite A, Tulsa, Oklahoma 74127; telephone 918/581-7458 or FTS 745-7458.

* * *

The Dawson and Nebraska Public Power Districts, both located in central Nebraska, have agreed to cooperate in evaluating powerline markers that might reduce bird collisions. Twelve-inch, bright yellow aeronautical balls were installed on company lines with which sandhill cranes (*Grus canadensis*) frequently collided along the Platte River, Nebraska. The Service's Wyoming Cooperative Fishery and Wildlife Research Unit will monitor crane collisions on marked and unmarked lines for the next 2 to 3 years to see if markers reduce collision frequency. The resulting data will have application to the recovery of whooping cranes (*Grus americana*) because collisions with powerlines are the number one known cause of death of free-flying whoopers. This research will complement a study in Colorado that is testing another marker in differing habitat conditions where the line collisions are predominantly by geese and ducks.

* * *

Whooping cranes occurred in the southeast and wintered on portions of the Atlantic coast in the 19th century. The U.S. Whooping Crane Recovery Plan has a goal of establishing three wild, self-sustaining populations, including one in eastern North America, so that the species may be reclassified from the Endangered category to Threatened. In 1983, the recovery team recommended research at potential reintroduction areas in the upper peninsula of Michigan and adjacent Ontario, Canada; Okefenokee Swamp in southern Georgia; and three sites in central Florida. Project leaders reported on their studies at the recovery team meeting in February. The recovery team has now narrowed the candidate release sites to Kissimmee Prairie in Florida and the Okefenokee Swamp. Both sites would be suitable for attempting to establish a nonmigratory whooping crane population like that which survived in Louisiana into the 1940's. Captive-reared whoopers would be introduced using the "gentle release" technique that has been successful in supplementing the wild population of the Endangered Mississippi sandhill crane (*Grus canadensis pulla*) in Jackson County, Mississippi. Specific selection of a proposed release site will occur in summer 1989, and the first birds could be released as early as 1991.

* * *

Region 6 — During the week of February 22-26, 1988, approximately 300 people attended public meetings in Libby, Troy, Trout Creek, Thompson Falls, and Kalispell, Montana, on a proposal to test augmentation of the grizzly bear (*Ursus arctos*) population in the Cabinet-Yaak ecosystem by adding 4 to 8 grizzly bears to the estimated 15 bears that now live there. The proposal is intended to help meet the grizzly bear recovery goal for the Cabinet-Yaak ecosystem. The 60-day comment period closed on March 31, 1988. After comments are organized and evaluated, a decision will be made on whether or not to proceed with the proposal.

* * *

Region 6 recently assembled a group of four biologists in the Grand Island, Nebraska, Office to be known as the "Platte River Task Group." The Group is charged with conducting studies and other activities related to the recovery of four Threatened and Endangered bird species (whooping crane; bald eagle; interior least tern; and piping plover, *Charadrius melodus*) on the Platte River.

* * *

The second meeting of the Black-Footed Ferret Interstate Coordinating Committee was held in Northglenn, Colorado, March 8-9, 1988. Representatives of 9 of the 12 States within the potential range of the ferret (*Mustela nigripes*) were in attendance. The committee will be expanded to involve a national represent-

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ative from Federal land management agencies. The Coordinating Committee serves as an advisor to the Regional Director of the Fish and Wildlife Service in Denver, who has lead responsibility to coordinate recovery of the black-footed ferret throughout its potential range. For now, captive breeding appears to be the best strategy for recovery of the species. There are no known ferrets in the wild at this time. The Committee met to discuss programs and problems involved in identifying, evaluating, and ranking ferret habitat (prairie dog ecosystems) for possible reintroduction of captive-reared black-footed ferrets in 1991.

* * *

Region 7 — The recent listing of the Aleutian shield-fern (*Polystichum aleuticum*) as Endangered marks the first listing of a plant in Alaska. Despite surveys in each of the past 4 years, one population consisting of only 6 plants comprises the current known world population for the species. However, because this plant occurs at high elevations on remote Aleutian islands, the Service is optimistic that additional specimens will be found. Toward this end, three teams of botanists will be conducting surveys this July and August on several of the Aleutian Islands, including Attu, Unalaska, Atka, and Adak. The shield-fern is without close relatives in North America and appears to be a relict of preglacial times.

* * *

Region 8 (Research) — This year to date (March 25), three captive pairs of Puerto Rican parrots (*Amazona vittata*) at the Puerto Rico Research Station aviary have produced fertile eggs. This includes two of the four fertile pairs from 1987 and an additional captive pair. The production of fertile eggs from this additional pair is very important from a genetic standpoint. The male was caught in the wild in the early 1970's and is thought to be the only representative of his family line in the captive flock.

* * *

In February, 10 palilas (*Loxioides bailleui*) were captured and fitted with miniature radio transmitters prior to release. The birds will be tracked at the Mauna Kea study area on the island of Hawai'i daily for up to 28 days, which is the expected life of the transmitter batteries. This study will provide researchers with information on home-range and movement patterns of individual birds during the pre-breeding period.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	23
Birds	61	15	145	7	3	0	231	55
Reptiles	8	7	59	14	4	14	106	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	41	2	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	29	0	2	0	0	0	31	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	139	6	1	31	3	2	183	56
TOTAL	327	49	467	97	19	39	998	263 **

Total U.S. Endangered 376
Total U.S. Threatened 116
Total U.S. Listed 492

Recovery Plans approved: 223
Species currently proposed for listing: 17 animals
31 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive Ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
April 30, 1988 36 plants

April 1988 Vol. XIII No. 4

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

California Condor Population Grows by One

The first California condor (*Gymnogyps californianus*) chick ever conceived in captivity hatched in an incubation chamber at San Diego Wild Animal Park on April 29, marking a turning point in efforts to save the critically endangered species. This event brings the cooperative recovery program one step closer to the day when California condors can be released back into their native habitat.

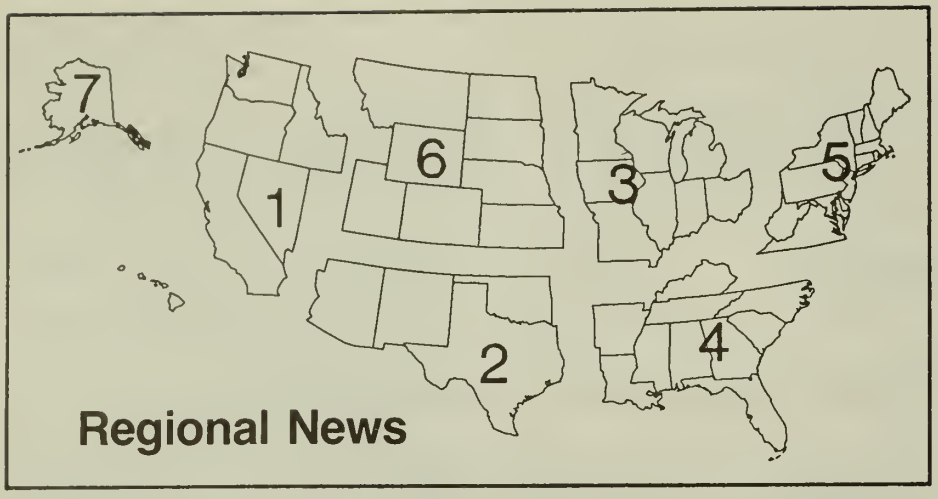
The chick, which was given the name "Molloko" (a Maidu Indian word for condor), hatched after a 57-day incubation at the zoological park. Veterinarians said the chick's condition was good and it appeared strong. Attendants helped the chick emerge from the shell and removed the last fragments 61½ hours after it first started to hatch. Four days later, zookeepers introduced the chick to its surrogate parent, a hand puppet designed to look like the head of an adult condor. Using the puppet, keepers feed the chick minced mice and regurgitated vulture food. When the chick is about one month old, it will be transferred to outdoor facilities where the other condors are housed. At that time, veterinarians will decide whether or not it is an appropriate time for blood tests to determine its sex.

After the egg was laid on March 3, it was removed from the cage housing its parents in order to stimulate them to produce another egg. Although the pair resumed mating activities the next day, no additional eggs have been produced. Biologists are hoping for greater success next year. California condors in the wild have shown the ability to produce up to three eggs in a season to replace ones that are lost.

Four of the last five known California condor breeding pairs in the wild disappeared over the winter of 1984– 1985. The Fish and Wildlife Service then decided that bringing the few remaining birds into a captive breeding program, thereby increasing their numbers, was the best chance to avert the species' extinction while investigations continue into the mortality of condors in the wild. The last free-flying condor was captured on the Bitter Creek National Wildlife Refuge in 1987. In addition to the new chick, there are now 27 California condors in existence; 14 are housed in breeding facilities at the San Diego Wild Animal Park and 13 are similarly cared for at the Los Angeles Zoo. The combined population is composed of 13 males and 14 females.

photo by Craig W. Racioti, courtesy of Zoological Society of San Diego

California condor chick Molloko receives a meal of minced mice from its "puppet parent" at San Diego Wild Animal Park.



Regional News

Regional endangered species biologists have reported the following recent news and activities:

Region 1 - An Environmental Assessment evaluating a temporary, experimental release of same-sex, captive-bred Andean condors (*Vultur gryphus*) in the southern California range of the California condor (*Gymnogyps californianus*) was distributed recently to 260 State, Federal, and private reviewers for a 30-day comment period. The proposed research task is designed to test release techniques, evaluate and select suitable release sites, and train personnel. Released birds will be equipped with radio tags to allow tracking and gathering of behavioral data. The information gained will be used when captive-bred California condors are eventually released to the wild.

* * *

Regional staff members attended the annual Desert Tortoise Council meetings in Laughlin, Nevada, March 26-29, 1988. The major issues of interest covered at the meeting included conservation biology theory applied to the desert tortoise (*Xerobates agassizii*), the Bureau of Land Management's (BLM) new plan to manage the tortoise's habitat on BLM lands, some specific planned projects that will have a significant impact on the tortoise, discussion on the genetic and morphometric differences of the three apparently distinct populations, and status reports.

* * *

Senior Staff Biologist John Ford of the Honolulu, Hawaii, Field Office was nominated by Hawaii Governor John Waihee to a 4-year term as a member of the Natural Area Reserves System Commission. State Senate confirmation is expected shortly.

* * *

Region 2 - CBS Evening News gave coverage to the avian cholera outbreak among waterfowl in the San Luis Valley, Colorado, in February and the possible threat to whooping cranes (*Grus americana*). An estimated 6,000 ducks and geese died. Over 20 sandhill crane (*Grus canadensis*) carcasses were recovered but no whooping cranes were known to be affected. Knowledge of the problem in the San Luis Valley allowed Bosque del Apache National Wildlife Refuge in New Mexico to provide supplemental grain to whooping cranes, holding them in New Mexico for about 2 weeks longer than normal. The disease outbreak was over in late March when mild weather allowed the birds to disperse to many roost sites and made food more accessible.

* * *

The Canadian Whooping Crane Recovery Plan was published recently by the Canadian Wildlife Service. This plan complements the U.S. recovery plan and emphasizes actions within the boundaries of Canada. The Canadian Whooping Crane Recovery Team is the first recovery team organized in Canada and the plan is the first prepared for recovery of an endangered species in Canada. Copies are available from Dr. James Lewis, Whooping Crane Coordinator, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103.

* * *

Seventy-six seedlings of Kearney's blue-star (*Amsonia kearneyana*) were planted on a private ranch in a remote canyon of the Baboquivari Mountains

(continued on page 10)

U.S. Fish and Wildlife Service
Washington, D.C. 20240
Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshall P. Jones, *Acting Chief, Office of Management Authority*
(202-343-4968)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)
TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* David F. Riley, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* John S. Popowski, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W. Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* Tom Olds, *Assistant Regional Director;* John I. Christian, *Deputy Assistant Regional Director and acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02168 (617-965-5100), Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

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Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8, (FWS Research and Development), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrowe (202-653-8762), *Endangered Species Specialist.*

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Endangered Species Act Protection is Proposed for Nine Species

During April 1988, three species of plants and six species of invertebrate animals were proposed by the Fish and Wildlife Service for Federal listing as Endangered or Threatened. If the proposals are made final, Endangered Species Act protection will be extended to the following:

Alabama Canebrake Pitcher-plant (*Sarracenia rubra* ssp. *alabamensis*)

Some of the rarest and most unusual plants of the southeast are the pitcher plants, carnivorous species that trap and digest insects within hollow leaves or "pitchers." These plants grow only in open, boggy sites, a limited type of habitat that is rapidly being modified for agriculture and other purposes. Threats to pitcher plants also come from collectors, who are attracted to these species by their scarcity and distinctive feeding habits. As a result, the Service has taken action to give the most vulnerable taxa protection under the Endangered Species Act. The green pitcher plant (*Sarracenia oreophila*) is listed as Endangered, and the same status recently was proposed for the mountain sweet pitcher plant (*Sarracenia rubra* ssp. *jonesii*). (See story in BULLETIN Vol. XIII No. 3.) Now, the Service has proposed to list a related taxon, the Alabama canebrake pitcher plant (*Sarracenia rubra* ssp. *alabamensis*) as Endangered (F.R. 4/21/88).

The Alabama canebrake pitcher-plant occurs in sandhill seeps, swamps, and bogs along the fall-line of central Alabama. It requires sunny areas with little competition from woody vegetation. Historically, this subspecies was reported from 27 sites, but 16 of them have been destroyed through habitat alteration (e.g., drainage and conversion to cropland or pasture), herbicide application, overcollecting, and/or vegetational succession (due to suppression of naturally-occurring wildfires).

Extensive searches of potential habitat over the past 20 years indicate that only 11 populations remain—5 in Chilton County, 4 in Autauga County, and 2 in Elmore County. All are on private lands. Only 3 of the remaining 11 populations are of significant size (50 or more plants). Two of these three sites face imminent threats, one from gravel mining and the other from drainage.

Taking is another well-documented threat to the Alabama canebrake pitcher plant. Collecting by commercial plant dealers and hobbyists has contributed to the destruction of several historical populations and significantly depleted many others. In 1975, one collector even ran an advertisement in a local newspaper offering a reward for pitcher plant locations and specimens. Listing *S. r.* ssp. *alabamensis* as Endangered would not prohibit taking of this plant on State or private lands, but it would restrict interstate trade.

photo by Randy Troup

Alabama canebrake pitcher-plant (Sarracenia rubra var. alabamensis)

Major landowners have been contacted about the presence of the Alabama canebrake pitcher plant on their property and informed about land uses compatible with its survival. Several owners have been very receptive to protection, and efforts are under way to enlist the support of others. Suggested habitat management techniques include the use of prescribed burning or manual clearing in order to maintain the open sites needed by the pitcher plant.

Comments on the proposal to list the Alabama canebrake pitcher plant as Endangered are welcome and should be sent to the Jackson Field Office, U.S. Fish and Wildlife Service, Jackson Mall Office Center, Suite 316, 300 Woodrow Wilson Avenue, Jackson, Mississippi 39213, by June 20, 1988.

Cooley's Meadowrue (*Thalictrium cooleyi*)

As its common name indicates, Cooley's meadowrue is a plant found in open sites. This small herb in the buttercup family (Ranunculaceae) is endemic to a few areas of the southeastern coastal plain, where it inhabits wet savannas, bogs, and other sunny, moist locations. Habitat modification and the direct application of herbicides threaten this plant's survival, and the Service has proposed to list it as an Endangered species (F.R. 4/21/88).

T. cooleyi is a rhizomatous perennial with narrow, lance-shaped leaves. Its stems, which seldom reach more than 40 inches (one meter) in height, are erect in the full sun but sometime sprawling when in shade. A dioecious species, Cooley's meadowrue bears separate male and female flowers. Both types of flowers are very small and lack petals, but the staminate (male) blossoms have yellowish to white sepals with lavender filaments and the pistillate (female) ones have greenish sepals. The dioecious nature of *T. cooleyi* further increases the vulnerability of very small populations in which plants of only one sex may remain.

Historically, 15 populations of Cooley's meadowrue were reported from 7 counties in North Carolina, Georgia, and Florida. Only 10 are known to survive, one in Florida (Walton County) and the rest in North Carolina (Columbus, Onslow, and Pender Counties). All 10 are on privately owned land, although The Nature Conservancy owns part of one site in Pender County. The extirpated populations are believed to have succumbed as a result of fire suppression and silvicultural/agricultural activities. These and other threats, such as mining, drainage, road construction, and herbicide use, pose danger to the remaining populations.

Because *T. cooleyi* is shade-intolerant, it depends on wildfires or certain other kinds of disturbance to maintain the open, sunny areas upon which the species depends. It is no accident that seven of the current populations are along roadsides or in powerline rights-of-way. Fire suppression has allowed shrubs and trees to encroach on some *T. cooleyi* sites, making the habitat too shady for this species. As a substitute for fire, certain other kinds of disturbance, such as mowing and logging, can open up habitat for the meadowrue if properly done; however *T. cooleyi* cannot survive bulldozing, drainage, conversion of habitat to pine plantations, or the direct application of herbicides.

North Carolina already lists Cooley's meadowrue under State law as endangered, a classification that prohibits take without landowner permission and intrastate trade without a permit. A Federal listing would complement this protection

(continued on page 4)

Nine Species

(continued from page 3)

and further encourage conservation of the species.

Comments on the Service's proposal to list Cooley's Meadowrue as a Threatened species are welcome and should be sent to the Asheville Field Office, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina, by June 20, 1988.

Dwarf-flowered Heartleaf (*Hexastylis naniflora*)

A herbaceous plant in the birthwort family (Aristolochiaceae), *H. naniflora* is known from only 24 populations in an 8-county area of the upper piedmont of North Carolina and adjacent South Carolina. The dark green, leathery, heart-shaped leaves are supported by long thin petioles arising from a subsurface rhizome. Its maximum height rarely exceeds 6 inches (15 centimeters). The usually beige to dark brown jug-shaped flowers, which appear from mid-March to early June, are small and inconspicuous. The dwarf-flowered heartleaf differs from other members of the genus *Hexastylis* by its small flowers and its habitat in acidic soils along bluffs and adjacent slopes, in boggy areas next to streams and creekheads, and along the slopes of nearby hillsides and ravines.

Three of the 24 populations currently receive some form of protection. Most of the largest South Carolina population, which contained over 4,000 plants until 64 percent were destroyed by construction of a reservoir, is now being protected by the City of Spartanburg. Two of the larger North Carolina populations are registered natural areas receiving short-term protection under that State's Natural Heritage Program. However, since these registry agreements are nonbinding, both sites remain vulnerable in the long term. The remaining populations of dwarf-flowered heartleaf are threatened by alteration or loss of habitat from conversion to pasture, grazing, intensive timber harvesting, residential construction, and construction of small ponds at former creekheads.

A natural factor affecting the vigor of some populations is the fact that their preferred habitat is often shared by dense stands of mountain laurel (*Kalmia latiflora*) or *Rhododendron* spp., which reduce the amount of light reaching the low-growing *H. naniflora*. In such situations, selective logging could benefit these heartleaf populations by opening them up to more light, provided that increased siltation from the intensive soil disturbances associated with forest clear-cutting is avoided.

In North Carolina, *H. naniflora* is listed under State law as endangered. Such plants are protected from intrastate trade without a permit, and the State statute also provides for monitoring and management. South Carolina currently offers no official protection, although the dwarf-flowered heartleaf is unofficially recognized as an endangered component of the State's flora. The Service's April 21, 1988 proposal to list *H. naniflora* at the Federal level as a Threatened species, if finalized, will provide for additional protection and recovery activities.

Comments on this listing proposal are welcome, and should be sent to the Asheville Field Office by June 20, 1988.

photo by Robert R. Currie

dwarf-flowered heartleaf (Hexastylus naniflora)

Little-wing Pearlymussel (*Pegias fabula*)

The little-wing pearlymussel, the sole member of its genus, is a small freshwater mollusk whose size does not exceed 1.5 inches (3.8 cm) in length and 0.5 inch (1.3 cm) in width. The shell's outer surface is often eroded, giving it a chalky or ashy white appearance. Like other freshwater mussels, this species feeds by filtering food particles from the water. Its reproductive cycle includes an early larval stage when the mussel larvae (glochidia) probably attach to the gills or fins of a fish and transform into juvenile mussels. The young mussels then drop off to the stream substrate where, if conditions are favorable, they grow to maturity. The specific host fish for *P. fabula* and many other aspects of this mussel's life history are unknown.

Pegias fabula inhabits clear, cool, free-flowing streams and is usually found in the transitional zone between riffles and pools. The species has been recorded historically from 27 stream reaches in Alabama, North Carolina, Kentucky, Tennessee, and Virginia, all of them within the Tennessee and Cumberland River drainages. Based on extensive surveys of historical and potential habitat, however, it has been reduced in range to only six short reaches—three in southeastern Kentucky, two in southwestern Virginia, and one in central Tennessee. On April 21, 1988, the Service proposed listing *P. fabula* as an Endangered species.

Habitat loss and water quality deterioration are the primary reasons for the sharp decline of the little-wing pearlymussel. Some sites were flooded by impoundments. Others were degraded by industrial and municipal pollution, siltation from certain mining or agricultural practices, or other land disturbances within the drainage. Most of these factors threaten the remaining six *P. fabula* populations. The Service has no evidence that further mining, if conducted in accordance with Federal and State regulations, is a threat to the mussel. Unregulated mining operations in the past, however, did contribute to the decline, and current activities not in compliance with appropriate regulations may be a threat.

Comments on the listing proposal are welcome, and should be sent to the Asheville Field Office by June 20, 1988.

Five Texas Cave Invertebrates

Five species of small, cave-dwelling invertebrate animals in Texas are believed to be vulnerable to extinction due to the projected impacts of development on their limited habitat. Each is restricted to six or fewer small, shallow, dry caves near the city of Austin. To help prevent the loss of these species, the Service has proposed listing the following as Endangered (F.R. 4/19/88):

- **Tooth Cave pseudoscorpion (*Microcreagris texana*)** — Resembling a tiny, tailless scorpion, this species reaches a maximum length of only 4 millimeters

(continued on next page)

(approximately 3/16 inch). It lacks both eyes and a stinger, and is harmless to humans, though it uses its pincers to prey on small insects and other arthropods. The only known sites for this animal are Tooth and Amber Caves, both in Travis County.

• **Tooth Cave spider (*Leptoneta myopica*)** — An even smaller creature, the Tooth Cave spider is 1.6 mm (about 1/16 inch) in body length. This spider is sedentary, spinning webs from the ceiling and walls of Tooth Cave, its only habitat. Although it is never found outside the cave, it does have rudimentary eyes.

• **Bee Creek Cave harvestman (*Texella reddelli*)** — This light yellowish-brown harvestman has relatively long legs that extend from a small body (2 mm, or less than 1/8 inch, in length). It is eyeless and probably predatory on small insects. *T. reddelli* is known from Tooth, Bee Creek, McDonald, Weldon, and Bone Caves in Travis and Williamson Counties.

• **Tooth Cave ground beetle (*Rhadine persephone*)** — Only marginally larger than the other invertebrates in the listing proposal, this species has a reddish-brown body 7-8 mm (about 5/16 inch) long. Like the spider above, the Tooth Cave ground beetle has rudimentary eyes. It probably feeds on the eggs of cave crickets. *R. persephone* is known only from Tooth and Kretschmarr Caves in Travis County.

• **Kretschmarr Cave mold beetle (*Texamaurops reddelli*)** — This eyeless, dark-colored beetle with elongated legs measures less than 3 mm (approximately 1/8 inch) in length. It is known from Kretschmarr, Tooth, Amber, and Coffin Caves in Travis and Williamson Counties.

The caves inhabited by all five of these invertebrates are small. McDonald Cave, the largest, consists of less than 60 meters (about 200 feet) of passage, and most of the others are considerably smaller. They occur as "islands" of cave habitat within the Edwards Limestone formation. Their isolation has resulted in the evolution of highly localized and distinct cave faunas. In addition to the five species proposed for listing, these caves and others in the area support a number of other uncommon and scientifically significant species.

drawing by John E. Cooper

Harvestmen, sometimes referred to as "daddy longlegs," have a small, roundish body and eight long, thin legs.

The proximity of the caves to the city of Austin makes them vulnerable to the continued expansion of the metropolitan area. The main threat to the five cave invertebrates is the potential loss or degradation of their habitat from anticipated road construction, residential and commercial development, and industrial projects. Without proper safeguards, such activities could fill or collapse the shallow caves; alter drainage patterns that affect cave habitat; introduce exotic competitive and predatory organisms (e.g., cockroaches, sowbugs); and pollute the cave systems with pesticides, fertilizers, oils, and other harmful runoff. Development may already have claimed at least one site; Coffin Cave was not even found during recent survey attempts.

Comments on the listing proposal are welcome and should be sent to the Regional Director, Region 2 (address on BULLETIN page 2), by June 20, 1988.

drawing by John E. Cooper

Pseudoscorpions are tiny, harmless arachnids that somewhat resemble the larger true scorpions but lack the elongate tail, poison bulb, and stinger.

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, the rule on take is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against take of listed plants.

Listings Approved for Three Plants

Final listing rules were published recently for three species of plants, bringing Endangered Species Act protection to the following:

• **Relict trillium (*Trillium reliquum*)** — This herbaceous member of the lily family produces early spring flowers that are usually greenish to brownish-purple. Only 10 populations are known to exist—2 in Alabama, 3 in South Carolina, and 5 in Georgia. Habitat disturbance resulting from logging, urbanization and other development, and fire is the main threat to the relict trillium's survival. It was proposed in the January 14, 1987, *Federal Register* for listing as an Endangered species (see story in BULLETIN Vol. XII No. 2), and the final rule was published April 4, 1988.

• **Palo de Nigua (*Cornutia obovata*)** — An evergreen tree endemic to Puerto Rico, *C. obovata* declined with the widespread deforestation of the island. Only seven individuals of this species currently are known to survive at two widely separated sites. Any further losses could lead to its extinction. The Service proposed on April 24, 1987, to list *C. obovata* as Endangered (see BULLETIN Vol. XII No. 5), and the final rule was published April 7, 1988.

• **White-haired goldenrod (*Solidago albopilosa*)** — This herbaceous perennial is known only from the Red River Gorge area of Daniel Boone National Forest in eastern Kentucky. It is usually found in rockhouses (natural, shallow, cave-like formations) and beneath overhanging ledges. Because these same features are very popular for recreation, the goldenrod is subject to intensive disturbance. Management efforts to divert recreation to other areas of the gorge are needed. To help prevent the species' extinction, the Service proposed on April 24, 1987, to list it as Endangered (see BULLETIN Vol. XII No. 5). Information gained since then indicates that the species' status, though still vulnerable, is not as critical as once thought. Accordingly, the Service gave it the classification of Threatened in the April 7, 1988, final rule.

Saving the Masked Bobwhite

Robert R. Gabel
Patuxent Wildlife Research Center
and
Steven J. Dobrott
Buenos Aires National Wildlife Refuge

The masked bobwhite (*Colinus virginianus ridgwayi*) is one of 21 subspecies of bobwhites in North America. It once ranged from southern Arizona to south-central Sonora, Mexico, but was extirpated from the United States by about 1900. Although some ornithologists believed it to be extinct during the 1950's and early 1960's, the masked bobwhite survived in small, isolated populations in Sonora.

The masked bobwhite tolerates only light grazing pressure on its arid grassland habitat, and its decline is directly attributable to the rapid expansion of the cattle industry in Arizona from 1870 to 1890. In many areas, little vegetation remained after grazing, particularly during the drought-stricken years of 1891-1893. With its habitat severely reduced, the masked bobwhite retreated. Livestock grazing persists today as a threat to the survival of masked bobwhites in Mexico.

A recovery program for the masked bobwhite began in 1966 when the Patuxent Wildlife Research Center in Laurel, Maryland, established a captive breeding colony and began developing the ability to produce large quantities of healthy birds for release into the wild. Biologists at Patuxent's Arizona Field Station conducted studies of the bird's habitat requirements and distribution, and developed release techniques, from 1967 to 1978. In 1985, the Buenos Aires National Wildlife Refuge in southeastern Arizona was established to restore and preserve habitat for the masked bobwhite. Captive-produced birds have been released at the refuge annually since then.

Captive Propagation

The captive breeding program at Patuxent started with the acquisition of four captive-bred pairs from private breeders. These birds had low fertility and hatch rates, along with high chick mortality, presumably because they were from inbred stock that was several generations removed from the wild. To improve the genetic quality of the captive flock, 57 additional wild birds were caught in Mexico and shipped to Patuxent in 1968 and 1970. Successful reproduction soon followed, and approximately 3,000 chicks are now produced annually.

The captive management program for masked bobwhites combines basic gamebird husbandry with research findings. Early research was conducted with masked bobwhites and non-endangered northern bobwhite (*C. v. virginianus*) surrogates. Findings on nutritional requirements of the quail led to the development of optimal diets. Automatic light timers are used to simulate natural daylength and thereby stimulate egg production at appropriate times of the year. Medications are incorporated into the feed to prevent bacterial and parasitic infections. One of the most important aspects of the captive propagation program, however, is genetic management.

FWS photo

release of a Texas bobwhite male foster parent with a covey of 4-week-old masked bobwhite chicks

Because the masked bobwhite has a relatively short lifespan and generation interval, and because the captive population is derived from relatively few birds, the genetic integrity of the captive flock must be strictly maintained to prevent the loss of genetic diversity over time. To accomplish this, a computer-assisted pedigree and mate-selection program was established in 1982. Using this program, inbreeding is minimized and representation of the original founding animals is carried through from one generation to the next. This system has restricted inbreeding per generation to well below the one-percent level recommended by many population geneticists. In addition, biochemical analyses have demonstrated that the captive population of masked bobwhites has retained a level of genetic diversity comparable to that of other bobwhite subspecies. Reproductive characteristics (fertility, hatch rates, and chick mortality) also show no apparent effects of inbreeding.

FWS photo

An adult masked bobwhite male in the wild exhibiting the solid breast coloration and nearly all black head present in this subspecies.

In 1986, to further improve the genetic quality of the captive flock, 18 additional masked bobwhites were caught in Mexico and brought to Patuxent. This was the first influx of "new blood" since 1970. Most of these birds produced young that same year, thus adding additional founder animals and greater genetic diversity among the captive birds.

Reintroductions in Arizona

From 1937 to 1950, numerous attempts were made to establish masked bobwhites in Arizona and New Mexico by releasing either pen-reared birds or wild bobwhites captured in Mexico. Unfortunately, most of these releases were made outside of the masked bobwhite's historical range, and none resulted in establishment of a viable wild population.

Searches for suitable release sites within the masked bobwhite's historical range, including Arizona's Altar Valley, began in 1969. Experimental releases made by the Fish and Wildlife Service from 1975 to 1979 led to the reestablishment of a sizeable population on the then privately owned Buenos Aires Ranch. In 1977, natural reproduction of reintroduced masked bobwhites was confirmed at this location. At its peak in 1979, this population included at least 74 calling males. However, two dry summers, coupled with commercial cattle grazing, subsequently caused a drastic population reduction. Cursory investigations in 1982 and 1983 confirmed that only a few birds remained. In 1985, additional summer surveys failed to reveal evidence of masked bobwhites on the Buenos Aires Ranch.

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photo by Steven J. Dobrott

masked bobwhite release box at Buenos Aires National Wildlife Refuge at a site that now has excellent habitat

Masked Bobwhite

(continued from previous page)

In August 1985, the Service purchased the Buenos Aires Ranch for inclusion in the National Wildlife Refuge System. Three months later, a wild adult male masked bobwhite was seen at the refuge headquarters, indicating that some birds had indeed survived.

Biologists at the Buenos Aires Refuge are once again reintroducing the masked bobwhite into its former habitat using a release technique developed by the Arizona Field Station in 1977. The method includes the use of sterilized wild-caught males of a non-endangered subspecies, the Texas bobwhite (*C. v. texanus*), as foster parents for captive-bred masked bobwhite chicks. After a brief adoption and conditioning period, these family units are released in areas believed to be good habitat for masked bobwhites. From 1985 to 1987, over 4,500 quail were released on the new refuge using this method. Tentative plans call for 5 consecutive years of releases, followed by a 2-year evaluation to determine if release procedures or habitat management practices should be modified and if additional releases are needed.

Breeding by released birds on the refuge has been documented. Although the summer rainfall that stimulates the quail to breed has been scant, one nest, two broods of hatchlings, and a subadult bird hatched in the wild have been observed. Several coveys are being monitored by radio-telemetry. Because little is known about the habitat requirements of the masked bobwhite, studying these birds will help direct future habitat management.

Today, the lush grasslands of the Altar Valley hold a brighter future for this Endangered quail, but the success of the release effort still depends on habitat recovery, weather cycles, and the ability of the released birds to survive and reproduce. The Service's goal is to establish a self-sustaining masked bobwhite population on the refuge within 10 years. If the reintroductions are successful, a unique wildlife component that has been missing from the Southwest for 80 years will be restored to its native habitat in Arizona.

APPROVED RECOVERY PLANS

Carla W. Corin
Division of Endangered Species and Habitat Conservation
Washington, D.C.

Black Lace Cactus Recovery Plan

The recovery plan for the black lace cactus (*Echinocereus reichenbachii* var. *albertii*) was approved on March 18, 1987. The plant was federally listed as Endangered on October 26, 1979, and is also listed by Texas under State law as Endangered. One of the five other varieties of *E. reichenbachii* is proposed for listing as Threatened (*E. r.* var. *chisoensis*; see BULLETIN Vol. XII No. 8), and another is under review for a possible listing proposal. Six other species in this genus are already listed as Endangered.

The black lace cactus is a particularly attractive plant, usually with a very dark purple central spine 0.08 to 0.11 inches (2 to 3 millimeters) long surrounded by 14 to 16 radial spines, white with dark purple tips, on each areole. Its pink to light purple flowers are 2 to 3 inches (5 to 7.5 centimeters) in diameter. The resulting green fruits have conspicuous long wool on the areoles. This variety grows either as solitary stems or in clumps of 5 to 12. Stems are green, 2.9 to 5.9 inches (7.4 to 15 cm) tall and 1 to 2 inches (2.5 to 5 cm) in diameter. Some morphological variation is found among the three known populations of black lace cactus, one having plants somewhat larger with well-developed central spines, which are sometimes absent on some plants in the other populations.

Echinocereus reichenbachii, the lace cactus, ranges from western Kansas to northern Mexico. Its large colorful flowers make it popular among cactus fanciers, and it is widely collected. The black lace cactus, *E. r.* var. *albertii*, has been found only in three Texas Gulf Coast counties (Refugio, Jim Wells, and Kleberg), where it grows in sandy-loam brush tracts. Other varieties of the species are usually found among rocks in limestone areas.

The greatest threat to the survival of the black lace cactus is habitat destruction. Many sites formerly home to this plant have been cleared and replanted to pasture or cropland. Grazing presents a danger, as the plants grow in openings among the brushy areas and are thus susceptible to trampling by cattle. Collecting is another threat to this and many other cacti. This plant has been especially popular because of its large, showy flowers. There has been some collecting of the black lace cactus, but apparently collectors have closely guarded their knowledge of its locations, and there is currently no evidence of collecting pressure.

All three known populations of the black lace cactus are on private land. The Endangered Species Act does not prohibit take on private land, although it does regulate interstate trade in Endangered plants. One of the Jim Wells County populations has been nearly destroyed by clearing. Another group found in that area is quite vigorous and thus far has escaped damage, although some clearing has occurred nearby and the landowner's plans are unknown. In Kleberg County, the earliest known collection was made on a high bank above a creek. This population was later destroyed by brush clearing, as was a second population found later. A surviving population (4 stands) was found in a broad band of brush along both sides of the creek, mostly in small openings among the brush. This also has

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Recovery Plans

(continued from page 7)

been probably saved from clearing by being on sloped drainage areas along a creek bed. In Refugio County, there is a large, patchy population over about 42 acres (17 hectares) adjacent to the Aransas River. During 1986 field surveys, individuals here appeared less robust than at other sites. There were fewer juveniles and some dead plants. Again, this is private land, leased for cattle grazing and petroleum activities.

The objectives of the Black Lace Cactus Recovery Plan include obtaining permanent protection of two or more of the known populations in order to consider reclassification to Threatened status. Full recovery criteria are to be established after the success of management at protected locations can be evaluated and searches for more populations are carried out. An important step has already been taken towards protection of the cactus. Landowners have been identified and are being contacted by The Texas Nature Conservancy. These people are given information about the black lace cactus and are being encouraged to protect plants on their property. One family has already joined The Nature Conservancy's Land Steward Society, thus indicating a voluntary willingness to protect their black lace cacti. It is hoped that other landowners will follow suit and will consider steps leading to permanent land protection by the Service, The Nature Conservancy, or other conservation agencies.

Research needs to be conducted on various aspects of the black lace cactus' life history. Various attempts to transplant it have not met with long term success. Population dynamics, pollinators, and the restricting soil, climate, and microhabitat requirements must be studied. Searches will be conducted for undiscovered populations, and potential safe habitat for establishment of new populations needs to be found once more specific life requirements are known. Several agencies have land within the range of the black lace cactus where it may be possible to introduce the plant. Also, propagation studies are under way, and if they are successful, a botanical garden population will be established for use in research and public education.

Another important part of the recovery plan is to curtail any collecting activity that might be discovered. People need to be reminded of trade restrictions pertaining to Endangered species, and any convictions should be publicized as a deterrent. A comprehensive trade management plan for all cacti should be developed to reduce collecting pressure, and thus improve chances of recovery for all Threatened and Endangered cacti.

drawing by Linda Ashling

black lace cactus (Echinocereus reichenbachii *var.* alberti)

Atlantic Coast Piping Plover Recovery Plan

The piping plover (*Charadrius melodus*) is a small Nearctic shorebird found only in three geographical regions. It nests on sandy beaches along the Atlantic coast from Newfoundland to South Carolina; on sandy beaches in the Great Lakes area (now only at a few sites on the upper lakes); and along major river systems, alkali lakes, and wetlands in the northern Great Plains. On January 10, 1986, the Great Lakes population was designated as Endangered and the other two as Threatened. Two recovery regions have been designated, one for the Atlantic Coast population and the other for the inland areas. The Atlantic Coast Piping Plover Recovery Plan was approved by the Fish and Wildlife Service on March 31, 1988. (The plan for the inland recovery areas was approved May 12, 1988, and will be summarized in a future edition of the BULLETIN.)

The piping plover is about 7 inches (17 centimeters) long, with a 15-inch (38-cm) wingspan. In breeding plumage, it has a light beige back and crown, white rump and underparts, and black upper tail with white edging. The spread wings have a single white stripe, and black wrist marks and trailing edges. The single black breastband and black bar across the forehead are absent from the winter plumage. Breeding birds have orange legs and a bill with a black tip; the legs fade to yellow and the bill becomes mostly black in winter. Although two subspecies (Atlantic, *C. m. melodus*, and Northern Great Plains, *C. m. circumcinctus*) were officially recognized by the American Ornithologists' Union, recent electrophoretic and other studies have not detected any differences across the bird's range.

The Atlantic Coast population nests on coastal beaches, sand spits, barrier islands, and dunes. Piping plovers have also been found nesting on dredge spoil sites of suitable material. The nest is a shallow depression or scrape, often lined with pebbles or bits of shell. Nests are seldom closer than 100 feet (30 meters) apart; the usual interval is over 200 feet (60 m). Incubation of the normally 4 eggs takes 27 to 30 days, and is shared equally by the parents. The well-camou-

(continued on next page)

drawing by J. Zickefoose

Piping plovers use a variety of methods to distract intruders from the nest site, including this "broken wing" display.

flaged chicks are precocial, leaving the nest as soon as their down is dry. Families remain together until the chicks fledge in 28 to 35 days. At that time, the birds leave the nesting territories for more communal feeding areas. Reported fledging success rates vary depending on how data are reported, but it appears that productivity in recent years has been below that needed to maintain the current population. Little is known about the winter distribution and ecology of the piping plover. It is believed, based on band recoveries and sightings, that the majority of birds that nest on the Atlantic Coast winter between North Carolina and Key West.

Piping plovers suffered, as did many other shorebirds, from shooting for the millinery trade around the turn of the century. With the passage of the Migratory Bird Treaty Act in 1918 they made a recovery, only to be impacted by habitat loss from dune stabilization and beachfront construction. Some recovery of populations occurred after the major hurricanes of 1938 and 1954, which flattened dunes and destroyed construction, rejuvenating nesting habitat. Since at least 1955 there has been a steady decrease. The 1986 breeding census found 550 pairs in the United States from Maine to North Carolina, and 240 pairs in eastern Canada. Over 80 percent of the known breeding is in Massachusetts, New York, New Jersey, and Virginia.

Major factors in the decline of the piping plover include habitat loss, human disturbance, and predation. Studies have found that nesting success is lower on recreational beaches than on undisturbed ones in the same area. Crushing of eggs and young by pedestrian and vehicular traffic and predation by cats and dogs are factors. Biologists suspect that subtle disturbances may cause disruption of territory establishment, leading to nest site abandonment. Disturbance also can result in increased chick mortality due to frequent interruption of their feeding activity. Debris and garbage left by humans may attract predators such as red foxes, dogs, cats, raccoons, opossums, striped skunks, and rats. Predation by opossums has increased as they have spread northward. Avian predators, including the northern raven, black-crowned night heron, fish crow, American crow, and certain gulls, are also a threat. Herring and great black-backed gulls have both expanded their breeding range southward in recent years, resulting both in increased predation and in displacement of plovers from historical nesting areas.

The primary objective of the recovery plan is to increase the Atlantic Coast population to 1,200 self-sustaining breeding pairs, while maintaining the current distribution for 5 consecutive years. This population could then be considered for delisting. Conservation efforts to date have involved many Federal, State, and local groups. Censusing and research studies have been ongoing for many years. Fencing and posting to divert recreational users, while generally used to protect tern nesting areas, have also been somewhat beneficial for piping plovers. There is a continuing need to direct more of this effort towards the plovers, since their nesting precedes that of terns by 4 to 6 weeks. There has been complete closure of some beach portions on National Wildlife Refuges in Massachusetts, Rhode Island, Connecticut, New Jersey, and Virginia.

The highest priority tasks in the recov-

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Virginia Co-op Unit Assists Virginia and North Carolina with Spiny Mussel Recovery

Richard Neves
Leader, Virginia Cooperative Fish and Wildlife Research Unit

Only three species of freshwater mussels in the world bear processes (spines) on their valves, and each is endemic to a river system in the Southern Atlantic Slope of the eastern United States. Although considerable disagreement exists on the proper bionomials and taxonomic relationships among these species, their scientific and common names, according to the American Malacological Union, are the Altamaha spiny mussel (*Elliptio spinosa*), Altamaha River, Georgia; Tar River spiny mussel (*Elliptio steinstansana*), Tar River, North Carolina; and James River spiny mussel (*Pleurobema collina*), James River, Virginia. The Tar River spiny mussel was Federally listed as Endangered in July 1985, and the James River spiny mussel was proposed for Endangered status in September 1987. The status of both species was reviewed in previous issues of the BULLETIN (Vol. X No. 7 and Vol. XII No. 10, respectively).

Because the biology of all three species is essentially unknown, and the Tar River species is critically endangered, the North Carolina Wildlife Resources Commission initiated a study with funds granted by the Fish and Wildlife Service under Section 6 of the Endangered Species Act to search for remnant populations in the Tar River and to conduct a life history study. Until enough specimens are located to initiate the proposed biological research, the Commission has contracted with the Virginia Cooperative Fish and Wildlife Research Unit to conduct a life history study on the related James River spiny mussel, which still occurs in sufficient enough numbers to be sampled and studied. Objectives of this research project are to describe the reproductive cycle (period of spawning, gravidity, release of glochidia) and to determine the fish hosts needed by the glochidia to attach and metamorphose to free-living juvenile mussels.

Sampling for *P. collina* began in summer 1987 in the Craig Creek drainage, Craig County, Virginia. Subpopulations were located and will be monitored in 1988 for reproductive traits. The second objective of the study will combine sampling of fishes in streams to identify likely hosts and the collection of gravid female mussels to obtain glochidia for infesting suspected hosts in the laboratory. This work will begin in spring 1988 and continue through summer 1989. If or when sufficient specimens of the Tar River spiny mussel are located, research results on the James River species should expedite the planned life history investigation. Information on the reproductive cycles of these species will be critical elements in any efforts to implement recovery actions.

Recovery Plans

(continued from page 9)

ery plan, those necessary to maintain current population status, are:

1. **Monitor population trends** through annual surveys in each State and province. This will assist in assessing the effectiveness of various management strategies and identify sites requiring more effort or different techniques. Existing survey methods are constantly being refined.

2. **Establish management programs** to improve productivity. These programs will identify landowners on whose property piping plovers nest, and provide them with protection and management recommendations.

3. **Reduce disturbance by pedestrians and off-road vehicles.** This task may involve fencing and posting of nesting areas; using permits, closures, or other restrictions to limit recreational use and access; enforcing pet restrictions; and rerouting off-road vehicle traffic.

4. **Development and employment of predator control techniques**, including investigation of the long-term impacts of predation and other disturbance on the plovers. Some indirect predator control may be accomplished by removing litter and garbage, which attract predators to beaches. More direct methods of predator removal will be studied. Limited trials of predator exclosures placed around plover nests in 1987 produced encouraging results. Testing of this technique will be expanded in 1988.

5. **Gain a better understanding of piping plover wintering ecology**. Additional surveys to determine migration and wintering areas will assist in documenting that part of the plover's life cycle and determine vital habitat characteristics, particularly on the wintering grounds. This habitat could then be protected.

6. **Develop public information**. The piping plover recovery effort has already benefitted from national news stories and magazine articles that have made more people aware of the bird's plight. Informational brochures, posters, slide/tape presentations, and other tools geared to various categories of beach users also are needed to educate the public and gain more support for the recovery effort.

Other actions needed to provide for full recovery of the Atlantic Coast population of the piping plover include creation of additional habitat by controlling vegetation encroachment, discouraging dune stabilization activities and construction in nesting areas, and encouraging well-timed use of dredge spoil to enhance or create additional nesting habitat.

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(continued from page 2)

southwest of Tucson, Arizona, in late March. In the wild, the species is known from only one locality consisting of eight individuals. The species' native population, located on the Tohono O'odham Indian Reservation, dropped from 25 plants in 1982 to only 8 plants in 1988. The transplanted seedlings were propagated from seed at the Arizona-Sonora Desert Museum and are being carefully monitored. As of May 1, 61 of the 76 transplanted individuals were flourishing in their new habitat. Fifteen of the seedlings died from what appears to have been fertilizer burn. Another lot of 76 seedlings will be transplanted in late October. The Service hopes to establish a second population of this species to ensure its survival in case the remaining eight wild plants fail.

* * *

Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*) is a narrowly endemic plant restricted to specialized soils in central Arizona. Jeanette Milne, Transition Zone Horticultural Institute, and Dr. Barbara Phillips and Dr. Art Phillips, Museum of Northern Arizona, Flagstaff, under contract with the Service, have conducted trace element and mycorrhizal analyses on the soils at two Peebles Navajo cactus sites. (Some seed plants develop symbiotic relationships with soil fungi so that root structures composed of both fungal and seed plant tissues are formed; these are known as mycorrhizae.)

The most striking microelement values were low levels of manganese, iron, and zinc. These low levels might prevent some potential plant competitors from establishing themselves in *Pediocactus* habitat. Low phosphorus levels, also characteristic of the sites, are probably important for the growth of the endomycorrhizae (in which fungal tissue actually grows within the roots of the higher plant) that characterize the roots of *P. peeblesianus*. It is typical to find mycorrhizae in very rocky, droughty soil conditions in which non-mycorrhizal plants have difficulty surviving. Mycorrhizae could provide a competitive edge for the cactus in these soils

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Regional News

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by greatly facilitating the absorption of the available water and nutrients by the cactus. Other plants might more easily compete with the cacti in other areas because of more favorable moisture conditions.

* * *

The Kemp's ridley sea turtle (*Lepidochelys kempii*) nesting season started late at Rancho Nuevo, Mexico, again this year, probably due to cool spring temperatures. The first turtle did not nest until April 21 and an additional 24 turtles nested the next day. Richard Byles, project officer for the ridley project, placed satellite transmitters on the first two turtles encountered and he has been collecting data on dive durations, surface durations, water temperatures, and locations from the turtles since the transmitters were deployed. Plans call for an additional 16 transmitters to be attached to adult ridleys by June of this year as part of a year-long movement and behavior study. An additional study was initiated this year with Kemp's ridleys in order to address tag loss with the Monel flipper tags currently in use. A new tag, the Passive Integrated Transponder (PIT) tag, is being implanted in the muscle of the left foreflipper of each turtle also tagged with a Monel tag. The PIT tags are the size of a grain of rice and are imbedded in a glass capsule. When interrogated by a hand-held reader, they emit a unique 10-digit ID code. The expected life of a PIT tag is 25 years or more.

* * *

Region 4 - A cooperative project to mark cavity trees of the Endangered red-cockaded woodpecker (*Picoides borealis*) on private lands continues to benefit the species. Initiated last year, the project is being conducted in the towns of Pinehurst and Southern Pines, North Carolina. These communities contain the largest known red-cockaded woodpecker population on private lands, estimated at about 130 birds. Approximately 600 cavity trees have been marked with 5x5-inch aluminum signs portraying the species and stating that the trees should not be cut. Each sign includes instructions to contact the North Carolina Wildlife Resources Commission or the local building inspector for information. Town planners in Pinehurst and Southern Pines have conditioned permits to prevent the destruction of marked trees. Contacts with landowners have provided a significant public relations benefit. Only one landowner did not want the trees on his property marked, and he was already aware of the trees and did not indicate any adverse feeling toward the species. As a result of this project's success, the Service hopes to secure funding to prepare generic signs that could be used on cavity trees through the Southeast. Cooperators in the North Carolina project include the Service's Asheville, North Carolina, Field Office, the North Carolina Wildlife Resources Commission, North Carolina State University, and the town planners of Pinehurst and Southern Pines.

* * *

The Asheville Field Office and the U.S. Forest Service are continuing to monitor the Bachman's warbler (*Vermivora bachmanii*) population in Francis Marion National Forest, South Carolina. This area is one of the last documented nesting sites for the species, which has a 150-year history of disappearing from its known habitat for years at a time. The monitoring, which was agreed upon by the two agencies as part of an earlier formal consultation on the species, involves the experimental cutting and regeneration of a variety of different stands within the swamp forest. It is hoped that these habitat alterations will provide suitable nesting conditions for this bird, which was last sighted in 1980 in Cuba. The bird is now considered by many to be the rarest warbler in North America.

* * *

An overlook and trail facility on the Blue Ridge Parkway in North Carolina has been designed to avoid a recently located population of Heller's blazing star (*Liatris helleri*). Park resource management staff and landscape architects cooperated with the Fish and Wildlife Service and the National Park Service to complete the project. Also, permanent monitoring plots were established to measure the effects of trampling and increased visitor use on this species. New trails and visitor facilities have just been constructed as a result of the completion of the last section of the Parkway near Grandfather Mountain.

* * *

Region 6 - Both the Service and the Wyoming Department of Fish and Game are looking optimistically toward a strong comeback by the black-footed ferret (*Mustela nigripes*). Last year, the captive breeding program at Sybille, Wyoming, produced seven kits. The births brought to 25 the number of ferrets in captivity, but one died of cancer in January. Most of the 15 females have bred this spring, and up to 50 kits may be born in captivity in late May or early June. Dr. Tom Thorne, Wyoming Game and Fish Department, cannot provide guarantees, but there is great hope based on experience gained from last year's success.

Plans are under way to establish a second captive breeding population this summer. Wyoming and the Service advertised for different zoos to express an interest in providing facilities to house the second ferret population. It has been decided that establishing a second captive population would avoid having "all of our eggs in one basket" and would safeguard the species from extinction due to disease, fire, or some other unexpected catastrophe. Several proposals have been received in response to the advertisement, and a decision on the site of the second captive breeding facility should be made soon.

With optimism for success of the captive breeding effort, the Service, in cooperation with other State and Federal agencies, is beginning to identify major prairie dog complexes that may be suitable for reintroduction sites. Through the Interstate Working Group, which currently represents 9 of the 14 States in the ferret's historic range, groups are mapping prairie dog complexes. Once they are mapped, they will be prioritized from a biological standpoint as to their suitability for ferrets. With good captive reproduction, establishment of a wild population could be attempted as early as 1991. Other reintroductions would follow in succeeding years. The Recovery Plan identifies the need for 10 widely distributed populations.

* * *

The final recovery plan for the North Park phacelia (*Phacelia formosula*) has been printed and distributed. There are nine known locations of this plant, which is only found in Jackson County, Colorado. Threats to its survival include off-road vehicle activity; livestock grazing, trampling, and trailing; and coal, oil, and gas development. The plan calls for protection of existing populations and research on the species' habitat and biology. Recovery plans can be purchased from the Fisn and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852 (telephone toll-free at 800/582-3421).

* * *

A study of the Uncompahgre fritillary butterfly (*Boloria acrocnema*) was conducted in 1987, but a second year of studies must be conducted before the status of the species can be determined. The study will be jointly funded by the Fish and Wildlife Service, Forest Service, and Bureau of Land Management. After the results of the second year of study are known, these agencies will work together to develop conservation measures for the species. It is currently known to inhabit a small number of alpine meadows in Colorado.

* * *

Region 8 - The Florida Cooperative Fish and Wildlife Research Unit and the National Ecology Research Center are involved in an interagency study of the ecology of West Indian manatees (*Trichechus manatus*) in the Cumberland Sound region of Georgia. One purpose of this study is to determine the potential effects on manatees of dredging in the Sound. This information is needed to mitigate human-caused manatee deaths throughout the manatee's summer range. Through radio telemetry, manatees are studied during the spring and summer when they are present in the Cumberland Sound region. Time spent in the region by tagged manatees, areas of greatest use,

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Regional News

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and manatee behavior (particularly feeding behavior) are being noted.

In 1987, four radio-tagged manatees were studied in Cumberland Sound. Two had been tagged in March at Fernandina Beach in Nassau County, Florida, and two that were radio-tagged in Brevard County, Florida, migrated to Cumberland Sound in May. Tagged manatees were present in the region throughout the spring and summer at various times. Several areas were repeatedly used by tagged as well as untagged manatees. They were observed to feed at high tide on *Spartina* growing at the water's edge. As part of the study, another manatee was radio-tagged February 25 at Fernandina Beach.

* * *

Biologists from the Patuxent Wildlife Research Center's Hawaii Research Station assisted State personnel in a comprehensive nonbreeding-season population survey of the Endangered palila (*Loxioides bailleui*) on February 2-4, 1988. The evaluation was conducted on the wooded slopes of Mauna Kea, the last remaining habitat of this bird. A total of 219 palila were recorded at 65 of 150 stations censused on 10 transects. The population was estimated to be 4,350 birds (with a 95 percent confidence range of 3,199 to 5,517 birds). This latest estimate reflects a 26 percent increase over the July 1987 count. The increasing trend since 1985 is encouraging; however, the palila is still restricted to only a small portion of the apparently suitable habitat on Mauna Kea.

In February, Hawaii Research Station staff biologists completed an aviary study to quantify potential behavioral effects of radio telemetry transmitters on the palila. Results indicated that the behavior of palilas with "placebo" transmitters was not different from that of control birds without transmitters. Following the aviary study, a full-scale radio telemetry study on free-ranging palilas began on February 22 to determine palila habitat selection and use, daily movement patterns, and home range. Ten adult palilas (five males, three females, two of unknown sex) have since been mist-netted, weighed, measured, banded, and fitted with operational radio transmitters weighing approximately 1.3 grams.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	25
Birds	61	15	145	7	3	0	231	59
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	41	2	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	29	0	2	0	0	0	31	22
Crustaceans	5	0	0	1	0	0	6	21
Insects	8	0	0	7	0	0	15	12
Plants	140	6	1	33	3	2	185	70
TOTAL	328	49	467	99	19	39	1001	269 **

Total U.S. Endangered 377
Total U.S. Threatened 118
Total U.S. Listed 495

Recovery Plans approved: 229
Species currently proposed for listing: 22 animals
26 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive Ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
April 30, 1988 36 plants

May 1988 Vol. XIII No. 5

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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June-July 1988 Vol. XIII Nos. 6-7

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Protection Extended to Three Plants

Carla W. Corin
Division of Endangered Species and Habitat Conservation
Washington, D.C.

During June 1988, three plants were added to the Federal list of Endangered and Threatened species. Protection under the Endangered Species Act is now available to the following:

Daphnopsis hellerana

This Puerto Rican plant, an evergreen shrub or small tree, is so rare that it has no common name. The species is found near the San Juan metropolitan area in only two populations of about seven plants each. Two other historical populations have been lost to urbanization, limestone quarrying, land clearing, and other human activities. One of the known sites, although on Commonwealth (Land Authority) land, is subject to construction and quarrying activities. The other is on land leased from the National Institutes of Health by the University of Puerto Rico Medical School for a primate research center. Both the Land Authority and the primate research center have expressed a willingness to cooperate in the protection of the plant. *Daphnopsis hellerana* was proposed for listing as an Endangered species in the July 6, 1987, *Federal Register* (see summary in BULLETIN Vol. XII No. 8), and the final rule was published June 23, 1988.

Lakeside Daisy (*Hymenoxys acaulis* var. *glabra*)

This herbaceous perennial with attractive yellow flowers is known from only a few sites on Manitoulin Island and the Bruce Peninsula in Ontario, Canada, and from scattered locations over 4 square miles of private land on the Marblehead Peninsula in Ottawa County, Ohio. The survival of the Ohio population is threatened by limestone quarrying and natural succession to woody growth over its open prairie habitat. Efforts are under way by the Ohio Department of Natural Resources to acquire one of the Marblehead Peninsula sites populations to provide protection against ongoing quarrying activities. The Lakeside daisy was proposed for listing as Threatened on August 19, 1987 (summary in BULLETIN Vol. XII No. 9), and the final listing rule was published on June 23, 1988.

Cumberland Sandwort (*Arenaria cumberlandensis*)

Unlike most species of the genus *Arenaria*, which grow in hot, dry, sunny environments, this herbaceous perennial requires cool, moist, shady sites that are found on sandstone rock faces in Tennessee and Kentucky. Its four Tennessee sites on public and private land are being affected by hikers and other recreationists, logging, and people excavating for Indian artifacts. The Kentucky site in Daniel Boone National Forest is subject to the same threats.

The Cumberland sandwort is listed by the State of Tennessee as endangered, and as such is provided some protection. Although it is listed as endangered on Kentucky's unofficial list, it is provided no protection by that State. Federal listing as an Endangered species was proposed on July 6, 1987 (see BULLETIN Vol. XII No. 8), and the final rule was published on June 23,1988.

Listing Proposal is Withdrawn

The Fish and Wildlife Service published a notice in the June 23, 1988, *Federal Register* withdrawing its November 4, 1987, proposal to list the Miami palmetto (*Sabal miamiensis*), a small palm restricted to Dade County, Florida, as an Endangered species. Information received subsequent to the proposal indicates that the characteristics used to separate *Sabal miamiensis* as a distinct species fall within the range of variation found in populations of the scrub palmetto (*Sabal etonia*), a widespread species. The Service believes that this information is substantial enough to place the taxonomic validity of *Sabal miamiensis* into doubt.

Further publications on *Sabal* systematics are expected. In the event that the taxonomic disagreement about *Sabal miamiensis* is resolved in favor of it being a distinct species or variety, the Service will consider proposing it again for listing.

photo by LuRay Parker © 1987 Wyoming Game and Fish Department

The population of black-footed ferrets at Wyoming's breeding facility has grown to 58 animals. Some of this year's largest litters were produced by ferret kits born just last year (above). For more news on these animals, see Regional News, page 6.

Regional endangered species staffers have reported the following news from May and June:

Region 1—Regional personnel participated in two training sessions on endangered species issues in Oregon for the U.S. Forest Service. Section 7 consultation and Oregon's listed species were two subjects presented to approximately 100 Forest Service staffers (predominantly biologists, but also foresters and land managers).

* * *

Fish and Wildlife Service representatives appeared before the California Fish and Game Commission in May to present the Andean condor (*Vultur gryphus*) experimental release proposal and to address any concerns the Commissioners might have. No opposition was voiced by the public or the Commissioners. The Commission voted unanimously in favor of the project and amended the current Memorandum of Understanding on condors to include the experimental release.

On May 20, 1988, the Service's Portland Regional Director signed a Finding Of No Significant Impact and a decision document on the experimental Andean condor release. This represents the final go-ahead for the 2-year project that will involve the release, study, and recapture of up to 20 young Andean condors in Ventura County as a means of testing potential release sites and techniques that can be used in the eventual reestablishment of California condors (*Gymnogyps californianus*) in their native range. Up to 10 young Andean condors are scheduled for release this August at the Hopper Mountain National Wildlife Refuge and Sespe Condor Sanctuary.

* * *

Seventy five percent of the California least terns (*Sterna antillarum browni*) nesting in the three Orange County colonies were killed recently in a rash of predation. The major culprit is the red fox (*Vulpes vulpes*). Trapping efforts on Seal Beach National Wildlife Refuge have not kept up with the influx of foxes, although 140 had been trapped and removed as of mid-June.

* * *

The Service's Great Basin Complex in Reno, Nevada, is participating in the 1988 census of snowy plovers (*Charadrius alexandrinus tenuirostris*) in the western States. The census is being coordinated by the Oregon Department of Fish and Wildlife. Volunteers are being used to survey key nesting areas of this bird, which is a category 2 candidate for a future listing proposal.

* * *

Dr. John Hafernik, an entomology professor at San Francisco State University, recently reported that Bay checkerspot butterflies (*Euphydryas editha bayensis*) have been rediscovered at a historical collection locality near Mt. Diablo in Contra Costa County, California. This population was thought to have been extirpated by the last severe drought. The County plans to construct a small water storage reservoir in the watershed within which these butterflies occur.

* * *

A joint Federal/State/local government task force has been established to focus on Kern County (San Joaquin Valley), California, endangered species issues.

(continued on page 3)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-235-2771)
Marshall P. Jones, *Chief,*
Office of Management Authority
(202-343-4968)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Rolf L. Wallenstrom, *Regional Director;* David F. Riley, *Assistant Regional Director;* Wayne S. White, *Endangered Species Specialist.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* James Johnson, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director and Acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrowe, *Endangered Species Specialist (202- 653-8762).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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Regional News

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The task force met in Bakersfield, California, on April 21, 1988, to define objectives. The primary objective is to develop a plan to conserve listed species (State and Federal) and high priority listing candidates in conjunction with proposed development in the County. The mood of the task force members was optimistic, even though they realized the difficulty of the task. The planning area encompasses the known range of the blunt-nosed leopard lizard (*Gambelia silus*), San Joaquin kit fox (*Vulpes macrotis mutica*), and giant kangaroo rat (*Dipodomys ingens*). Listed species have been declining in California's San Joaquin Valley due to agricultural development, urban expansion, and oil and gas production. The task force hopes to address these and other threats.

* * *

The Service was informed by Dr. Michael Hadfield of the University of Hawaii's Department of Zoology that 80 percent of one adult population of the Endangered Oahu tree snail (*Achatinella* sp.) was lost recently to rat (*Rattus* sp.) predation. This particular population had been studied for 5 years and had been considered relatively stable. The reasons for the increase in rat predation are not known.

* * *

The Nature Conservancy of Hawaii closed escrow on the purchase of the 400-acre Sutton parcel at Hakalau Forest National Wildlife Refuge on April 13, 1988. Once subdivisions are completed next month, the Service will purchase 100 percent interest in the parcel from The Nature Conservancy for the appraised value of $360,000. The refuge protects important habitat for some of Hawaii's endangered forest birds.

* * *

A meeting was held among Regions 1 and 2 of the Service, the California Department of Fish and Game, and the Bureau of Land Management concerning the potential listing of the flat-tailed horned lizard (*Phrynosoma mcalli*). It was decided that Region 1 would take the lead because the threats there are better documented. A remaining question is the status of the animal in Mexico. The California Department of Fish and Game supports the listing, and the Bureau of Land Management does not oppose it.

* * *

Region 1 staffers assisted the California Departments of Transportation and Fish and Game in the design of a water delivery system and management plan for improving habitat for the Endangered Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) at Valencia Lagoon in Santa Cruz County. A nearby well will provide a dependable water supply to the lagoon, especially important during drought years. This may help to attract salamanders away from an adjacent water channel that requires periodic sediment removal.

* * *

As part of a compensation package for the destruction of valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) habitat by the Gold River housing project, 10 acres of land adjacent to the development in the American River Parkway near Sacramento, California, are being revegetated with elderberry trees. The revegetation effort, which consists of transplanting elderberry bushes to restorable riparian sites within the Parkway, began in February 1988. A visit to the site on April 26 revealed that elderberry longhorn beetles had emerged recently from the transplanted trees. One beetle had been observed on the site earlier that day by the biological consultant monitoring the project. We hope to determine the extent to which it is possible to successfully transplant elderberry trees and have beetles survive inside the transplants. Although these preliminary observations are encouraging, it is too early to predict how many of the transplanted trees will ultimately survive and provide long-term habitat for the beetle. We also do not know the reproductive or emergence success of beetles inhabiting the transplanted trees.

* * *

Region 2—Seventeen members of the Arizona Native Plant Society helped Service biologists search for *Agave parviflora* ssp. *parviflora*, a category 1 listing candidate, on the Buenos Aires National Wildlife Refuge in southern Arizona. Three previously unknown populations of this plant were found within the Refuge boundaries and another population was found on Coronado National Forest lands just outside the Refuge. The presence of this attractive agave on Refuge lands means that this species will be protected on the western edge of its range.

* * *

Permanent monitoring plots were established this spring for the endangered Cochise pincushion cactus (*Coryphantha robbinsorum*) and two category 1 listing candidates, the sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*) and acuna cactus (*Neolloydia erectocentra* var. *acunensis*). The Cochise pincushion cactus is threatened by collecting and habitat degradation. The single population of the sentry milk vetch numbers fewer than 500 plants and occurs on the South Rim of the Grand Canyon where it is threatened by trampling. The acuna cactus appears to be declining due to unknown causes, and two of the three known populations are now being monitored.

* * *

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Chinese River Dolphin Proposed for Listing Protection

Gloria Thompson
National Marine Fisheries Service

In response to a petition from the Center for Environmental Education, the National Marine Fisheries Service (NMFS) proposed May 18, 1988, to list the Chinese river dolphin (*Lipotes vexillifer*) as Endangered. According to the petition, this dolphin is found primarily in the lower and middle sections of the Chang Jiang (Yangzte) River in the east central region of mainland China.

The NMFS, which has responsibility under the Endangered Species Act for most rare marine animals, had determined that the petition presented substantial scientific information and had solicited comments concerning the status of the Chinese river dolphin. Comments were received from the U.S. Fish and Wildlife Service (FWS) and Chen Peixun of the Institute of Hydrobiology in the People's Republic of China. Both favored listing the species as Endangered. A status review was also conducted by Robert L. Brownell, Jr., (FWS) and William Perrin and Doug DeMaster (NMFS).

The status review indicates that the population size has declined drastically since the species was originally described. Between 1979 and 1981, it was determined that fewer than 400 occurred in the middle and lower reaches of the Chang Jiang River. The total world population currently consists of an estimated 300 individuals, of which about 100 occur in the lower reaches of the river. The species is listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and is classified as endangered on the International Union for the Conservation of Nature and Natural Resources (IUCN) 1986 Red List of Threatened Animals. Factors relevant to the dolphin's population decline are (1) reduction in prey availability resulting from overfishing, pollution, and loss of nursery areas for migratory fish species and (2) explosions associated with river construction projects and illegal fishing.

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Arizona supports a unique desert population of nesting bald eagles (*Haliaeetus leucocephalus*), and the Service coordinates the equally unique Arizona Bald Eagle Nest Watch Program to monitor the birds during their breeding season. This year, 19 nest watchers monitored 20 active nests from February to June for both human and natural disturbances that threatened successful fledging of the nestlings. Fortunately, the season was a big success with a record 24 fledglings, 2 more than the previous high. Nest watchers played a vital role in establishing this new high by rescuing three nestlings that fell from their nests before they were ready to fly. In each case, nest watchers were able to place the young eagles back into their nests unharmed.

* * *

The U.S. recovery team for the whooping crane (*Grus americana*) approved draft criteria for establishing a captive whooping crane flock within Canada. All birds and eggs will remain the property of the Canadian and U.S. Governments, which will be responsible for use or disposition of the birds. The site must be funded by non-Federal money. Groups that might be interested in housing the flock will be canvassed and invited to apply.

Objectives of the facility will be to increase the numbers of birds and eggs for release into the wild, reduce the chance of an epizootic destroying the captive breeding program, afford Canadians an opportunity to view whooping cranes, and allow Canada to participate more actively in the captive propagation program. The goal is to have the first whooping crane on site by 1990.

* * *

Aransas National Wildlife Refuge in Texas has completed a study of whooping crane habitat losses along the Gulf Intracoastal Waterway. The study was initiated because of concern about steady erosion of marshes along the Waterway. The erosion is a consequence of: (1) wave action caused by boat wakes; (2) wave action due to wind; (3) sloughing from the banks due to underwater suction after barges pass; and (4) sloughing due to maintenance dredging, which steepens the bottom gradient.

Measurements from aerial photographs taken since 1930 documented the changes caused by construction and maintenance of the Waterway. In the 11.9 miles of the Waterway within the Aransas Refuge, 1,485 acres of whooping crane habitat have been degraded or destroyed. An estimated 335 acres of crane habitat have been created or enhanced by the placement of dredged material, resulting in a net loss of 1,150 acres. Measurements along fixed land points indicate an annual loss of 3 feet of tidal marsh adjacent to the Waterway. This problem is being discussed with the U.S. Army Corps of Engineers.

* * *

Surveys by Canadian Wildlife Service biologists in May located 30 whooping crane nests within Wood Buffalo National Park, Northwest Territories, Canada. Twenty-seven eggs were picked up in late May and a single viable egg was left in each visited nest. The 27 transferred eggs are a new record. Dr. Rod Drewien was given 12 viable eggs for cross-fostering in sandhill crane (*Grus canadensis*) nests at Grays Lake National Wildlife Refuge in Idaho because he believed the habitat would support that number despite the drought. Ten of the 12 hatched, one was eaten by a predator, and the embryo in the other egg died. Fifteen of the Wood Buffalo Park eggs, nine of them viable and six either infertile or containing dead embryos, were transferred to the Patuxent Wildlife Research Center in Laurel, Maryland, where the nine good eggs hatched. The six unhatched eggs will be tested for environmental contaminants.

* * *

Welder Flats, which provides coastal habitat for 11 to 13 wintering whooping cranes, is one of the first areas protected under the new Texas Coastal Preserve System. The system is designed to protect fragile biological communities. The 1,500-acre Welder Flats Unit contains mud flats and shallow-water feeding habitat across San Antonio Bay from Aransas National Wildlife Refuge. The Welder Flats property is owned by the Texas General Land Office and leased to the Texas Parks and Wildlife Department for management within the system.

* * *

A report on the status of the Mexican garter snake (*Thamnophis eques megalops*) and the narrow-headed garter snake (*Thamnophis rufipunctatus rufipunctatus*) in Arizona was completed recently for the Service by the Arizona Game and Fish Department. The report documents declines in both species and points out threats from bullfrog and exotic fish predation; human killing of snakes; and habitat damage resulting from overgrazing, water diversion, and general watershed degradation. Of 79 localities sampled, the Mexican garter snake was found in 21 and the narrow-headed garter snake was found in only 10.

Neither subspecies is restricted to Arizona; *T. r. rufipunctatus* also occurs in southwestern New Mexico, while *T. e. megalops* has one known locality in southwestern New Mexico and others in Sonora and Chihuahua, Mexico. Because more information is needed on the status and distribution of both snakes, they will be retained as category 2 listing candidates.

* * *

An attempt at captive propagation of Gila trout (*Salmo gilae*) began recently with the transfer of 36 adult fish and 1,800 eggs from the wild to Mescalero National Fish Hatchery in New Mexico. The fish came from Main Diamond Creek in the Aldo Leopold Wilderness and the eggs came from McKnight Creek in the Gila National Forest. Hatchery Manager Dean Chase developed a unique "cookie jar" egg incubation system which has proven very successful in hatching the eggs and starting the fry on feed. From approximately 2,300 eggs he expects to obtain at least 1,500 "swim-up" fry. The goals of the Gila trout program are to (1) develop hatchery culture techniques for the species, (2) build a captive brood stock, and (3) produce enough offspring for reintroduction in native habitat.

* * *

Region 3—Peregrine falcon (*Falco peregrinus*) reintroduction efforts in the midwest are progressing toward establishment of a wild, self-sustaining population. Four pairs of peregrines in Minneapolis and St. Paul, Minnesota; Toledo, Ohio; and Chicago, Illinois, are known to have hatched at least 10 chicks. Another two pairs are nesting on the Wisconsin cliffs along the Mississippi River and are believed to be incubating eggs. Four additional pairs, all judged too young to successfully nest this year, are defending territories. Two of these pairs are at urban sites and the others are at natural cliff sites. Prospects are good for some of these four pairs to produce chicks next year. Meanwhile, hacking efforts are continuing; there are plans to release 80 to 100 young peregrines in Region 3 this year. A mix of urban and "natural" hack sites will be used, as well as one site on the wall of an abandoned iron mine pit in northern Minnesota.

The peregrine reintroduction program in Region 3 is a highly coordinated effort currently involving six States, three Federal agencies, the University of Minnesota, The Nature Conservancy, the Chicago Peregrine Release, and the St. Louis Peregrine Restoration Project. Drs. Patrick Redig and Harrison Tordoff have taken the lead in keeping the program running smoothly.

* * *

As of June 1, the Service knew of eight populations of an Endangered plant, the running buffalo clover (*Trifolium stoloniferum*). Three are in Indiana, one is in Kentucky, three are in Ohio, and one is in West Virginia. Historically, this plant was known to occupy a range extending from Kansas into West Virginia. A recently completed survey funded by the Service in Indiana revealed the three populations there. Additional Service-funded surveys are proceeding in Ohio and Illinois, and a fourth will soon commence in Missouri. The draft recovery plan calls for considering the species for reclassification to Threatened status when 30 secure, self-sustaining populations are known. When

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Manatees on the Move

Glenn Carowan, Manatee Coordinator
Jacksonville, Florida, Field Office

The West Indian (Florida) manatee (*Trichechus manatus*) was in the spotlight recently as two of these critically endangered marine mammals were set free on the Merritt Island National Wildlife Refuge and another pair was featured in a new exhibit at Walt Disney World's Living Seas in Epcot Center.

Magoo and Hillary were released on the Merritt Island Refuge on June 7 after being rehabilitated at Sea World of Orlando. Magoo, a 722-pound male manatee, had spent more than 5 years recuperating from what appeared to be chemical burns received in a drainage canal, and Hillary, an 880-pound female, was rescued in February 1988 after becoming entangled in a shrimp net. At their release site in the Banana River, both manatees were equipped with radio transmitters to assist Fish and Wildlife Service researchers in tracking their movements and in determining their reacclimation to the natural environment. As of June 18, both manatees were still doing well, and had joined other wild manatees.

At Disney World's Epcot Center, Jean Pierre and Lorelei were relocated on June 1 to a 200,000-gallon undersea environment at the Living Seas exhibit. The exhibit was designed to recreate conditions identical to the underwater world at Homosassa Springs, Florida, where the two manatees had been held since 1986 following their relocation from Miami Seaquarium. Lorelei, the 13-year-old, 815-pound female, was the first manatee conceived and born in captivity. Jean Pierre was rescued as an orphaned calf in 1980. Since neither manatee could be released to the wild after such extended periods of captivity, the Service and the Florida Department of Natural Resources endorsed placing them in the exhibit at Living Seas. This exhibition will provide an opportunity for in-depth behavioral and life history studies, and will significantly benefit public awareness efforts. It is hoped that exposing the manatees to the 8 to 10 million international tourists who annually visit the attraction will promote a greater desire to protect manatees in the United States and other parts of the world.

Walt Disney World guests view West Indian manatees close-up at Epcot Center in a 200,000-gallon saltwater enclosure constructed specially for the rare mammals. Two manatees have a new home at the Living Seas as part of a research facility that will also provide visitors information about these endangered animals.

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the species was listed in June 1987 as Endangered, it was known to survive at only one site in the wild, and the population contained only 18 plants. The new findings on the running buffalo clover are a fine example of the importance of Federal listing in spurring survey and protection efforts for little-known species.

* * *

Region 4—The southern Appalachian Mountains are experiencing better than expected success in peregrine falcon restoration efforts. Peregrine releases in the region began in 1984. A model based on past data had predicted that first pair establishment would take place in 1988 and first reproduction would occur in 1989. However, results ran 2 years ahead of predictions, with first pair establishment in 1986 and first reproduction in 1987.

Five pairs of birds, all in North Carolina, have already been confirmed this year; reports of two additional pairs and several single birds also have been received. Since the model predicted only one pair in 1988, the results are five to seven times what had been expected by this point. The model predicted 20 breeding pairs by 1994 and 26 breeding pairs by 1996. It seems likely that these goals also will be achieved sooner than expected. This success is probably attributed to greater survival of peregrines from fledging to one year of age; the model had assumed only 45 percent survival the first year. The greater survival is believed to be at least

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partially the result of benefits gained from experiences in other Regions.

* * *

Tennessee Valley Authority biologists found a freshly-dead, 4-year-old specimen of the Endangered tan riffle shell mussel (*Epioblasma walkeri*) in an area of the Duck River in west central Tennessee that is being considered for impoundment by the Columbia Dam. This mussel, one of the most endangered of the federally listed mussels, is known to survive in only two other rivers — the Middle Fork Holston River and the Clinch River, both in southwestern Virginia. Both rivers contain only small populations. The Tennessee Valley Authority will conduct further surveys of the Duck River.

* * *

The Asheville, North Carolina, Field Office has negotiated a cooperative agreement with the Arkansas Game and Fish Commission for the production of a booklet on the bats of the eastern United States. The booklet will follow the format of "The Bats of Arkansas: A Valuable Resource," written by Dr. M. J. Harvey, which is produced and distributed by the Commission. The new booklet will expand on the earlier publication, covering all bats found in the eastern United States. The four federally listed endangered bats found in the east and the four eastern bats that are currently candidates for addition to the Federal list will be given special emphasis. The booklet will include color photographs of most of the eastern bats and brief summaries of their life histories. The status, natural values, and ecological roles of these unique flying mammals also will be discussed.

Human misunderstanding and fear of bats have been a significant factor in their decline in the United States. Informational publications such as this will assist in alleviating this fear and misunderstanding. Funds for this publication are being provided from Region 4's prelisting recovery program. Region 3 is also contributing funds to purchase copies of this publication, which is scheduled for distribution by July 1989.

* * *

The small-anthered bittercress (*Cardamine micranthera*), a plant historically known from only 2 counties in North Carolina and presumed extinct for 3 decades, was recently rediscovered in Stokes County, North Carolina. Subsequent searches of remaining suitable habitat by personnel of the Asheville Office and the North Carolina Natural Heritage Program resulted in the location of two additional sites. All three of the existing populations are small (one consists of three plants) and are vulnerable to disruption of the fragile streamside seepage habitat they occupy. The Asheville Office is preparing a proposal to list the species as Endangered.

* * *

Region 5—In early May, non-game biologists with the West Virginia Department of Natural Resources checking squirrel boxes in West Virginia found seven Endangered northern flying squirrels (*Glaucomys sabrinus fuscus*) in a single nest box. The animals were apparently all adults of both sexes. The reasons for their aggregation at this time of year are unknown.

* * *

A study is being conducted in West Virginia this summer to determine the impacts of gypsy moth (*Lymantria dispar*) control on Endangered Virginia big-eared bats (*Plecotus towndsendii virginianus*). The concern is not that the control methods would affect the bats directly, but that they could decrease the bats' food supply (primarily moths) at a time of maximum energy demand for the bats, such as when females are nursing their young. Researchers from West Virginia University are collecting guano samples from the bats and are sampling insects from treated and untreated areas to determine which "non-target" moth species, if any, are decreasing in association with gypsy moth control efforts, and whether these moths figure importantly in the bats' diet.

* * *

Recent observations of two pairs of Threatened piping plovers (*Charadrius melodus*) and their chicks on the Delaware coast revealed that these birds do not remain in the immediate vicinity of their nests after hatching. Chicks are capable of rapid movement and were seen feeding in dune areas more than 900 feet north and south of their original nest location within 2 days of hatching. Unfortunately, chick mortality was high. Within 10 days of hatching, only one of seven chicks remained alive. Some chicks disappeared overnight and likely were victims of predation. The deaths of others could be directly or indirectly attributed to the impacts of heavy human and vehicular use of the birds' preferred feeding areas.

* * *

A recovery meeting was held this spring at Great Dismal Swamp National Wildlife Refuge to begin development of a recovery plan for the Threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*). The plan will be written to be consistent with refuge management objectives. It is expected that refuge management practices will be of key importance in recovering this shrew.

* * *

Another recovery planning session was held this spring at Blacksburg, Virginia, for the Endangered Peter's Mountain mallow (*Iliamna corei*). Some recovery work has already been carried out by the State of Virginia, in cooperation with researchers at Virginia Polytechnic Institute and State University, using funds provided by the Service under Section 6 of the Endangered Species Act. Most of this work concentrated on keeping the small handful of plants alive through last year's drought and determining the conditions needed for seed production and germination.

* * *

The Maryland Heritage Program will conduct studies this summer, also using Section 6 funds, on the status and habitat requirements of the harperella (*Ptilimnium nodosum*), which was proposed in February 1988 for listing as Endangered (see proposal summary in BULLETIN Vol. XIII No. 3). In another project, the Maryland Heritage Program will study management and transplant feasibility for Canby's dropwort (*Oxypolis canbyi*), a plant listed in 1986 as Endangered.

* * *

A study will be conducted this summer to review the taxonomy of two listing candidates in the genus *Bacopa* that grow in freshwater tidal habitats in Virginia. This research, which is being conducted with prelisting recovery funds, will determine whether or not the plants are distinct taxa. If they are, these plants will very likely warrant listing proposals.

* * *

Region 6—As of June 28, 13 of the 15 female black-footed ferrets (*Mustela nigripes*) at Wyoming's captive breeding facility had produced litters. Some of the largest litters were produced by ferrets born just last year. There are now 34 kits at the facility, giving us a total population of 58 ferrets. As mentioned in last month's BULLETIN (Vol. XIII No. 5), there is considerable concern about having all of the known ferrets in one location. Region 6's Chief of Endangered Species and Environmental Contaminants, along with two people from the Wyoming Game and Fish Department, recently toured three zoos (in Minneapolis, Minnesota; Omaha, Nebraska; and Washington, D.C.) that had submitted proposals to provide facilities for housing and breeding the ferret. A determination will be made soon as to the location of the new facility.

The people of Chevron Corporation recently donated $10,000 to the University of Wyoming to support research related to reintroduction of the black-footed ferret. Chevron also contributed $5,000 last year to assist in the captive breeding effort.

* * *

The Service's Grand Island, Nebraska, Field Office has been involved in an active public information program regarding the interior populations of the least tern (*Sterna antillarum*) and piping plover. It is working with the Service's Law Enforcement Division, Nebraska Game and Park Commission's Law Enforcement Division, National Audubon Society, Sierra Club, and Platte River Whooping Crane Trust to protect these species dur-

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Piloting a New Course

Michael Sweet
Missouri Department of Conservation

In September 1986, two teenage boys decided to explore an inactive iron ore mine at Pilot Knob Hill near Arcadia, Missouri. While others had passed through this dangerous rite of boyhood without serious injury, these youths were not as lucky and they suffered a nearly fatal accident. The episode, however, had one positive result: the ultimate protection of a major hibernaculum for an Endangered bat.

As they headed out toward one of the 13 entrances, called the "Devil's Icebox," a wall collapsed and trapped one of the boys, crushing both of his legs. After 19 hours, rescue workers extracted him from the rubble using hydraulic jacks and air bags. The potential for another collapse was so great that the workers left behind the equipment, which was worth more than $50,000. Another boy was apprehended attempting to liberate the equipment the following week.

The injury and obvious potential for future accidents led many local citizens to demand the closure of all of the mine entrances. This sentiment increased as residents remembered that the hilltop was an attractive vantage point for viewing a Civil War battle reenactment in the valley below Pilot Knob. However, closing the entrances would also seal the fate of one-fourth of the world's Indiana bat (*Myotis sodalis*) population. Although Missouri abounds in caves, only a few caves and mines have the temperature and moisture characteristics, along with the lack of human disturbance, that this Endangered bat needs to survive the winter. Approximately 140,000 Indiana bats hibernate in Pilot Knob Mine, which has not operated since 1890.

These factors brought together an unusual group of interests in an effort to prevent future accidents and, at the same time, save the Indiana bat population. The property owner, Pilot Knob Ore Company, was involved, as were representatives of the Fish and Wildlife Service, Missouri Departments of Conservation and Labor Standards (Mine Safety), Commissioners of Iron County, several private conservation organizations, and many interested individuals.

After all was said and done, the owner decided to donate the peak of Pilot Knob (90 acres) to the Service for protection of the bat population. The area is now managed as a satellite of the Mingo National Wildlife Refuge. To prevent future accidents, the Missouri Department of Conservation is spending $43,000 to construct a barbed wire-topped chain link fence around the area containing the entrances. Ninety percent of this cost will be reimbursed by the Service from funds appropriated by Congress under Section 6 of the Endangered Species Act. Entry to this dangerous inactive mine is now prohibited, and violations can result in a fine of up to $20,000 and/or a year imprisonment.

These Indiana bats must cluster densely in a cold cave to maintain proper temperatures with minimum energy expenditure. Of all available caves, only a few are suitable for their hibernation. Pilot Knob Mine fortunately has the particular characteristics that duplicate the cave habitat needed by this endangered species.

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ing their nesting season. News releases, posters, and public service announcements and interviews on Nebraska television and radio stations have been used to encourage the public to avoid disturbing nesting colonies along the Platte River wherever possible. Local businesses that could directly disturb the species (such as sand and gravel companies) have been asked to display posters in conspicuous areas to remind people of the birds' presence. Businesses and organizations that could have indirect impacts on the species (such as those that sell recreation equipment or four-wheel drive and all-terrain vehicles) also are displaying the posters. Volunteers are participating in a "Tern Corps" that watches nesting colonies during times of heavy human use.

* * *

Research funded by the Bureau of Reclamation and the Colorado Division of Wildlife, and conducted by researchers from the Larval Fish Laboratory at Colorado State University in Fort Collins, Colorado, recently led to the capture of two humpback chubs (*Gila cypha*) and a Colorado squawfish (*Ptychocheilus lucius*) in a canyon of the lower Little Snake River in Colorado. The Little Snake River is a tributary of the Yampa River in northwest Colorado. The discoveries were made as part of a radio-tracking study of adult Colorado squawfish that were originally tagged in the Yampa River.

There have been scattered reports of Colorado squawfish and humpback chub in the Little Snake River, but very little sampling had been done to confirm those reports. Because of its widely fluctuating flows, it was previously assumed that the Little Snake River was important only for input of seasonal flows and sediments to the Yampa River. Followup studies will seek to determine if Colorado squawfish and humpback chub use the Little Snake River for spawning.

Fishery surveys of the San Juan River, which originates in southwestern Colorado and flows through the northwestern corner of New Mexico into southeastern Utah, indicate that the San Juan River may be more important to the recovery of the Colorado squawfish than previously believed. In 1987, 6 adult and 20 young-of-the-year Colorado squawfish were captured in the San Juan. So far in 1988, three adult squawfish and one razorback sucker have been captured. Past studies of the San Juan have resulted in only incidental capture of Colorado squawfish. Studies to be conducted in fiscal years 1988 and 1989 will attempt to determine the abundance and distribution of rare fishes in the San Juan River in Utah and New Mexico, assess habitat potential and possible limiting factors, and describe current and likely future hydrologic conditions

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of the river. Results of these studies are needed to develop a draft recovery management plan for the San Juan River.

* * *

Region 8—Two whooping cranes from the captive flock maintained at the Patuxent Wildlife Research Center died in late May. Twenty-seven other whooping cranes were examined and found to be very thin. They were administered supportive care consisting of fluid therapy, intestinal protectants, vitamin supplements, antibiotics, and anabolic steroids for 5 to 17 days. The cause of the problem is still being investigated. A possible food-borne toxin causing food aversion is considered the most likely explanation and is supported by necropsy findings by the National Wildlife Health Research Center in Madison, Wisconsin. Feed samples have been sent to six laboratories for nutrient, bacteriologic, environmental contaminant, and mycotoxin analyses. The remaining whooping cranes are still being monitored but no longer require medical care.

* * *

A captive-produced Puerto Rican parrot (*Amazona vittata*) chick that hatched on May 14 died 6 days later. In addition, a new wild Puerto Rican parrot pair at Cacique exhibited abnormal behavior near its nest on May 14; when inspected on May 15, the nest was empty. On May 17, the South Fork 1 pair behaved in an unusual manner, and a nest inspection on May 18 revealed two dead chicks and a pipped egg that had failed to hatch. The pair did not accept a replacement chick. Both pairs have subsequently abandoned their nests. All three dead chicks were sent to the National Wildlife Health Research Center for necropsy; the diagnosis was aspiration pneumonia and bacterial pneumonia.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	25
Birds	61	15	145	7	3	0	231	59
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	41	2	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	29	0	2	0	0	0	31	22
Crustaceans	5	0	0	1	0	0	6	21
Insects	8	0	0	7	0	0	15	12
Plants	142	6	1	34	3	2	188	70
TOTAL	330	49	467	100	19	39	1004	269 **

Total U.S. Endangered 379
Total U.S. Threatened 119
Total U.S. Listed 498

Recovery Plans approved: 229
Species currently proposed for listing: 22 animals
23 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive Ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
June 30, 1988 36 plants

June-July 1988 Vol. XIII Nos. 6-7

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

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Sea Turtle Conservation in the Southeastern Continental United States

Earl Possardt
Southeastern Sea Turtle Coordinator
Jacksonville, Florida, Field Office

Sea turtles, large air-breathing reptiles that spend almost their entire lives at sea, have existed for at least 100 million years. These remarkable animals swam the earth's oceans in countless numbers until recent times, when they have declined because of commercial exploitation, habitat alteration, incidental take by commercial fisheries, and other factors. Of the seven generally recognized species, six are listed by the United States as Endangered or Threatened.

Nesting Habitat

The southeastern United States coast, especially in Florida, provides nesting habitat for four listed species of sea turtles. About 15,000 female loggerhead turtles (*Caretta caretta*) nest annually on these beaches. This population is second in size only to the estimated 30,000 loggerheads nesting each year in the Sultanate of Oman. These aggregations comprise approximately 90 percent of the world's known population. Ninety percent of the loggerhead nesting in the United States occurs in Florida, 2 percent in Georgia, 6 percent in South Carolina, and the remaining 1 to 2 percent in North Carolina. In comparison, green turtle (*Chelonia mydas*) nesting in the continental United States is much lower, with 150 to 250 females nesting annually on east-central and southeast Florida beaches. Leatherbacks (*Dermochelys coriacea*) nest even less frequently in the continental United States, with fewer than 20 to 25 females nesting in Florida each year. The hawksbill (*Eretmochelys imbricata*) rarely nests in the continental United States.

The critical plight of the Kemp's ridley (*Lepidochelys kempii*), which only rarely nests in the United States (Texas), is well documented. An estimated 100,000 to 300,000 clutches of eggs were deposited annually on its major nesting beach in Mexico prior to 1947. This plummeted to an estimated 2,000 to 3,000 nests by the 1960's. Nesting has continued to decline, with 737 nests recorded in 1987. The decline of loggerheads is less dramatic, but recent evidence from nesting surveys in South Carolina and tagging studies in Georgia point to a 5 and 3 percent annual decline, respectively, on nesting beaches in these States. Recorded green turtle nesting in the southeastern United States has been recovering in recent years, from 59 nests in 1979 to 746 in 1985. Although more thorough surveys partially account for these higher numbers, comparison of beaches monitored over this period indicates a true nesting increase.

(continued on page 3)

photo by Earl Possardt

Kemp's ridley sea turtle, the only listed species that normally nests in daylight, at Rancho Nuevo, Mexico

Listing Protection Proposed for Seven Species

The Fish and Wildlife Service proposed during July to list seven taxa — two mammals, two mollusks, and three plants — as Endangered or Threatened species. If the proposals are later made final, full Endangered Species Act protection will be extended to the following:

Two Florida Beach Mice

Extensive development of beachfront habitat is threatening a number of beach mouse (*Peromyscus polionotus*) taxa in the southeastern United States. At least one subspecies on Florida's Atlantic Coast is already believed to be extinct, and three others found near the Florida/Alabama border are listed by the Service as Endangered (see BULLETIN Vol. X No. 7). In July, the Service published a proposal (F.R. 7/5/88) to add another two subspecies, the **Anastasia Island beach mouse (*P. p. phasma*)** and the **southeastern beach mouse (*P. p. niveiventris*)** to the Federal list of Endangered and Threatened wildlife.

Beach mice are burrow-dwelling mammals that depend on natural coastal dune habitat. They cannot survive in areas that

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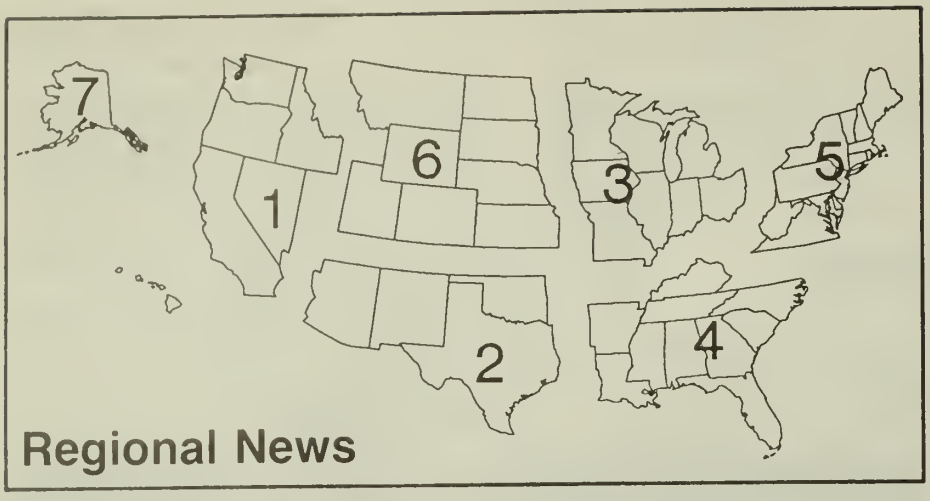

Regional News

Regional endangered species staffers have reported the following news from June and July:

Region 1 — Fish and Wildlife Service representatives attended the annual meeting of the Interagency Grizzly Bear Committee (a group of State and Federal agency directors and managers who advise and direct grizzly bear (*Ursus arctos*) recovery efforts in the conterminous United States). The meeting was hosted by the Committee's North Cascades Working Group, an organization of State and Federal biologists and land managers whose purpose is to oversee the evaluation of bear habitat and the status of the bear in the North Cascades ecosystem.

Two public meetings were conducted, one on each side of the Cascade Mountains. The purpose of the meetings was to expose the public to concepts of grizzly bear management in the North Cascades and to gather public responses. Considerable concern was voiced about translocation of grizzly bears into the North Cascades ecosystem. The public was assured that the Service has no plans at this time for translocating grizzly bears into this ecosystem.

* * *

Region 2 — A wild male sandhill crane (*Grus canadensis*) was captured at Grays Lake National Wildlife Refuge in Idaho during August 1987, shipped to Patuxent Wildlife Research Center in Maryland, and paired with a captive-reared female. A good pair bond seemed to be established and the pair was shipped to Grays Lake in May. They were held in an enclosure in the marsh for several weeks and then released. They continued to behave like a pair immediately after their release, but they later separated. This test of force-pairing was an effort to see how whooping cranes might respond in similar circumstances.

* * *

The 1988 breeding season in Arizona for the bald eagle (*Haliaeetus leucocephalus*) was a record breaker. A total of 24 young fledged this year from 23 occupied breeding areas. The previous high was in 1985 when 22 young were fledged from Arizona nests. Two new breeding areas were discovered this year, bringing the total of known breeding areas in Arizona to 27. This number is up significantly from 1971, when we knew of only one bald eagle breeding area in the State.

The Arizona Nest Watch Program continues to contribute to the recovery of this population by monitoring all active nests during the breeding season. This season, nestwatchers were directly responsible for saving four young eaglets—placing three stranded nestlings back into their nests and removing a large fishing lure from the beak of the fourth, thus saving it from starvation.

The current Arizona bald eagle ecology study is in its second year. One of the more interesting findings is that all radioed juveniles disperse in June, fly north for the summer, then return to their desert natal areas in the fall of the same year. A male juvenile eagle that was banded and radio-tagged during the 1987 season migrated to Yellowstone Lake in Wyoming in June 1987 and returned to Arizona in September. He then returned to Yellow-

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-235-2771)
Marshal P. Jones, *Chief,*
Office of Management Authority
(202-343-4968)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Regional 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Erwin "Wally" Steucke; *Acting Regional Director;* David F. Riley, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* Conrad A. Fjetland, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director and Acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrow, *Endangered Species Specialist (202-653-8762).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

THE ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

Approved Listing Rules

During July 1988, final listing rules were approved for two fishes, a mussel, a mammal, and two plants. Endangered Species Act protection is now available to the following:

• **shortnose sucker (*Chasmistes brevirostris*)** and **Lost River sucker (*Deltistes luxatus*)**—These fishes are restricted to the Klamath Basin of south-central Oregon and north-central California. Dams, draining of marshes, diversion of rivers, and dredging of lakes have reduced the range and numbers of both species by more than 95 percent. Both are jeopardized by continued loss of habitat; hybridization with more common fishes; and competition with, and predation by, non-native species. No significant recruitment of young into the population has occurred for about 18 years. Both species were proposed for listing as Endangered on August 26, 1987 (see summary in BULLETIN Vol. XII No. 9), and the final rule was published in the July 18, 1988, *Federal Register*.

• **James spinymussel (*Pleurobema collina*)**—This small freshwater clam, endemic to the James River drainage of Virginia and West Virginia, survives in only 5 to 10 percent of its historical range. It is in danger of extinction from water quality degradation and invasion of its habitat by the exotic Asiatic clam (*Corbiculata fluminea*). The September 1, 1987, proposal to list the James spinymussel as Endangered (see BULLETIN Vol. XII No. 10) was made final July 22, 1988.

• **Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*)**—A small, hopping mammal with elongated hind legs, the Tipton kangaroo rat was distributed historically in dry, open scrub habitat in the Tulare Lake Basin of the San Joaquin Valley, California. Conversion of native wildlands for agricultural production has eliminated the species from about 96 percent of its known former range. Much of the remaining habitat is highly fragmented and long-term survival of the species in these areas is not ensured. The Service proposed listing the Tipton kangaroo rat on July 10, 1987, as Endangered (see BULLETIN Vol. XII No. 8), and the final rule was published July 8, 1988.

• **Houghton's goldenrod (*Solidago houghtonii*)**—A perennial in the family Asteraceae, this plant grows to a height of about 30 inches (77 centimeters) and bears flat-topped clusters of relatively large yellow flowers. It is native to beach flats along the northern shores of Lakes Michigan and Huron. Currently, its range is reduced to 39 sites in 8 Michigan counties and several sites in Ontario, Canada. The main threats to its survival are residential development of beachfront habitat, off-road vehicle use and certain other recreational activities, and rising lake levels. The August 19, 1987, proposal to list Houghton's goldenrod as a Threatened species (BULLETIN Vol. XII No. 9) was made final on July 18, 1988.

• **Pitcher's thistle (*Cirsium pitcheri*)**—This plant, another member of Asteraceae, also grows to about 30 inches high. Among its distinguishing characteristics are the white-wooly, deeply divided leaves and cream-colored or yellowish flowers. Pitcher's thistle occurs along the sandy shores of the Great Lakes, primarily on stabilized, well developed dunes. Its range includes sites in Indiana, Michigan, Wisconsin, and Ontario. Although there have been few documented losses of complete populations, many colonies have been reduced in size and are therefore probably less able to reclaim disturbed areas. Because this plant grows along lakeshores, its habitat is likely to become increasingly vulnerable to development and recreation. The Service proposed on July 20, 1987, to list Pitcher's thistle as Threatened (see BULLETIN Vol. XII No. 8), and the final rule appeared in the July 18, 1988, *Federal Register*.

Sea Turtles

(continued from page 1)

Aquatic Habitat

The coastal marine environment of the southeastern United States provides equally important habitat for sea turtles. The bays, sounds, and nearshore waters from Chesapeake Bay to Laguna Madre in Texas are rich sources of benthic invertebrates, such as mollusks, sponges, and horseshoe crabs, which are the primary prey for juvenile and adult loggerheads. Green turtles, although greatly diminished from historical numbers, still graze on the coastal sea grass pastures of Florida's east coast and the Gulf of Mexico. Flotillas of leatherbacks are also occasionally sighted within several miles of shore feeding on concentrations of their principal food, jellyfish and other soft-bodied animals. Adult Kemp's ridleys, when away from their nesting beach in Mexico, are primarily associated with nearshore and inshore habitat in the Gulf of Mexico. Juveniles are found in these same habitats in the Gulf and along the South Atlantic coast. Both juvenile and adult Kemp's ridleys prey on the abundance of crabs found in these waters.

photo by Blair Witherington

green sea turtle digging its nest

Threats on Land and at Sea

Sea turtles face serious danger throughout all life history stages. Threats on the nesting beaches include the destruction of nesting habitat from natural or human-accelerated beach erosion and the construction of sea walls, riprap, or other devices to protect oceanside property. Artificial lighting in developed areas disorients hatchlings when they emerge at night. Significant hatchling mortality can result as the young turtles crawl toward the lights. The same lights may deter some females from nesting, particularly green turtles, which appear to be more sensitive to this factor. High-rise condominiums and exotic Australian pines can shade nests and alter the natural sex ratio, since incubation temperature influences the gender of the embryos as they develop. Beach nourishment projects can

(continued on page 4)

Sea Turtles

(continued from page 3)

disrupt nesting turtles, destroy nests, and leave beach sand too compact for subsequent nesting. Predators, such as raccoons, feral hogs, ghost crabs, and in some cases man, take a heavy toll of eggs on many nesting beaches.

Other dangers are encountered at sea. Probably the most serious threat to sea turtles in the South Atlantic and Gulf of Mexico is shrimp trawling. The National Marine Fisheries Service (NMFS) has estimated that nets from shrimp vessels drown over 11,000 sea turtles annually. Other commercial fisheries in these waters cause additional deaths but to an unknown degree. Marine pollution from oil and human refuse is another documented threat. Three percent of Florida's sea turtle strandings between 1980 and 1985 were linked to the ingestion of tar balls or were otherwise related to petroleum. Leatherbacks die from impaction of their digestive systems after ingesting plastic bags which resemble jellyfish, their primary food item. Boat strikes also take a toll; in Florida, for example, between 1980 and 1985, 23 percent of stranded turtles had evidence of propeller wounds or cracked carapaces from boat collisions. It is unknown, however, what percentage of these wounds occurred pre- or post-mortem.

photo by Earl Possardt

Beachfront development can have serious impacts on sea turtle reproduction.

photo by Earl Possardt

This undeveloped beach may be protected as part of the Indian River acquisition proposal.

Research, Conservation, and Protection

Fortunately, sea turtle conservation is a truly cooperative effort, and many organizations, agencies, and universities are working together to improve the odds for these species. The NMFS, which is responsible for sea turtle protection in the marine environment, has been working on regulations that require shrimp vessels 25 feet or more in length to use turtle excluder devices (TEDs) in their trawls at certain times. This is probably the single most important action taken for sea turtle conservation since the 1970's, when the six listed sea turtle species were given Endangered Species Act protection. (The recent legislation reauthorizing the Endangered Species Act contained a provision to delay the implementation of the TEDS regulations.) A long-term tagging project at Cumberland Island National Seashore by the University of Georgia has provided not only the best data available on loggerhead nesting population dynamics, but also a unique opportunity to evaluate the effectiveness of TED regulations on a nesting population of loggerhead turtles.

The Fish and Wildlife Service (Service) is acting to increase hatchling production for the 6 to 10 percent of the sea turtles in the Southeast that nest on national wildlife refuges each year. Predation is being reduced by screening nests and removing raccoons, and nests are being relocated on beaches that are experiencing severe erosion. The Air Force, Marine Corps, National Park Service, many Florida State Parks, South Carolina Wildlife and Marine Resources Department, some local communities (such as the City of Boca Raton, Florida), Greenpeace, Caretta Research Inc., and many volunteers implement similar programs.

An excellent example of interagency cooperation and success is at Cape Canaveral, Florida, where 4,000 to 5,000 clutches are deposited annually on the 42 miles (68 kilometers) of beaches managed by the National Park Service, Merritt Island National Wildlife Refuge, and the Air Force. Nest protection efforts by these agencies in 1987 resulted in over 60 percent of the nests producing hatchlings. Without these efforts, raccoon and hog predation would have destroyed over 95 percent of the nests. The Service has funded researchers from the University of North Carolina (Wilmington), University of Toronto, and the Kennedy Space Center to determine the natural sex ratio of hatchlings on southeastern nesting beaches. This information will be used to evaluate nest relocation projects that may be inadvertently skewing the natural sex ratio.

A 22 mile (35 km) stretch of beach between Melbourne Beach and Wabasso Beach, Florida, accounts for approximately 25 percent of all green and loggerhead nesting in the United States. Nesting densities reach 800 nests per kilometer on some segments. The Service and Florida Department of Natural Resources are developing acquisition proposals which would protect an estimated

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9 miles (15 km). With 5 miles (8 km) already publicly owned by Brevard County and the State, a total of about 14 miles (23 km) of this crucial nesting habitat could eventually be protected for sea turtles and other wildlife.

Many coastal communities are passing lighting ordinances to reduce hatchling mortality. Brevard County instituted the first such ordinance for Florida in 1985. Prior to implementation of the ordinance, researchers at the University of Central Florida had documented hatchling disorientation at approximately 12 percent of the nests on a 13-mile (21 km) study area in south Brevard County. The year after the lighting ordinance became effective, hatchling disorientation was reduced to about one percent.

The Army Corps of Engineers Waterways Experiment Station in Vicksburg, Mississippi, has been involved in testing the response of hatchlings to various artificial light regimes, with some promising possibilities for compatible beachfront lighting. The newly created Sea Turtle Research Center at the University of Florida, Gainesville, will continue to pursue the problem of hatchling disorientation and search for non-detrimental light systems. The Corps also is engaged in evaluating sand compaction levels on natural and nourished beaches, the impacts of compacted beaches on turtle nesting, and the effectiveness of tilling as a means to ease beach compaction. This summer, University of Indiana researchers will explore hatchling orientation mechanisms and mortality factors in the Florida nearshore and offshore marine environment.

The Minerals Management Service is funding studies to determine the abundance of sea turtles around offshore oil rigs in response to concern about sea turtle mortality from the removal of oil rigs by explosives. It also funded a recent study by the University of Miami on the effects of oil on sea turtles to better evaluate risks from offshore oil development.

photo by David Goethe

A hatchling loggerhead represents hope for the survival of the species.

Sea turtle population studies in the Indian River, Florida, by the University of Central Florida have documented a high incidence of fibropapillomas, a tumorlike condition, in green turtles. Research on the etiology of these large wart-like growths is being conducted at the University of Florida's School of Veterinary Medicine.

The NMFS station at Panama City, Florida, is conducting studies of juvenile Kemp's ridley and green sea turtles in the northeastern Gulf of Mexico. Its Beaufort, North Carolina, laboratory will soon initiate sea turtle population studies in Pamlico and Core Sounds in North Carolina with the cooperation of the State and the Service.

Education

The cornerstone of a successful sea turtle conservation program is education. One organization, the Center for Environmental Education (Sea Turtle Rescue Fund) in Washington, D.C., is providing information to the public through newsletters, bilingual sea turtle education kits, and pamphlets. The Florida Power and Light Company, NMFS, and South Carolina Wildlife and Marine Resources Department also have produced educational brochures. The Service has developed a bilingual slide-tape program, entitled "America's Sea Turtles," which is available on loan from most of the Service's coastal field stations and the Atlanta and Albuquerque Regional Offices. In Florida, "sea turtle walks" conducted by Florida Power and Light, Canaveral National Seashore, several State parks, and other organizations are very popular and inspire a lasting interest in sea turtle conservation.

While it is evident that much work and research is being conducted, and progress has been made on some critical issues, the survival of the listed sea turtles is by no means assured. The success or failure of some management actions cannot be determined until many years after implementation. Only continued or even increased conservation efforts will determine whether these ancient creatures, which have roamed the seas for over 100 million years, survive or are driven to a premature extinction.

Earthwatch volunteers with a nesting leatherback sea turtle at Sandy Point National Wildlife Refuge in the U.S. Virgin Islands

Listing Proposals

(continued from page 1)

have been altered by condominium developments and other construction. Beach mice also are threatened by the influx of non-native animals associated with human habitation, including such predators as free-roaming house cats and competitors like the house mice (*Mus musculus*) that colonize adjacent dune grasslands. As a result, beach mouse populations in many areas have been either eliminated or fragmented into small colonies.

Historical records indicate that the Anastasia Island beach mouse once occurred from the mouth of the St. Johns River at Jacksonville (Duval County) to the southern end of Anastasia Island (St. Johns County). Currently, viable populations are believed to exist only at the ends of Anastasia Island on public land (Anastasia State Recreation Area to the north and Matanzas National Monument to the south). A proposed bridge scheduled for construction in the early 1990's would lead directly into the limited habitat of the southern population. It could be detrimental to the survival of the mouse in that area unless planners can find ways to avoid or offset impacts. This subspecies was proposed for listing as Endangered.

The southeastern beach mouse historically inhabited coastal dune habitat from Ponce (or Mosquito) Inlet (Volusia County) south to Hollywood Beach (Broward County). In the late 1800's, it was considered extremely abundant from Palm Beach to the northern limit of its range. Extensive surveys in recent years, however, found that urbanization apparently has eliminated the southeastern beach mouse from most of its southern range. Good populations still occur on protected habitat within Cape Canaveral National Seashore and Merritt Island National Wildlife Refuge. Because this subspecies is vulnerable but in somewhat less critical danger than the Anastasia Island beach mouse, the southeastern beach mouse was proposed for listing as Threatened.

With publication of the listing proposal, a Federal agency whose activities are likely to jeopardize the survival of these beach mice is required to confer with the Service. In the case of Fort Matanzas National Monument, the National Park Service will need to ensure that the new bridge proposed for Matanzas Inlet will not jeopardize the Anastasia Island beach mouse on park property. Under the National Flood Insurance Program, the Federal Emergency Management Agency also will have to confer with the Service if any flood insurance that it authorizes will permit and/or in effect subsidize construction that could jeopardize either of the two beach mice. It is not known at this time, however, whether or not any Federal activities will actually be affected by consultations.

Magazine Mountain Shagreen (*Mesodon magazinensis*)

The Magazine Mountain shagreen is a dusky brown or buff colored snail approximately 0.5 inch (13 millimeters) long and 0.3 inch (7 mm) high. It is found only in cool, moist crevasses within rock slides on the north slope of Magazine Mountain in Logan County, Arkansas. Because of its extremely limited range, this snail is vulnerable to any land use changes that would alter the rock slide habitat. Accordingly, the Service has proposed listing the Magazine Mountain shagreen as a Threatened species (F.R. 7/5/88).

Magazine Mountain is relatively separated from other mountains in the region and is regarded as an "island" ecosystem that provides habitat for a number of endemic animal and plant taxa. One or more of these endemics will probably be proposed for listing following the assimilation of additional data. The mountain, which lies within the Ozark National Forest, is classified by the U.S. Forest Service as a Special Interest Area and is being considered for designation as a Research Natural Area.

The Arkansas Department of Parks and Tourism is interested in developing Magazine Mountain as a State Park and has applied for a special use permit from the Forest Service, although the State may also request a land exchange. Any construction (e.g., structures, roads, trails) or recreational activitiesassociated with a State Park could threaten the snail if the rock slides on the north slope are disturbed. The U.S. Army also would like to use the National Forest in this area for training exercises. The Forest Service will be required to confer with the Fish and Wildlife Service before allowing any activities in the National Forest that would be likely to jeopardize the snail.

Speckled Pocketbook Mussel (*Lampsilis streckeri*)

Another Arkansas species, this freshwater mussel is restricted to the Middle Fork of the Little Red River with a current range of not more than 6 miles in Van Buren and Stone Counties. The speckled pocketbook has an elliptical yellow or brown shell up to 3 inches (76 mm) long with chevron-like spots and obvious rays. Impoundments, channelization, and water pollution eliminated this mollusk from other parts of the Little Red River system where it historically occurred. The current population is estimated at only a few hundred individuals, and the Service has proposed to list the speckled pocketbook mussel as Endangered (F.R. 7/25/88).

Federal agencies whose activities could affect the survival and recovery of the speckled pocketbook include the U.S. Army Corps of Engineers and the Environmental Protection Agency (EPA). The Corps conducts channel maintenance for flood control on the Archey and South Forks of the Little Red River, both of which contained habitat for the mussel until they were channelized. It is considered possible that sections of habitat in both forks could be renovated and populations of the speckled pocketbook reestablished. The EPA could be involved through efforts to restore water quality within the species' range.

Autumn Buttercup (*Ranunculus acriformis* var. *aestivalis*)

This plant, a herbaceous perennial in the buttercup family (Ranunculaceae), is endemic to the upper Sevier River Valley in western Garfield County, Utah. Its habitat consists of peaty hummocks in a freshwater marsh. Livestock grazing has extirpated the autumn buttercup from its type locality and reduced its single known

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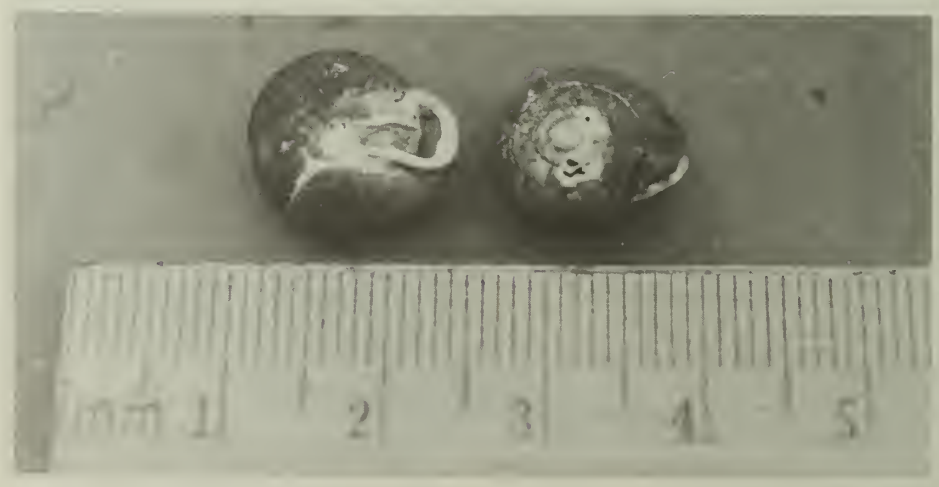

photo Ronald F. Caldwell

Magazine Mountain shagreen

drawing by K. H. Thorne

*autumn buttercup (*Ranunculus acriformis *var.* aestivalis*)*

remaining population by over 90 percent in the past 5 years. Approximately 11 individuals survive on less than 0.01 acre of privately owned land that is highly vulnerable to continued grazing and habitat modification. Believing the species to be in imminent danger of extinction, the Service has proposed to list it as Endangered (F.R. 7/22/88).

The landowner has tentative plans to increase the size of the spring-fed pond immediately to the north of the autumn buttercup site. That action could subject the population to further grazing and trampling pressure. The owner, however, may be willing to allow construction of a protective fence. The Great Basin Field Office of The Nature Conservancy has purchased an option to acquire the site. Also, the Center for Plant Conservation, through The Arboretum at Flagstaff, has obtained two seedlings and will attempt to propagate them.

Two Colorado Plants

Two wildflowers endemic to the shale badlands of north-central Colorado have been proposed for listing as Endangered species (F.R. 7/5/88). Both species are characterized by the clusters of showy flowers they bear. The **Osterhout milk-vetch (*Astragalus osterhoutii*)** is a tall, rush-like plant with linear leaflets and bright green stems that reach up to 40 inches (100 centimeters) in height. Each inflorescence bears 12 to 25 white flowers that measure about one inch (2.5 cm) across. The **Penland beardtongue (*Penstemon penlandii*)**, another herbaceous perennial, belongs to the snapdragon family (Scrophulariaceae). A shorter plant, it produces linear leaves and several clumped, pubescent stems up to 10 inches (25 cm) tall. There are 5 to 15 brightly bicolored flowers on each inflorescence. The blooms measure about 0.6 inch (1.5 cm) wide and have blue lobes with a violet throat.

Both species are endemic to Middle Park, a sagebrush basin in Grand County. The beardtongue is known only from one area. The milk-vetch occurs at the same area but also at small sites scattered over a 12-mile region, with most along the Muddy Creek drainage. The Bureau of Land Management (BLM) administers most of the land on which both species are found. A portion of the beardtongue site has been impacted by mineral exploration.

The main threat to the Osterhout milk-vetch is the proposed Muddy Creek Reservoir. Construction of a high dam would inundate approximately 14 percent of the known plants, and a low-dam alternative would flood about 8 percent. Although the expected direct impacts are small, potential secondary effects could threaten another 60 percent of the milk-vetch habitat. The degree of secondary impacts would be the same under both of the reservoir alternatives. Most of these associated effects would result from the construction of recreational facilities and from increased ORV use by visitors drawn to the area. The habitat is currently susceptible to habitat damage from off-road vehicle (ORV) use. Additionally, the fragile soils, steep topography, and arid environment in the badlands exacerbate ORV impacts.

The Service has worked with the Colorado River Water Conservation District (the main proponent of the dam), the District's consultants, and the BLM on development of a draft environmental impact statement for the reservoir project. Potential mitigation measures that may be proposed include fencing milk-vetch habitat from ORV use, measures to reduce other harmful impacts from recreation, and population monitoring efforts. The Corps of Engineers will be involved in project evaluations due to the need for a construction permit under Section 404 of the Clean Water Act. Both agencies also are now subject to the interagency conferral provisions of the Endangered Species Act.

* * *

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and forwhich jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, the rule on take is different; the prohibitions against collecting and destruction apply only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against take of listed plants.

Regional News

(continued from page 2)

stone Lake for his second summer. Some migrating juveniles have been tracked as far north as British Columbia and Manitoba, Canada. Equally interesting is the speed at which they migrate. This year, one of the juveniles traveled 420 miles in one day! A total of 39 juvenile eagles have been banded and 10 of them carry radio transmitters.

The first survey of wintering bald eagles in the Grand Canyon was conducted in January. Eighteen eagles in one day were observed foraging on trout at the mouth of Nankoweap Creek.

* * *

Grand Canyon National Park is sponsoring a 3-year survey to determine the productivity of peregrine falcons (*Falco peregrinus*) in the Canyon and to develop a monitoring handbook. Surveys conducted this spring resulted in the discovery of 26 eyries. The researchers estimate that only 40 percent of the available

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Regional News

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peregrine habitat was surveyed this spring and that the actual number of eyries could be between 60 and 70. These estimates, if borne out, indicate that the Grand Canyon may support the largest concentration of peregrines for an area its size in North America.

* * *

Region 4 — The Service's Asheville, North Carolina, Field Office, in cooperation with the U.S. Forest Service and the National Park Service, is sponsoring a cave management seminar at Gatlinburg, Tennessee, March 8–11, 1989. The seminar will be conducted by the American Cave Conservation Association, a private nonprofit organization at Horse Cave, Kentucky, that is dedicated to the protection of cave and karst resources in the United States. The seminar program will involve professional cave managers from Federal and State agencies, the academic community, and private organizations like The Nature Conservancy. In the past, the Association has conducted seminars for the National Park Service, the U.S. Forest Service, and the Bureau of Land Management. The emphasis of the Gatlinburg seminar will be on the Endangered, Threatened, and listing-candidate species that are associated with, or are dependent on, cave and karst systems. For more information about the seminar, contact Bob Currie, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801 (telephone 704/259-0321 or FTS 672-0321).

* * *

Region 6 — Representatives of Region 6 also attended the Interagency Grizzly Bear Committee's annual meeting. A special Committee task force recently reviewed the status of the grizzly bear population in the Yellowstone ecosystem, which includes 9,600 square miles of rugged habitat. Because of the difficulty of counting the Yellowstone bears, total numbers cannot be accurately determined. However, the results of the recent survey show that there were at least 45 adult female grizzly bears in the ecosystem as of 1985, as compared to a minimum of 32 adult females known to be alive in 1983. Based on the number of females actually counted each year, the task force estimated that there were a minimum of 170-180 grizzlies in the ecosystem in 1985 and that the population is now increasing at a rate of up to about 2 individuals per year.

There are probably more then 170-180 grizzly bears alive now in the Yellowstone ecosystem. This marks the first time the Yellowstone grizzly bear population has shown an increase since 1975, when the grizzly was declared a Threatened species in the conterminous 48 States. The increase is believed to be partially a result of interagency management programs and increased efforts to find existing bears. The increase in the population is cause for optimism, but continued intensive management and public support are essential for the survival and long-term recovery of the grizzly bear in the Yellowstone ecosystem.

* * *

Bald eagles have successfully nested in North Dakota for the first time since 1975. Two adult bald eagles and a fully feathered nestling were observed in June 1988 in trees along the Missouri River near Garrison Dam. The birds were observed on several other occasions, and in early July a warden for the North Dakota Game and Fish Department observed both adults and the fledgling flying near the nest.

* * *

Region 6 has printed and distributed copies of the Dwarf Bear-poppy (*Arctomecon humilis*) Recovery Plan. The plant was listed as Endangered in 1979, and is restricted to the eastern edge of the Mojave Desert in Washington County, Utah. Past impacts to the species have resulted from highway construction and expansion of the city of St. George. The most severe current threats to the plant are off-road vehicles and continued urban development. Recovery actions will include restrictions on off-road vehicle use and public information on the species' plight.

* * *

Region 8 (Research) — The Patuxent Wildlife Research Center reports that 50 active palila (*Loxioides bailleui*) nests have been located in the Mauna Kea study area on the Island of Hawai'i. Nesting success has been calculated to be 47 percent, with most of the successful nests fledging just one bird.

There has been poor success with the radio telemetry studies of the endangered palila during the breeding season. The radios placed on 7 birds ceased to operate within 5 days of release. This is in contrast to successful radio tracking of palilas for up to 28 days during the nonbreeding season. The birds mutually preen one another during the breeding season and appear to be damaging or removing the radios.

Approved Recovery Plans

Carla W. Corin

Under the Endangered Species Act, the Fish and Wildlife Service is responsible for developing and carrying out recovery plans for all listed domestic species under its jurisdiction. Accordingly, recovery plans were recently approved for the following species:

Blue Ridge Goldenrod

The Blue Ridge goldenrod (*Solidago spithamaea*) is a perennial herb 4 to 8 inches tall with yellow flowers blooming from July to September. It is a member of a large and taxonomically complex genus in the equally large and complex aster (Asteraceae) family. This species, found only in limited areas of the Blue Ridge Mountains in North Carolina and eastern Tennessee, is one of the few southeastern representatives of a widely distributed group of goldenrod species abundant in more northern alpine localities. It inhabits rock outcrops, ledges, cliffs, and balds at elevations generally above 4,600 feet (1,400 meters). *S. spithamaea* is possibly a relict from a cooler, moister time, surviving at these higher elevations when the climate warmed.

The Blue Ridge goldenrod was federally listed as Threatened on March 28, 1985. It is also listed as threatened by North Carolina and endangered by Tennessee under their State provisions to protect threatened and endangered species. The Federal law prohibits taking plants from Federal lands without a permit and regulates interstate trade. Both States prohibit taking without a permit and landowner's permission, and North Carolina also regulates intrastate trade.

The life history of *S. spithamaea* is little known. Although various hymenopterous insects have been seen on the flowers, the pollinators have not been identified. The goldenrod appears to spread vegetatively by extending rhizomes, and presumably reproduces by seed, but the relative importance of each method of reproduction is unknown.

The main potential threats to the Blue Ridge goldenrod are impacts associated with recreation, including loss of habitat to development and trampling by climbers,

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drawing by Susan Sizemore

Blue Ridge goldenrod

hikers, and sightseers. Natural succession, climatic extremes, erosion, and possibly acid precipitation are other factors. At present, there are three known populations: on National Forest land at Roan Mountain; at Grandfather Mountain, a commercial recreation site; and at Hanging Rock, a ski area under development. Three additional historical sites are known, but all have been extensively developed since the original collections and no Blue Ridge goldenrods have been found there in over 50 years. Three other reported sites have been searched repeatedly over the past 7 years with no success.

The primary objective of the recovery plan approved by the Fish and Wildlife Service on October 28, 1987, is to attain 5 self-sustaining, protected populations of the Blue Ridge goldenrod. At that level, the plant could be considered for removal from the Federal Endangered and Threatened Species List. To achieve this goal, the three known populations need to be protected, and two more either discovered or reestablished in the plant's historic range.

Currently, the most vigorous populations are at the Grandfather Mountain site. A conservation agreement has been in place since 1983 among the Service, North Carolina Department of Agriculture, and Grandfather Mountain, Inc. The owner of Grandfather Mountain has been very cooperative in conservation efforts for the goldenrod and other rare species on his property. On the other hand, the population on Roan Mountain (a massif on the North Carolina/Tennessee border that provides habitat for a number of listing candidates) is not as secure. The U.S. Forest Service, despite efforts to protect the *S. spithamaea* populations at its Roan Mountain site by blocking access to unauthorized "bushwhacked" trails, has had problems in some areas with trampling of plants and damage to habitat by hikers and sightseers. A closure order for one Forest Service site is successfully protecting the species at that isolated location. The plants at the Hanging Rock ski area in North Carolina are on a steep cliff face, and the owner and developer have expressed a willingness to cooperate in their protection.

Besides continuing efforts to protect these three populations, the Service plans to conduct population studies and ecological research on the Blue Ridge goldenrod. Information gathered during these studies may be used to develop a more specific management strategy, which may include reintroduction of the plant to suitable sites in its historic range.

Ringed Sawback Turtle

The ringed sawback turtle (*Graptemys oculifera*) was listed on December 23, 1986, as a Threatened species. This small freshwater turtle is found only in the Pearl River and one of its tributaries, the Bogue Chitto River, in Mississippi and Louisiana. In the Pearl River, it has been collected from near the coastal salt water influence upstream to Neshoba County, Mississippi. The highest densities are above the Ross Barnett Reservoir and below the confluence with the Strong River in Simpson County. In the Bogue Chitto River, the ringed sawback turtle has been found as far upstream as Franklinton, Louisiana.

G. oculifera is a relatively small turtle, adults ranging from 2.9 to 8.7 inches (7.5-22 centimeters) in plastron length. Its

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Recovery Plans

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common name is derived from the yellow ring, bordered on both sides by dark olive-brown, on each shield of the spiny, sawtooth-ridged carapace. The plastron is yellow. There also is a large yellow spot behind the eye, two yellow stripes running from the orbit back to the neck, and a yellow stripe covering the entire lower jaw. In *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*, Roger Conant describes the ringed sawback as having "... a clownish appearance, as though smeared with grease paint...."

The ringed sawback turtle is found on wide river stretches with a moderate current, numerous basking logs, and sandy nesting beaches. Nest site suitability appears to be influenced by sand particle size, elevation above and distance from the water's edge, and cover quality. The life history of the ringed sawback turtle has not been intensively studied, but research on various members of the genus has provided some information on *G. oculifera*. These studies have indicated, based on the numbers of eggs and follicles found in reproducing *G. oculifera* females, that this species may have a lower reproductive potential than other members of the genus. The nesting season is probably from mid-May to early August. As in many other turtles, nest temperature may be a determining factor in the sex of the hatchlings. Studies on three related species (*G. geographica*, *G. ouachitensis*, and *G. pseudogeographica*) found that at nest temperatures below 28° C. only males were produced, and only females were produced at temperatures over 30.5° C.

Egg mortality may be a limiting factor for the ringed sawback turtle. In other *Graptemys* species, egg mortality ranged from 82 to over 90 percent. It is unknown how inundation or submersion of eggs influences mortality. If this is a major problem, then the quality of available nest sites could be an important limiting factor for the ringed sawback turtle. Nest predation, mainly by fish crows and raccoons, is the dominant factor limiting *G. pulchra*, the Alabama map turtle, which is the only other member of the genus found in the Pearl River. *G. oculifera* is probably also a victim of such predation.

The main limiting factor for this turtle seems to be habitat availability. The ringed sawback turtle apparently does not migrate across land to other drainages. Much of its habitat has been lost to modification and degradation of water quality. Construction of the Ross Barnett Reservoir, modification of the west channel of the Pearl River to Bogalusa, Louisiana, and floodplain clearing at Jackson, Mississippi, have impacted 21 percent of *G. oculifera*'s historic range. The reservoir alone inundated 30 river miles. Planned or authorized projects will impact up to 28 percent of the remaining Pearl River habitat. Authorized channelization of 100 river miles of the Bogue Chitto River would likely eliminate the turtle from that tributary. Flood control projects on both the Pearl and Bogue Chitto Rivers may adversely modify the turtle's habitat. Water quality has been degraded by increased turbidity and by agricultural runoff that may contain pesticides. Sand and gravel dredging also degrades the environment by both direct habitat destruction and increased siltation.

The goal of the Ringed Sawback Turtle Recovery Plan, approved by the Fish and Wildlife Service on April 8, 1988, is to recover the turtle to the point where it is secure and no longer needs listing protection. In order to meet this goal, the following objectives must be met:

1) Protect a total of 150 river miles in 2 reaches of the Pearl River, one above and one below the Ross Barnett Reservoir, with a minimum of 30 miles in either of these reaches.
2) Attain a stable or increasing population over at least 10 years on these 2 reaches.
3) Establish a plan to periodically monitor population trends and habitat quality to ensure a continuing stable population.

To meet these objectives, further study of the two most vigorous populations of the ringed sawback turtle (above the Ross Barnett Reservoir and below the Strong River) is needed to evaluate population trends, and more detailed life history studies of this species are needed. Habitat characteristics must be described and limiting factors determined. Reproductive requirements, population structure, food sources, and behavior need to be studied. After gathering this information, the specific habitat that needs protection can be determined, and specific plans and actions to protect and monitor the population will be developed.

Piping Plover—Great Lakes and Northern Great Plains Populations

On January 10, 1986, the piping plover (*Charadrius melodus*) was added to the endangered and threatened species list. The northern Great Plains breeding population was listed as Threatened and the Great Lakes breeding population as Endangered; both populations in migration and on the wintering grounds are considered Threatened. The Atlantic Coast breeding population of the plover was also listed as Threatened. (See BULLETIN Vol. XIII No. 5 for story on that recovery plan.) The Great Lakes and Northern Great Plains Piping Plover Recovery Plan was approved on May 12, 1988.

This 7-inch (17-centimeter) long shorebird has a sand-colored upper body and white underparts. There are a black breastband and bar across the forehead except during winter plumage. The inland birds have a more complete breastband than the Atlantic Coast birds, but morphological studies have not found significant differences over the plover's range, and recent electrophoretic analyses show no genetic differences.

The ranges of the Great Lakes and

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photo by James P. Mattsson

piping plover

northern Great Plains populations of the piping plover remain similar to those described in historical accounts, but there has been a decline in number, particularly in the Great Lakes, where only about 17 pairs bred in 1986 and 1987. This decrease in the Great Lakes population has caused a gap in the distribution of the bird across North America. Past records for the northern Great Plains indicate breeding in Montana, Wyoming, New Mexico, North Dakota, South Dakota, Nebraska, and Iowa; at present there are no populations remaining in Wyoming or New Mexico. Nesting in the plains States is on sandflats, sandbars, silty flats, sandy beaches, gravel parking lots, saline wetlands, and sand and gravel pits and spoil piles. Between 1986 and 1987, it is estimated that 1,241- 1,309 pairs bred in the northern Great Plains (665 in the U.S., 576-644 in Canada).

Breeding of piping plovers in the Great Lakes area has all but ceased in Minnesota, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania, and New York, and now reliably occurs only in Michigan. The bird apparently was never abundant in the other States. In Michigan, the plover formerly nested on beaches of Lakes Superior, Michigan, Huron, and Erie, but the only remaining breeding populations are found in 6 counties of northern Michigan: Emmet, Charlevoix, and Leelanau Counties on Lake Michigan; and Chippewa, Alger, and Luce on Lake Superior.

The piping plover spends about 4 to 5 months on the breeding grounds, beginning to arrive in mid-April. Nesting is in open, sparsely vegetated habitats. Plovers are sometimes found nesting within colonies of common terns (*Sterna hirundo*) in Minnesota, least terns (*S. antillarum*) on riverine sandbars and sand pits in the Dakotas and Nebraska, and American avocets (*Recurvirostra americana*) along alkaline wetlands in North Dakota. Incubation lasts 25-31 days, with both sexes participating. Juveniles leave the breeding grounds after the adults, and most are gone by late August.

Inland populations of the piping plover nest in riverine and saline wetland habitats that tend to be ephemeral or subject to modification. Habitat has been lost to a variety of causes. On the Great Lakes, high water levels, flooding, and beach erosion have been major factors in the decline. On river systems in the Great Plains, piping plovers nest on sandbars within the channel and at sand and gravel pits along the rivers. Now, reservoirs, channelization, and flow modification have eliminated many sandbars in the Missouri and Platte Rivers, the main systems used by piping plovers. Reduced flows over many years have caused a riparian forest and other vegetation to invade river channels and eliminate nesting habitat for piping plovers. Regulated flows cause fluctuations at times inappropriate to nesting. The recovery plan calls for a determination and implementation of adequate flows.

Many piping plover nesting areas are at sand and gravel pits where nesting success is limited by vehicular and foot traffic and predation. In some areas of the plains, cattle may trample nests and leave footprints in which young birds may become trapped.

Band returns and sightings of color-marked piping plovers indicate that most inland plovers winter along the Gulf of Mexico coast. Most migrate to Texas, but some winter in Louisiana, Mississippi, Alabama, and Florida. Winter habitat on the Gulf coast is threatened by industrial development and urban expansion, recreational beach use, and, occasionally, oil spills. Stabilization of sand barrier islands can result in vegetation encroachment that reduces the quality of plover habitat.

The piping plover's status has received much publicity, and there are many encouraging efforts under way to aid its recovery. Intensive surveys are being carried out in most States where it occurs. Many nest sites are protected by posting, fencing, and patrols in areas where the birds may be subject to disturbance. Many sites are being protected through acquisition by States or The Nature Conservancy.

Because of the wide distribution of the piping plover, the recovery objectives take into account current information on the abundance and distribution of plovers in each State; knowledge of how thoroughly each State has been surveyed; historic population data; loss of viable habitat; assessment of the potential to increase breeding pairs at currently occupied sites; and potential to establish breeding pairs at unoccupied sites. There are separate goals for the northern Great Plains and the Great Lakes populations. To recover the Great Plains population, the following objectives must be met:

1) Increase the number of birds in the U.S. Northern Great Plains to 1,300 pairs (a 70 percent increase over the 1986 estimate);
2) maintain the 1,300 pairs in a specified distribution for 15 years;
3) attain the Canadian Recovery Objective of 2,500 birds for its prairie region; and
4) protect essential breeding and wintering habitat.

To prevent extirpation of the piping plover on the Great Lakes, the following criteria will be attained. Once they are met, it may be possible to consider reclassifying that population to Threatened.

1) Increase the population to 150 pairs;
2) protect essential breeding and wintering habitat;
3) achieve the Canadian Recovery Objective of restoring the Great Lakes population; and
4) maintain the following distribution for 15 years:

Duluth-Superior Harbor: 5 pairs
Wisconsin: 15 pairs (including the Duluth-Superior population)
Michigan: 100 pairs
Other Great Lakes Sites: 35 pairs.

The recovery plan emphasizes the protection of habitat as the principal means to achieve recovery. Indeed, a number one priority task in the northern Great Plains is the acquisition of breeding habitat in North Dakota and on the Platte River, Nebraska. The plan lists all known essential breeding and wintering habitat. Although all of this habitat is not likely to be acquired by the Service, the recovery plan lists a variety of Memoranda of Understanding and other agreements among public agencies and private organizations that must be completed to adequately protect essential habitat. For example, the recovery plan calls for a Memorandum of Understanding among the U.S. Army Corps of Engineers, National Park Service, U.S. Fish and Wildlife Service, and State agencies for the permanent protection and management of all essential piping plover habitat on the Missouri River in North Dakota, South Dakota, and Nebraska.

In order to meet the recovery objectives, a wide range of tasks is planned. Extensive surveys will be conducted to determine the current distribution and population trends during breeding, migration, and wintering. About 70 percent of the plovers' time is spent at areas other than the breeding grounds, but their location during that time is one of the least-known aspects of their life history. Winter studies are needed to more precisely determine their habitat requirements throughout the year.

Finally, the plan recommends designation of a recovery plan coordinator to coordinate the research and management activities that are being conducted by a variety of Federal, State, local, and private groups. Additionally, the coordinator would be able to assist in international efforts to help the piping plover. Canada now has a recovery plan. A public information campaign and other work are needed in Mexico and the Caribbean, where plovers may winter but where specific sites and threats are as yet unknown.

The Great Lakes and Northern Great Plains Piping Plover Recovery Plan summarizes a large body of data on the piping plover, an extensive bibliography, a list of people knowledgeable about the plover to contact in each State, population survey techniques, and other useful information on the species.

* * *

Copies of these and all other recovery plans are available for purchase about 6 months after they are approved. Requests should be sent to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852, or call toll-free 800/582-3421. (In Maryland, dial 301/770-3000.)

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	6
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	31	0	2	0	0	0	33	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	149	6	1	40	6	2	204	82
TOTAL	354	49	467	107	21	39	1037	283 **

Total U.S. Endangered 403
Total U.S. Threatened 128
Total U.S. Listed 531

Recovery Plans approved: 242
Species currently proposed for listing: 12 animals
16 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
November 30, 1988 36 plants

August 1988 Vol. XIII No. 8

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

September/October 1988 Vol. XIII Nos. 9–10

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Listing Protection is Proposed for Eight Vulnerable Species

During August and September of 1988, the Fish and Wildlife Service proposed to list eight taxa—five plants and three animals—as Endangered or Threatened species. If these species are listed, Endangered Species Act protection will be available to the following:

American Hart's-tongue Fern *(Phyllitis scolopendrium* var. *americana)*

The hart's-tongue fern is a species common in parts of Europe, but the rare American variety is restricted to a few locations in North America. This unique plant is found only at sites on or near dolomitic limestone (a type of limestone high in magnesium) with high humidity, shade, and a moist substrate.

The American hart's-tongue fern is currently known from two counties in Alabama, one county in Tennessee, one county in Michigan, two counties in New York, and seven counties in the Canadian Province of Ontario. In the northern part of its range, the variety occurs on or adjacent to limestone outcrops. The southern populations, however, are found only within limestone pits that trap cold air, have high humidity, and are well shaded. Such sites mimic the climate in which the northern populations grow.

Since the American hart's-tongue fern was discovered almost 200 years ago, this plant has been rare and limited to a small number of sites. Early concern for its survival is demonstrated by such articles as R. C. Benedict's 1925 publication, "Saving the Hart's Tongue." The primary threats to the fern include logging, quarrying, residential development, trampling, and other forms of habitat disturbance. Inappropriate collecting is another danger, at least to the smaller southern populations.

Michigan, Tennessee, and New York recognize the vulnerability of the American hart's-tongue fern and restrict take of the plant under State law. On September 12, 1988, the Service proposed to add Federal protection by listing the variety as Threatened. Some efforts to conserve the fern already have been made. The Tennessee site has been leased by The Nature Conservancy, two of the Michigan populations are on land owned by the Michigan Nature Association, and two of New York's sites are within State parks. Another of Michigan's populations is on land managed by the U.S. Forest Service (Hiawatha National Forest), which has rerouted a trail that traversed the area. One of Alabama's two sites is on a national wildlife refuge that was established by the Fish and Wildlife Service to conserve the Endangered gray bat *(Myotis grisescens)*.

drawing by Ann E. Lacey, reprinted courtesy of New York State Museum-Albany

***American hart's-tongue fern* (Phyllitis scolopendrium var. americana)**

Four Florida Plants

Two of Florida's recently proposed plants, **Cooley's water-willow *(Justicia cooleyi)*** and the **Brooksville bellflower *(Campanula robinsiae)***, are herbaceous species found only in north-central Hernando County. Cooley's water-willow is a rhizomatous perennial belonging to the acanthus family (Acanthaceae) and has upright, quadrangular stems usually less than 16 inches (40 centimeters) tall. Its small flowers are lavender-rose in color

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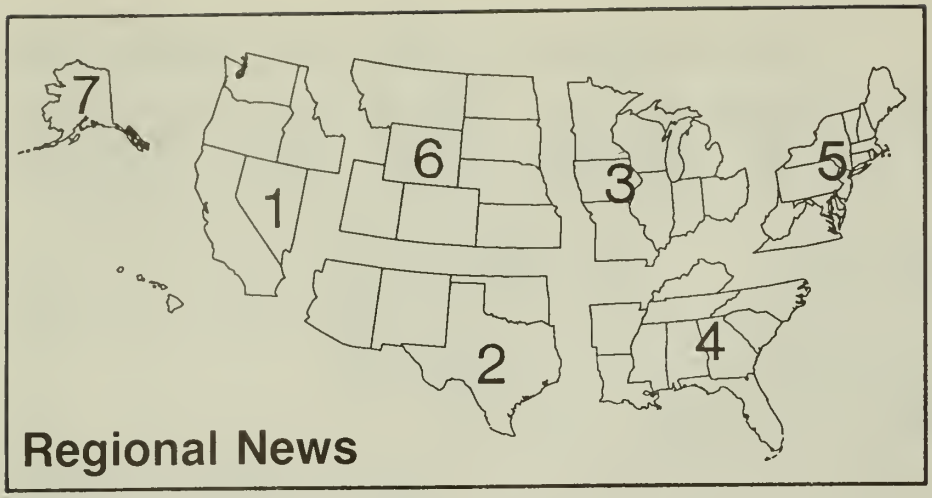

Regional News

Regional endangered species biologists reported the following news and activities for August and September:

Region 1 — August 1988 marked the beginning of the temporary, experimental Andean condor *(Vultur gryphus)* release effort at Hopper Mountain National Wildlife Refuge in southern California. Four female Andean condor chicks that had hatched at the Patuxent Wildlife Research Center in Maryland, San Diego Wild Animal Park, and Buffalo, New York, Zoo were transported to the refuge and released into holding pens. Researchers observed how the chicks acclimated to their new surroundings and each other before releasing them into the large netted enclosure that will be their home until they are ready to fly. Unfortunately, one of the immature condors died, apparently of stress, during transport to the release site.

After their release, the Andean condors will be monitored in the wild for 2 years and then recaptured for permanent release in Columbia, South America.

The Andean condor experiment will allow biologists to evaluate techniques that can be used to reestablish a wild population of the critically Endangered California condor *(Gymnogyps californianus)* in the future.

* * *

Region 1 met with staff from Regions 2 and 6 to discuss future recovery actions for the American peregrine falcon *(Falco peregrinus anatum)* in the western States. In the early 1980's, fewer than 10 pairs nested in Oregon, Washington,California, and Idaho; today, however, 104 nesting pairs are known. The Regions agreed on a 5-point action plan:

1) The two existing recovery teams (Pacific population and Rocky Mountain/ Southwest population) will be combined into a single recovery team.

2) The new team will prepare an addendum plan that links the two existing recovery plans.

3) Region 1 will host a meeting of experts to consider the recovery actions needed to integrate the recovery plans.

4) A thorough status review of the species will be initiated.

5) A reintroduction plan for 1989 will be prepared.

* * *

The Boise, Idaho, Fish and Wildlife Enhancement Field Station of the U.S. Fish and Wildlife Service has completed a 3-year cooperative agreement with the Bureau of Land Management to study a variety of issues related to the status and recovery of the Malheur wire lettuce *(Stephanomeria malheurensis)* and Macfarlane's four o'clock *(Mirabilis macfarlanei)*, two Endangered plants in Idaho and Oregon. The work has been an interagency effort: the Service organized and coordinated the work while the Bureau of Land Management contributed over $8,000 toward the study. Students and faculty at Boise State College also participated.

The research examined the important pollinator insects, the effects of livestock grazing on plant vigor, and artificial propagation. An intensive search for new colonies was included in the study. A total of 13 colonies of the four o'clock are now known. Nine were discovered as a result of this study, and one additional colony was established through outplantings. If these colonies can be secured from

(Continued on page 11)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief, Division of Endangered Species and Habitat Conservation*
(703-235-2771)
Marshal P. Jones, *Chief, Office of Management Authority*
(202-343-4968)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Regional 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Erwin "Wally" Steucke; *Acting Regional Director;* David F. Riley, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director and Acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrow, *Endangered Species Specialist (202-653-8762).*

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Final Listing Rules Approved for 25 Species

Michael D. Rees
Division of Endangered Species and Habitat Conservation
Washington, D.C.

During August and September of 1988, thirteen plant and twelve animal species were added to the Federal list of Endangered and Threatened species. The following now receive protection under the Endangered Species Act:

Mead's Milkweed *(Asclepias meadii)*

This tall grass prairie perennial, a member of the milkweed family (Asclepiadaceae), has a solitary stalk 8 to 16 inches high and broadly ovate opposite leaves with a whitish "waxy" covering. Historically ranging throughout much of the tall grass prairie, the plant is now restricted to 81 populations in 23 counties in Kansas, Missouri, Iowa, and Illinois. Only 15 percent of the populations are found on public land and receive official protection. The survival of the species is threatened by urban development, agricultural expansion, and detrimental agricultural practices. The small number of plants at each site and the species' poor reproductive success also threaten the continued existence of the species. Mead's milkweed was proposed for listing as a Threatened species in the October 21, 1987, *Federal Register* (see summary in BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 1, 1988.

Sandplain Gerardia *(Agalinis acuta)*

The sandplain gerardia, an annual member of the snapdragon family (Scrophulariaceae), is 4 to 8 inches tall with showy pink flowers. The species is known to occur only on open, sandy grasslands on Cape Cod, Massachusetts (two sites), and Long Island, New York (six sites), and on one serpentine barren in Baltimore County, Maryland. Another small population was discovered in early October in Rhode Island. Historically, the sandplain gerardia also occurred in Connecticut, but it is now believed extirpated in that State. The species is threatened by the continuing loss of its coastal grassland habitats due to residential and commercial development. The discontinuation of livestock grazing and the suppression of fires also have enabled competing woody vegetation to claim many of the plant's historical sites. The sandplain gerardia was proposed for listing as an Endangered species in the November 19, 1987, *Federal Register* (see summary in BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 7, 1988.

Mohr's Barbara's-buttons *(Marshallia mohrii)*

This perennial herb, a member of the aster family (Asteraceae), grows 1.0 to 2.3 feet tall with pale pink to lavender flowers. It typically occurs in moist prairie-like openings in woodlands and along shale-bedded streams. Other populations are located in swales on roadside rights-of-way. This species is known to exist on only 13 sites in Alabama and 1 site in Georgia. Five of these populations are confined to roadside rights-of-way and are threatened by routine maintenance practices or any future road expansion. Plants on the remaining privately owned sites are potentially threatened by conversion of their habitat to improved pastures or cropland. Woody plant succession also poses a threat to the survival of this species. Mohr's Barbara's-buttons was proposed for listing as a Threatened species in the November 19, 1987, *Federal Register* (see BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 7, 1988.

Chisos Mountain Hedgehog Cactus *(Echinocereus chisoensis* var. *chisoensis)*

This barrel-shaped cactus, a member of the family Cactaceae, has deep green to bluish-green stems up to 6 inches tall with showy red, white, and fuschia flowers. The entire known population of approximately 1,000 plants occurs in Big Bend National Park, Texas. Although collecting this plant without a permit is prohibited under National Park Service regulations, the species is vulnerable to illegal collecting, road maintenance, and trail construction. Habitat degradation from former grazing, climactic changes, or other undetermined factors also may be limiting the success of seedling establishment. The Chisos Mountain hedgehog cactus was proposed for listing as a Threatened species in the July 6, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 8), and the final rule was published on September 30, 1988.

Bradshaw's Lomatium *(Lomatium bradshawii)*

Bradshaw's lomatium, a small, herbaceous perennial plant in the family Apiaceae, is endemic to the lowland prairie community of the Willamette River Valley in Oregon. Once distributed throughout the valley, only 11 populations remain in isolated pockets. Over 90 percent of the known plants are located within a 10-mile radius of Eugene, Oregon. These few remnant populations are threatened by agricultural, residential and industrial development. Suppression of fire also appears to be allowing competing woody vegetation to invade the prairie habitat, causing a decline in the species at most of the sites. Bradshaw's lomatium was proposed for listing as an Endangered species in the November 21, 1986, *Federal Register* (see BULLETIN Vol. XI, No. 12), and the final rule was published on September 30, 1988.

Large-fruited Sand-verbena *(Abronia macrocarpa)*

This herbaceous perennial, a member of the four o'clock family (Nyctaginaceae), may reach a height of 20 inches and has showy pink-purple flower clusters. The only known population of the large-fruited sand-verbena occurs on sand dunes that lie entirely within a residential resort community in east Texas. In 1986, it was estimated that the population contained 250 plants. Because of its small population size and limited distribution, this species is vulnerable to residential development, recreation, and commercial use. The large-fruited sand-verbena was proposed for listing as an Endangered species on June 16, 1987 (see the summary in BULLETIN Vol. XII, No. 7), and the final rule was published on September 28, 1988.

Fassett's Locoweed *(Oxytropis campestris* var. *chartacea)*

This herbaceous perennial, a member of the pea family (Fabaceae), is covered with dense, white silky hairs and has rose-purple flowers. Fassett's locoweed is only known to occur on six sites in central Wisconsin, where it is found on sandy/gravelly shorelines of small inland lakes, and its total known population numbers fewer than 5,000 individual plants. The species occurs entirely on privately owned land, and is vulnerable to shoreline development and grazing. Fassett's locoweed was proposed for listing as a Threatened species in the December 4, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 1), and the final rule was published on September 28, 1988.

Harperella *(Ptilimnium nodosum)*

The harperella is an annual in the family Apiaceae growing up to 3 feet in height. This plant is found only in two habitat types: shallow, intermittently flooded coastal plain ponds and rock or gravel beds along clear, swift-flowing streams. Only ten viable populations are known: six stream populations in Alabama, Maryland, North Carolina, and West Virginia, and four pond populations in Georgia and South Carolina. Over half of the histor-

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ically known harperella populations have disappeared. Wetland drainage, water quality degradation, siltation, filling or deepening of ponds, home and road construction, mining, and other forms of development threaten the plant's habitat. A proposal to list the harperella as an Endangered species was published on February 25, 1988 (see summary in BULLETIN Vol. XIII, No.3), and the final rule was published on September 28, 1988.

Mountain Sweet Pitcher Plant *(Sarracenia rubra* spp. *jonesii)*

This subspecies of pitcher plant in the family Sarraceniaceae is a perennial insectivorous herb endemic to mountain bogs and streams in North and South Carolina. Twenty-six populations of the plant were reported historically, but only 10 remain (four in North Carolina and six in South Carolina). Most of the populations are extremely small, and eight of them are on private land. The survival of this species is threatened by drainage, impoundment, grazing, natural succession, collecting, and development. On February 10, 1988, a proposal was published to list the mountain sweet pitcher plant as an Endangered species (see BULLETIN Vol. XIII, No.3); the final listing rule was published on September 30, 1988.

Swamp Pink *(Helonias bullata)*

The swamp pink is a very attractive member of the lily family (Liliaceae), with a pink or purplish inflorescence at the top of a 1 to 2 foot stalk and lance-shaped evergreen leaves. Historically, this plant occurred in a variety of freshwater wetlands from southern New York to northern Georgia. Only about 75 populations of the species are now known, with 35 of them in New Jersey and the remainder in Virginia (16), North Carolina (7), Delaware (6), Maryland (4), South Carolina (1), and Georgia (1). The plant is believed to be extirpated from New York. The swamp pink is threatened by the filling and draining of its wetland habitats and by collecting. Pollution and sedimentation associated with urban and agricultural runoff also have rendered many habitats unsuitable for the species. On February 25, 1988, a proposed rule was published to designate the swamp pink as a Threatened species (see BULLETIN Vol. XIII, No. 3), and on September 9, 1988, the final rule was published.

Dwarf Lake Iris *(Iris lacustris)*

This herbaceous perennial, a member of the family Iridaceae, is less than 6 inches high and has attractive flowers that range in color from blue to dark violet. The species is found along the northern shores of Lakes Michigan and Huron, at about 60 sites in Michigan and 15 sites in Wisconsin, and in several areas of Ontario, Canada. It seems to thrive on calcareous gravels in partial shade near the lakeshores. Threats to this species include private residential shoreline development, road widening, chemical spraying and salting, and off-road vehicle use. Natural plant succession also has reduced habitat for the species. The dwarf lake iris was proposed for listing as a Threatened species on December 4, 1987 (see BULLETIN Vol. XIII, No.1), and the final rule was published September 28, 1988.

Erubia *(Solanum drymophim)*

The erubia is a tall evergreen shrub in the nightshade family (Solanaceae) that occasionally reaches 18 feet in height. This shrub is endemic to Puerto Rico, where it is found in evergreen forests on volcanic soils from 1,000 to 3,000 feet in elevation. Possibly once common, the species has been widely extirpated due to deforestation and deliberate eradication efforts. Only one population of about 200 individuals is known to survive. This site is on private land and is subject to commercial development. Proposed for listing as an Endangered species on November 19, 1987 (see BULLETIN, Vol. XII, No. 11–12), the erubia was listed in final on August 26, 1988.

Hinckley Oak *(Quercus hinckleyi)*

This low-growing shrubby evergreen, a member of the family Fagaceae, grows amid the Chihuahuan Desert scrub vegetation of western Texas where it usually forms dense thickets. Four populations of the Hinckley oak have been documented, one of which was discovered in 1988. Three of the known populations are on Big Bend Ranch, which was recently purchased by the State of Texas as a State park. The fourth population is on private land near a State highway. The plants are potentially threatened by road improvements, wildlife predation, disease, hybridization with other oak species, and collecting. On September 16, 1987, the Hinckley oak was proposed for listing as a Threatened species (see BULLETIN Vol. XII, No. 10); on August 26, 1988, the listing was made final.

Five Texas Cave Invertebrates

These small invertebrates are restricted to six or fewer small, dry caves near Austin, Texas. The **Tooth Cave pseudoscorpion *(Microcreagris texana)*** resembles a tailless scorpion, and is known to occur in only two caves. **The Tooth Cave spider *(Leptoneta myopica)*** is sedentary, spinning webs from the ceiling and walls of only one cave. The light yellowish-brown **Bee Creek Cave harvestman *(Texella reddelli)*** is probably predatory on small insects, and lives in at least five caves. The reddish-brown **Tooth Cave ground beetle *(Rhadine persephone)*** probably feeds on cave cricket eggs, and is known to occur in only two caves. The dark-colored, short-winged **Kretschmarr Cave mold beetle *(Texamaurops reddelli)*** is known to live in only four caves. The primary threat to these five species comes from potential loss of habitat due to urbanization. All of these caves are on private land, and most are in an area on which road, residential, commercial, and industrial development is likely. One of the caves may have already been lost to development. The five invertebrates were proposed for listing as Endangered species on April 19, 1988 (see BULLETIN Vol. XIII, No. 5), and the final rule was published on September 16, 1988.

Alabama Cave Shrimp *(Palaemonias alabamae)*

The Alabama cave shrimp is another rare cave-dwelling species. This small, nearly transparent freshwater crustacean has been found in only two caves in Alabama. The population in one of the caves has declined and may no longer exist. Groundwater contamination from surface runoff, low population levels, and collecting are the major threats to the survival of the species. The Alabama cave shrimp was proposed for Endangered status on November 19, 1987 (see BULLETIN Vol. XII, No. 11-12), and the final rule was published on September 7, 1988.

Shasta Crayfish *(Pacifastacus fortis)*

The Shasta crayfish is native to a small portion of the Pit River drainage system, including tributaries of the Hat Creek and Fall River subdrainages, in California. Its preferred habitats are cool, clear, spring-fed lakes, rivers and streams. Because of its specialized habitat needs, the Shasta crayfish is particularly vulnerable to changes in its aquatic environment. Major threats to the crayfish include: 1) habitat degradation and loss due to water diversion and impoundment projects, agricultural and residential development, and water pollution, and 2) competition with introduced crayfish. A comparison of population surveys conducted during 1978–1979 and 1985–1986 revealed the Shasta crayfish population had dropped more than 50 percent in the intervening 6 years, and that the remaining population numbered fewer than 3,000 individuals. On July 10, 1987, the Shasta crayfish was proposed for listing as an Endangered species (see BULLETIN Vol. XII, No. 8), and on September 30, 1988, the listing was made final.

Boulder Darter *(Etheostoma* sp.)

This small, olive- to gray-colored fish inhabits swift current flowing over boulder

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substrate in the Elk River system of Tennessee and Alabama. It is known to occur in disjunct segments on about 62 miles of the Elk River, and in about 2 miles of 2 Elk River tributaries. The current distribution represents a substantial reduction over the darter's historically known range. The species' decline has resulted primarily from habitat alteration associated with water impoundments. Water pollution from improper pesticide use, toxic chemical spills, uncontrolled phosphate mining, and increased levels of siltation could further threaten the species. The boulder darter was proposed for listing as an Endangered species on November 17, 1987 (see BULLETIN Vol. XII, No. 11–12), and the final rule was published on September 1, 1988.

Two Long-nosed Bats

Both the **Mexican long-nosed bat *(Leptonycteris nivalis)*** and **Sanborn's long-nosed bat *(L. sanborni)*** are adapted for life in arid country, and are found mainly in desert scrub habitat in the U.S. parts of their range. They depend largely on caves for roosting and on the flowers of agaves and certain cacti for food. Both species evidently have declined in recent years, and the remaining populations are jeopardized by disturbance of roosting sites, loss of food sources, and direct killing by humans. The Mexican long-nosed bat originally occurred from southwestern Texas and perhaps southwestern New Mexico, through much of Mexico, to Guatemala. The only roosting site in the U.S. currently known to be in use is a cave in Big Bend National Park, Texas. Sanborn's long-nosed bat originally occurred from central Arizona and southwestern New Mexico, through much of Mexico, to El Salvador. Only one breeding population (about 500 bats) is now known to occur in the U.S. in southeastern Arizona, although two other small populations may survive in this area. These bats were proposed as Endangered species on July 6, 1987 (see BULLETIN Vol. XII, No. 8); the final rule was published on September 30, 1988.

Stephens' Kangaroo Rat *(Dipodomys stephensi)*

This small, nocturnal rodent is endemic to southern California. The species probably once occurred through annual grassland or sparse coastal sage scrub of the Perris and San Jacinto Valleys and up adjoining sandy washes. However, urban and agricultural development have greatly reduced the habitat and range of the Stephens' kangaroo rat. Most of the species' remaining habitat is in private ownership, and consists of small (less than 10 acres), isolated pockets that are not expected to support the species indefinitely. The Stephens' kangaroo rat was proposed for listing as an Endangered species on November 19, 1987 (see BULLETIN, Vol. XII, No. 11–12), and the final rule was published on September 30, 1988.

Visayan Deer *(Cervus alfredi)*

Known only from the Visayan Islands in the central Philippines, this small deer has the most restricted range of all surviving species in the genus *Cervus*. The deer, standing about 25 inches at the shoulder, has a dark brown coat with light spots. It originally inhabited eight islands and was fairly widespread in the early 20th century. Logging and slash-and-burn agriculture eliminated much of the dense forest habitat on which the deer depends, and made its range more accessible to hunters and settlers. Today the deer survives on only four islands, in relatively small and isolated patches of remnant habitat. Although the deer is protected by Philippine law, hunting pressure is intense, especially during the dry season when the forests are more accessible. If the current rate of habitat loss and hunting pressure continue, the largest group is not expected to survive to the end of the century. The Visayan deer was proposed for listing as an Endangered species on August 19, 1987 (see BULLETIN Vol. XII, No. 9), and the final rule was published on September 1, 1988.

Mussel Reintroduction May Reduce Danger to Listing Candidates

Dick Biggins
Asheville, North Carolina, Field Office

Two species of mussels that are candidates for possible listing proposals, the slab-side pearly mussel *(Lexingtonia dolabelloides)* and the rough rabbit's foot pearly mussel *(Quadrula cylindrica strigillata)*, have been reintroduced into their historical habitat in the Duck River in south-central Tennessee. The reintroduction was a cooperative effort of the Fish and Wildlife Service (Tennessee Cooperative Fishery Research Unit and the Asheville Field Office) and the Tennessee Valley Authority. This project involved the movement of 1,213 individuals (102 slab-side pearly mussels and 20 rough rabbit's foot pearly mussels, with the remainder made up of six noncandidate mussel species).

The mussels, which were collected from the Duck River downstream of the reintroduction site, were marked and

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photo by Dick R. Biggins

Eight species of mussels, including two that are candidates for listing proposals, were placed into their historical range in the Duck River.

photo by Dick R. Biggins

***slab-sided pearly mussels* (Lexingtonia dolabelloides)**

Mussel Reintroduction

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inserted into the gravel substrate in a grid pattern throughout the transplant riffle area, producing a density of about 10 mussels per square meter. Initial observations indicate that mussels are maintaining their position within the substrate. To assess survival, reproduction, and recruitment within the bed, the site will be quantitatively monitored over the next few years. In addition, other ecological data will be gathered to determine the preferred habitat of each species. The reintroduction was part of a Service program to reduce or eliminate threats to candidate species before they require listing.

Experimental Population Approved for Rare Catfish

A Federal/State effort to establish an experimental population of the yellowfin madtom *(Noturus flavipinnis)*, a rare species of catfish, was approved by the Fish and Wildlife Service in August 1988 (F.R. 8/9/88). Under this rule, the fish will be reintroduced into an unoccupied part of their former range and designated as a "non-essential experimental population."

The yellowfin madtom once occupied many lower gradient streams in the upper Tennessee River basin, but it currently survives in only three locations: Citico Creek (Monroe County, Tennesse), a stretch of the Powell River (Hancock County, Tennessee), and Copper Creek (Scott and Russell Counties, Virginia). It was listed by the Fish and Wildlife Service in 1977 as a Threatened species. Good habitat for the madtom remains in the North Fork of the Holston River (Smyth and Washington Counties, Virginia), and the Service proposed on September 8, 1987, to establish an experimental population in Smyth County (summary in BULLETIN Vol. XII, No. 10-11). Although Smyth County officials subsequently declined to participate, Washington County has agreed to accept the fish.

The Fish and Wildlife Service has been working with the National Park Service for the past several years to reintroduce the yellowfin madtom in Abrams Creek within the Great Smoky Mountains National Park (Blount County, Tennessee). When a sufficient number of fish have been established there, the Service will direct its efforts to the Holston River (probably in 1989 or 1990). The fish for stocking will originate from madtom eggs gathered in Citico Creek. Current plans call for 100 to 200 fish to be introduced annually into one or two pools on the Holston River in Washington County for at least several years, contingent on the availability of funds. The reintroduction effort will be a joint project among the Virginia Commission of Game and Inland Fisheries, the University of Tennessee, the Tennessee Wildlife Resources Agency, the U.S. Forest Service, and the Fish and Wildlife Service.

Under its designation as a "nonessential experimental population," the Washington County yellowfin madtom population will be treated for most purposes of the Endangered Species Act as a species that is *proposed* for listing. The experimental population approach is designed to promote wider public acceptance of endangered species reintroductions by authorizing a greater degree of management flexibility. (See summary in BULLETIN Vol. IX, No. 9.)

Alabama Cavefish Reclassified to Endangered

The Alabama cavefish *(Speoplatyrhinus poulsoni)*, a blind, colorless fish known only from Key Cave in Alabama, was listed in 1977 as Threatened. Since then, extensive surveys of other caves in the region have failed to detect the species anywhere else. A 1985 estimate put the sole population at fewer than 100 individuals. Recent information indicates that groundwater pollution, a major threat to the aquatic habitat of Key Cave, threatens the small, restricted population with extinction. Because this species apparently is in greater peril than was previously known, the Service has reclassified it from Threatened to the more critical designation of Endangered (F.R. 9/30/88).

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and are shaped like a small snapdragon. Botanists know of seven current *J. cooleyi* sites. Although this species primarily inhabits native hardwood forests, two of the colonies occur in a modified woodland, one is found on a wide highway right-of-way amid a clump of trees, and one is in a cattle pasture. Some of the plants are protected by The Nature Conservancy's Robins Memorial Forest Preserve; however, habitat loss in other areas could imperil the species' survival.

The Brooksville bellflower is found at three sites, two of them on wet ground at the edges of two ponds. A moisture-

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drawing by Anna-Lisa King

***Brooksville bellflower* (Campanula robinsiae)**

Listing Proposed

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dependent species, its abundance apparently fluctuates considerably from year to year depending on water levels. Although there appears to be little danger to *C. robinsiae* from direct habitat destruction, runoff from nearby developed areas could modify its habitat by affecting the quantity and quality of its water supply.

Both species already are listed by Florida as endangered and they receive some protection under State law. A Federal listing would complement this protection, especially with regard to any potential Federal actions that could jeopardize the plants. The U.S. Department of Agriculture operates a Subtropical Agricultural Research Station and a Soil Conservation Service facility in the area. Colonies of both species occur on the research station, and the other facility contains *Justicia cooleyi* habitat. Management of these properties has so far not threatened the plants, but the agency will be required to avoid any future impacts if the two species are listed by the Service.

The proposal to list *Campanula robinsiae* and *Justicia cooleyi* as Endangered species was published in the September 12, 1988, *Federal Register.*

The **Florida ziziphus *(Ziziphus celata)*** and the **scrub blazing star *(Liatris ohlingerae)*** are the two other Florida plants proposed by the Service during September for listing as Endangered (F.R. 9/28/88). Both are found only in sand pine scrub vegetation, an unusual type of habitat that is restricted to Florida. Sand pine scrub supports a rich assemblage of endemic species, including 13 taxa (10 plants and 3 animals) that are already federally listed as Endangered or Threatened. This native habitat is rapidly being converted to citrus groves and housing developments.

The scrub blazing star is a perennial, herb in the aster family (Asteraceae) with erect stems reaching up to about 3 feet (one meter) in length and very narrow leaves. Its exceptionally large, bright pinkish-purple flower heads are so attractive that this species has been collected frequently. A 1988 survey found *L. ohlingerae* in 93 sites, 71 of them in Highlands County and the rest in Polk County. This relatively high count is misleading, however; most of the colonies are on small, isolated pockets of scrub habitat, and sites are disappearing very rapidly to development. The only currently protected habitat for this species is on the private Archbold Biological Station, Arbuckle State Forest and Park, and a tract that the State is acquiring at Saddle Blanket Lake. Florida already lists the scrub blazing star under State law as endangered.

The Florida ziziphus, a shrub in the buckthorn family (Rhamnaceae), grows to approximately 5 feet (1.5 m) high. It is distinguished by its small,dark, glossy green leaves borne on conspicuously spiny, zigzag branches. This species is considered one of the rarest shrubs in North America. Currently, despite intensive surveys, only two *Z. celata* populations are known. The better known population consists of about 30 stems, possibly growing from a single rootstock, on approximately 2 acres of scrub habitat in Polk County. A recently discovered population is in Highland County. Both sites are privately owned and neither is protected. Florida has proposed adding *Z. celata* to its own endangered species list.

drawing by Anna-Lisa King

***scrub blazing star* (Liatris ohlingerae)**

Two Woodland Salamanders

Two species of woodland salamanders in the genus *Plethodon* were proposed on September 28, 1988, for Endangered Species Act protection. The **Cheat Mountain salamander *(Plethodon nettingi)*** is known from a small area of the Allegheny Mountains in eastern West Virginia. A related species, the **Shenandoah salamander (*Plethodon shenandoah*)**, occurs on a few mountain slopes in Shenandoah National Park, Virginia.

The two salamanders are similar in appearance, reaching a maximum length of about 4.5 inches (12 cm) with dark grey to black bellies. The back of *P. nettingi* is dark and usually covered with a heavy sprinkling of brassy or silvery flecks. *Plethodon shenandoah* also has a dark back, but it lacks the heavy covering of flecks. Some individuals exhibit a color phase characterized by a narrow red

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Listing Proposed

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stripe down the back. Woodland salamanders usually are found during the day under rocks and logs or in rock crevices below the ground surface. At night, especially during rainy weather, they forage on the forest floor and occasionally climb trees or other plants in search of mites, springtails, flies, small beetles, and other insects.

The Cheat Mountain salamander occurs in cool, moist, high-elevation red spruce-yellow birch forests in a roughly 19 by 50 mile area of Pendleton, Pocahontas, Randolph, and Tucker Counties in West Virginia. Its range is almost entirely within the proclamation boundaries of the Monongahela National Forest.

During the "timber boom" era in West Virginia (late 1800's to early 1900's), virtually all of the Cheat Mountain salamander's habitat was lost. Since that time, maturing spruce forests have reclaimed about 10 percent of their former extent. This habitat, however, is being affected by logging, coal mining, and the construction of ski resorts, pipelines, and hiking trails. These factors can affect the Cheat Mountain salamander by permanently altering the habitat or by creating drier conditions, which the salamander cannot tolerate.

A 1986 status survey located 54 *P. nettingi* populations, which probably are remnants of a much larger population that was fragmented by habitat loss. The survey also revealed that almost all of the remaining populations have been affected by habitat alteration. Many may no longer be viable, and at least two are known to have been extirpated since the survey. Accordingly, the Fish and Wildlife Service has proposed to list the Cheat Mountain salamander as a Threatened species (F.R. 9/28/88).

The U.S. Forest Service has designated *P. nettingi* as a "management indicator" species in the Monongahela National Forest. When any surface-disturbing activities are planned within the salamander's range, agency guidelines call for surveys to determine if the species is present in the specific project area. Whenever possible, salamander populations are to be avoided. If the species is listed as Threatened, this existing protection would be strengthened by the Endangered Species Act. The Forest Service does not anticipate any major changes in current management.

photo by Mark Watson

***Cheat Mountain salamander* (Plethodon nettingi)**

The future of the Shenandoah salamander is less hopeful. This species is known only from north-facing talus slopes on three mountains in Shenandoah National Park (Madison and Page Counties, Virginia). Within the talus, *P. shenandoah* is confined to a few "islands" of soil and/or vegetative debris where specific moisture conditions favorable to the species are found. Competition with the more widespread red-backed salamander (*Plethodon cinereus*) appears to be a major factor restricting the range of the Shenandoah salamander to the generally dry talus areas. *Plethodon shenandoah* can survive in these areas due to its greater tolerance of dry conditions. These talus slopes, however, are changing as organic matter and the products of erosion accumulate, creating a moister environment. As this trend continues, *P. cinereus* could gain a competitive edge over *P. shenandoah*, eventually displacing it from the last vestiges of its habitat.

The precarious status of the Shenandoah salamander led the Fish and Wildlife Service to propose listing it as Endangered rather than Threatened (F.R. 9/28/88). It is already classified by Virginia under State law as endangered. Because the National Park Service is concerned about the Shenandoah salamander, it prohibits any new human-related activities that could further deteriorate the species' habitat.

photo by C. Kenneth Dodd, Jr.

***Shenandaoah salamander* (Plethodon shenandoah)**

Roanoke Logperch (*Percina rex*)

This fish, which is endemic to Virginia waters, occurs in four widely separated

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Listing Proposed

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populations. Each is vulnerable to extirpation because of water quality problems, relatively low density, and limited range. For this reason, the Service proposed on September 7, 1988, to list the Roanoke logperch as an Endangered species.

Large for a darter, this fish reaches up to approximately 5.5 inches (14 cm) in total length. It is characterized by an almost cylindrical body, conical snout, complete lateral line, and prominent bar markings on the sides. Roanoke logperch commonly live 5 to 6 years. During warm months, adults occupy gravel and cobble runs and riffles, while individuals of all ages apparently stay under large boulders within deep pools in winter. The species feeds primarily on aquatic insect larvae.

The Roanoke logperch occurs in four relatively small, disjunct populations. Three are within sections of the greater Roanoke River drainage (upper Roanoke River, Pigg River, and Smith River) and one is in the Nottoway River. All four are thought to be remnants of a single, much larger population that once occupied Virginia waters. The upper Roanoke River population, largest of the four, is under increasing stress from water pollution associated with urbanization, industrial effluents, and agricultural runoff. Several proposed water projects pose additional threats. The West Roanoke County Water Supply Project, intended to supply projected future water needs in the area, could result in long periods when an important stretch of logperch habitat is drawn down to low levels. Predicted effects of such low river flows include loss of riffle habitat, decreases in dissolved oxygen levels, increased concentration of pollutants, and higher water temperatures; however, recent project modifications should lessen the expected severity of these effects. Another proposed project, this one an Army Corps of Engineers flood control system, would involve channelizing the river within the city limits of Roanoke. Although the Corps has funded studies of the logperch and worked with the Service to reduce impacts, some adverse effects on the fish are expected.

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species found on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal tresspass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants.

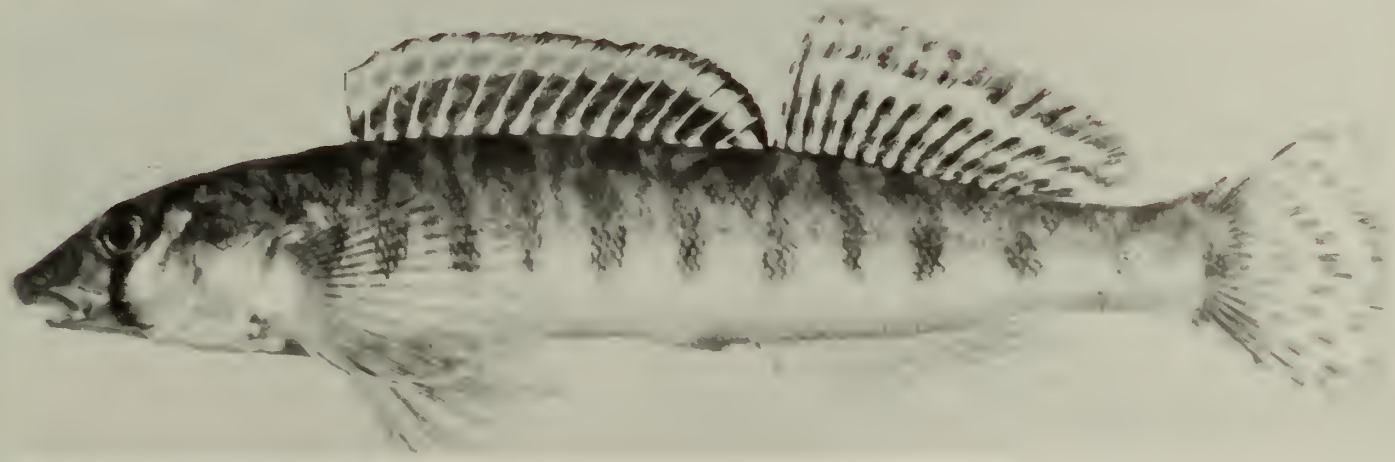

photo by Noel M. Burkhead and Robert E. Jenkins

***Roanoke logperch* (Percina rex)**

Nile Crocodiles in Zimbabwe Reclassified to Threatened

Because wild populations of the Nile crocodile *(Crocodylus niloticus)* in Zimbabwe have increased in recent years, these animals have been reclassified under the U.S. Endangered Species Act from Endangered to Threatened (F.R. 9/30/88). This change in the rules will allow noncommercial import of Nile crocodiles (e.g., sport hunting trophies) from wild populations in Zimbabwe into the United States in accordance with Zimbabwe laws and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Commercial import of wild crocodiles remains prohibited, although crocodiles and their skins from "ranched" populations in Zimbabwe can be imported for commercial purposes (see BULLETIN Vol. XII, No. 7).

The Nile crocodile historically occurred throughout much of Africa but was eliminated from many areas because of habitat loss, potential threats to people, and uncontrolled commercial hunting for the hide industry. After wholesale slaughter of Nile crocodiles for their skins took place in the 1950's, many accessible populations were seriously threatened with extinction. With subsequent protection by Zimbabwe and import restrictions by the U.S. (under the Endangered Species Act), crocodiles in that part of Africa began to increase. In some areas, including Zimbabwe, the damming of swift-flowing rivers created impoundments that provided additional

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Prospects Believed to be Improving for the Short-tailed Albatross

Michael Amaral
Alaska Regional Office

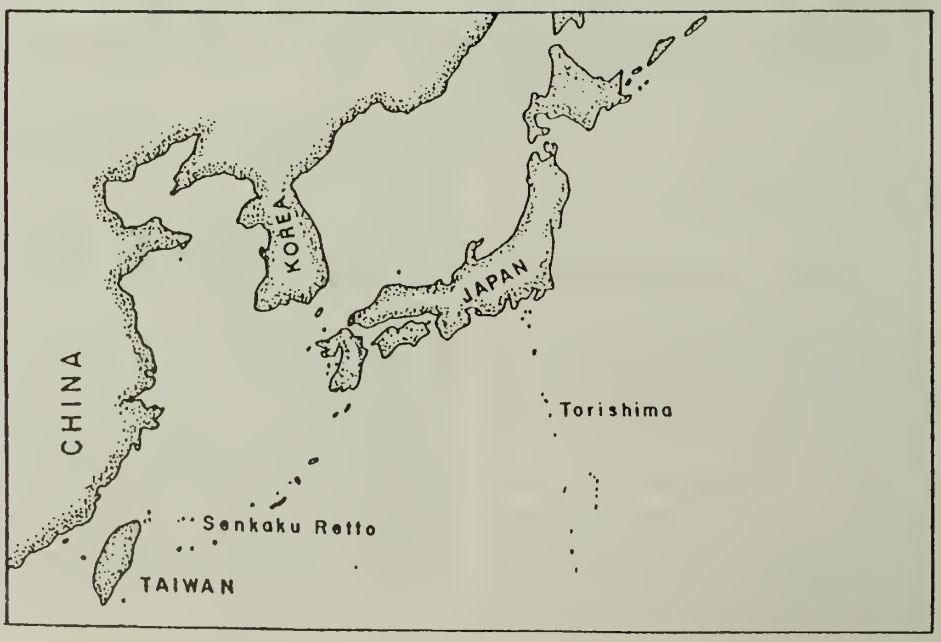
Dr. Hiroshi Hasegawa of Toho University in Chiba, Japan, is the world's leading researcher on the Endangered short-tailed albatross *(Diomedea albatrus)*. Since 1976, he has monitored the status of short-tails on Torishima Island, south of Japan, and since 1979 has banded all nestlings produced there with color-coded leg bands. Dr. Hasegawa's efforts have led to several observations of banded short-tails within the waters of Alaska and the Hawaiian Islands. In this way, he has contributed greatly to our understanding of the movements of this species away from its breeding grounds in Japan. In April 1988, Dr. Hasegawa was able to confirm a second breeding location for the species on Minami-kojima in the Senkaku Islands. At least seven nestings were observed.

After a lengthy correspondence, Fish and Wildlife Service endangered species staff in Anchorage arranged for Dr. Hasegawa to visit Alaska in September, where he presented a seminar on his albatross work and joined a cruise of the Service's research vessel, the Tiglax. After more than a decade of studying this seabird in Japan, Dr. Hasegawa was finally able to observe first-hand the waters of the eastern Aleutians and northern Gulf of Alaska where this species was historically an abundant and important member of the marine bird community.

The status of the short-tailed albatross is slowly improving. Sightings of this species in Alaska waters were scarce in the decades prior to 1980 but, while still considered rare, have increased significantly since then. On Torishima, Dr. Hasegawa reported that in 1976 he observed about 100 adults and 15 chicks, whereas 84 pairs nested and produced 64 fledglings in 1987. He estimates the total world population to be 400 birds. While the prognosis for the albatross seems cautiously favorable, Torishima is an active volcano with a history of violent eruptions. Rats have been introduced to the island and are another potential threat to eggs and young chicks. Lastly, Dr. Hasegawa reports that plastic particles are appearing with greater frequency in the food delivered to nestlings. Floating plastic can resemble the natural prey of the albatross, such as squid or large crustaceans, and can cause death when ingested.

photo by Hiroshi Hasegawa

short-tailed albatross



Current breeding range of the short-tailed albatross on Torishima and the Senkaku Retto Islands, off Japan. Figure adapted from Hasegawa and DeGange, American Birds, 1982.

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threats, they will constitute a major step towards recovery of the species.

The study also confirmed the inhibiting effects of cheatgrass *(Bromus tectorum)* on the recovery of the wire lettuce. Study plots in the field showed significantly reduced wire lettuce seed production when surrounded by dense stands of the aggressive, non-native grass. Given the widespread occurrence of cheatgrass in the west, it will be a formidable task to control this competitive species.

The Boise Field Station is compiling the study results for dissemination in the near future.

* * *

Region 2 — Biologists banded 17 whooping crane *(Grus americana)* chicks at Wood Buffalo National Park in the Northwest Territories, Canada, this summer. They believe that the summer 1988 production was 20 to 22 chicks. Canadian Wildlife Service biologist Ernie Kuyt documented the first record of a 3-year-old female producing fertile eggs; he previously had recorded several instances of 3-year-old males pairing with older females and producing fertile eggs. Heavy summer rains created excellent water conditions at Wood Buffalo and prospects are favorable for good nesting conditions again in 1989.

Only 2 of the 10 chicks that hatched last spring at Grays Lake National Wildlife Refuge in Idaho could be found for banding in August. Habitat conditions there have been the worst in the past 20 years. No surface water remains in the cattail and bulrush marshes on the 22,000-acre refuge. The only water is in small ponds within the marsh. Water is being pumped from a well at the headquarters into a previously dry pond near refuge grain fields so that the cranes will have drinking water. One of the whooping crane chicks was seriously underweight. Grain and pelleted food were placed in the marsh near the two surviving whooping crane chicks.

* * *

Personnel at Grays Lake National Wildlife Refuge observed an adult male whooping crane with an injured wing. It was captured and shipped by air to Chicago, where veterinarian Josh Dien of the Service's National Wildlife Health Center picked it up and took it by truck to the Center's lab in Madison, Wisconsin. The bone was too severely broken to repair and veterinarians amputated the outer wing on September 19. The bird seems to be recovering satisfactorily and will be retained in captivity. The male had been under observation all summer and was flying 2 days before the injury was noted. Field personnel believe the bird hit a fence because that was the only aerial

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photo by Ricardo Alcaraz, reprinted courtesy of *Dialogo*

Buitre, an adult Puerto Rican plain pigeon, helped to incubate and raise his squab, Gulliver. This was the first time in the captive breeding program that a squab of this Endangered species has been hatched and cared for by its natural parents.

Break-through in Recovery of Puerto Rican Plain Pigeon

Hilda Diaz-Soltero
Caribbean Field Office
Boqueron, Puerto Rico

April 22, 1988, marked a day of quiet celebration on the Humacao Campus of the University of Puerto Rico. A Puerto Rican plain pigeon *(Columba inornata wetmorei)* squab, later christened "Gulliver," hatched from an egg incubated by a 4-year-old pair of these rare pigeons. Although other plain pigeon squabs have been hatched and foster-raised by domestic ringed dove *(Streptopelia risoria)* surrogates or hand raised by aviary staff, Gulliver is the first Puerto Rican plain pigeon squab in the captive propagation program to be incubated and subsequently raised by his own parents—a necessary step in the long process toward reintroduction of this Endangered species into the wild. Gulliver has since fledged, and another pair of pigeons has begun the incubation process (as of September 1988). "I think we have solved our biggest problem," stated program Director Raul A. Perez-Rivera, "as birds imprinted on surrogates or humans are not good candidates for reintroduction. Now we can start mass production for the eventual release of large numbers of plain pigeons into the Rio Abajo Forest."

Although little has been reported about the historical range and abundance of the Puerto Rican plain pigeon, its status declined as birds were shot and the habitat was extensively altered. The species was listed by the Fish and Wildlife Service in 1970 as Endangered. A single wild population exists in the Commonwealth of Puerto Rico between the municipalities of Cidra and Cayey. Its numbers have been reduced to fewer than 150 birds according to the latest census (April 1988). A captive breeding program was started in 1983 under a cooperative agreement among the University of Puerto Rico, Puerto Rico's Department of Natural Resources, and the Service. The modest aviary facilities, located on the Humacao Campus of the University of Puerto Rico, are soon to be replaced by a modern facility constructed with $50,000 from the Service and additional funds from the University.

The first plain pigeon squab in the captive breeding program was produced at the end of 1984. Laid by an 11-month-old female, the egg was artificially incubated and the resulting squab was hand raised. Domestic rock doves (*Columba livia* var.) provided the pigeon "milk" for all hand-raised birds, and ringed doves were later used as surrogate incubators and foster parents for the squabs. Another "first" this spring has been the captive production of second-generation plain pigeons. Surrogate ring doves successfully incubated two eggs and both squabs have fledged. A total of 47 squabs have been captive bred to date (September 1988), showing phenomenal success in the first 4 years of the program.

The next step will be to release captive-produced birds when a sufficient number are available. The chosen release site is within the Rio Abajo Commonwealth Forest. Located near the center of the island, this forest once sustained populations of the pigeon and the even more imperiled Puerto Rican parrot *(Amazona vittata)*. Attempts will be made to eventually establish new populations of both of these unique, endemic species with captive-produced birds. The success achieved by Professor Perez-Rivera makes this recovery action an ever closer reality for the Puerto Rican plain pigeon.

Peregrine Falcon Restoration Advances in the Southern Appalachians

V. Gary Henry
Asheville, North Carolina, Field Office

Nineteen eighty-eight was the first year in which the southern Appalachian States received the majority of peregrine falcons *(Falco peregrinus)* released in the eastern peregrine falcon recovery program. Last year, the revised Eastern Peregrine Falcon Recovery Plan consolidated the 11 previously defined recovery regions for this bird into a total of five. For the purposes of the plan, the boundary of the southern Appalachians recovery region was changed to include parts of nine States: Alabama, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. It includes the Appalachian and Blue Ridge Mountains from the Maryland-Pennsylvania State line to the southern terminus in Georgia, as well as the Cumberland Plateau of Alabama, Tennessee, and Kentucky. The Appalachian region had been the third priority region for receiving birds. However, because recovery objectives are now being met in the mid-Atlantic and northern New York/New England regions, the emphasis has shifted to the southern Appalachian Mountains.

The recovery objective for downlisting the eastern peregrine falcon to Threatened was defined in the revised recovery plan as a minimum of 20 to 25 nesting pairs in each of the 5 recovery regions. A minimum of 175 to 200 falcons (an estimated 50 percent of the historical population) is the objective for full recovery and delisting of the eastern peregrine falcon. The number of historical pairs in the southern Appalachians was unknown, but the southern Appalachian's goal is a minimum of 20 pairs for downlisting and 25 pairs for delisting.

Following the initial hacking of eight birds in 1984 at two sites in North Carolina and Tennessee, the number of birds released each year has gradually increased (with the exception of 1986). In 1985, 33 birds were hacked at 6 sites. These sites include the original two sites, one new site each in North Carolina and South Carolina, and two new sites in Virginia. In 1986, 28 birds were released at 7 sites in these 4 States. The reduced number of birds released in 1986 can be attributed to initial reproduction problems at the captive propagation facilities in Boise, Idaho, following transfer of the breeders from the previously used Cornell University facilities.

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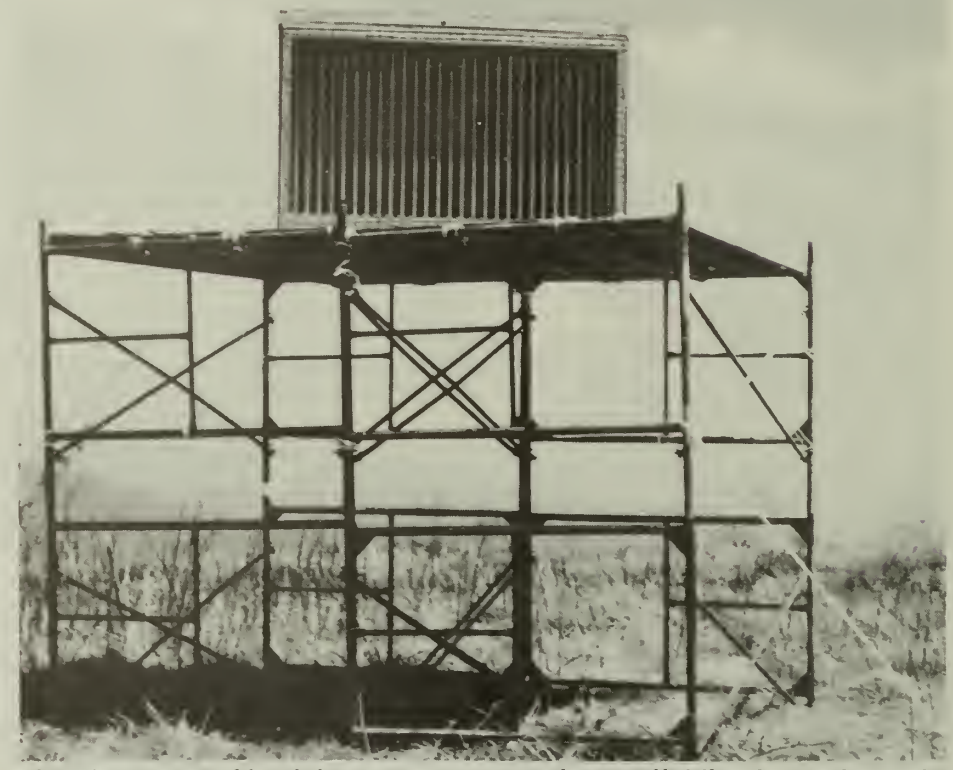

photo by Gary Henny

The placement of hack boxes on construction scaffolding is proving to be a quick and effective technique for preparing hack sites.

photo by Bill Duyck

peregrine falcon hack site on Grandfather Mountain, North Carolina

Peregrine Falcon

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In 1987, 40 birds were hacked at 10 sites. Georgia and West Virginia hacked their first birds at one site in each State. In addition, there were three new sites in North Carolina, one new site in Tennessee, and one old site each in North Carolina, Tennessee, and Virginia. At the tenth site, a chick was fostered into a natural eyrie in North Carolina. Again, in 1988, 10 sites in the southern Appalachians were used for hacking but the total number of released birds increased to 68. These 10 sites included 2 old sites in North Carolina; one old site each in South Carolina, Tennessee, and Virginia; 2 new sites in both Virginia and West Virginia; and one new site in Georgia. In 5 years of hacking, 177 birds have been released at 21 different sites in the southern Appalachians; 151 (85 percent) fledged successfully.

Several firsts were recorded in 1988. Not only was this the first year that the southern Appalachians received the majority of the released birds for the Eastern Peregrine Falcon Recovery Program, it was also the first year that two hack boxes were used at some of the sites. A concept of clustering sites was emphasized in the southern Appalachian region in order to saturate an area with released birds before returning birds establish territories and eliminate the area from further use as a release site. From 1984 through 1987, release sites were clustered in the southern end of the southern Appalachians. During 1988, a second cluster of release sites was started in the extreme northern end of the southern Appalachians with four sites in Virginia and West Virginia.

The success achieved so far in the southern Appalachians has exceeded our initial expectations. A model, based on the results achieved in the recovery program through 1985, was used to predict survival, territorial pairs, breeding pairs, and breeding success of peregrines in the southern Appalachians. Based on this model, the first returning pairs were expected in 1988 and the first breeding in 1989. The actual results, however, are 2 years ahead of the predictions with our first pair recorded in 1986 and first breeding attempt in 1987. In 1988, five territorial pairs were confirmed, and three of the five nested. Unfortunately, one pair was unsuccessful, and the other two pairs only produced one chick each. However, it does represent the first successful breeding in the southern Appalachians since pre-DDT days in the 1950s.

Another point of interest in the southern Appalachian releases is the use of construction scaffolding to build hacking towers. This technique has been used successfully by Tennessee Wildlife Resources Agency personnel for 2 successive years. Using this method, a tower can be built in approximately one-half hour. In about 2 hours, a tower, platform, and hack box can be completed. The Tennessee site is believed to be the only site using construction scaffolding.

photo by Bill Duyck

A Tennessee Valley Authority helicopter airlifted supplies to the remote peregrine falcon hack site on Grandfather Mountain, North Carolina.

Nile Crocodiles

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Nile crocodile habitat. Currently, the Service estimates that there are about 50,000 crocodiles in Zimbabwe, which is now managing the species as an economic resource.

Although the crocodile's status in Zimbabwe has improved, some threats remain and the Service does not believe that this animal is completely out of danger. Therefore, instead of removing it from protection under the Act, the Service reclassified the Nile crocodile in Zimbabwe from Endangered to Threatened. All other populations remain classified by the Service as Endangered, and import of Nile crocodiles (both wild and ranched) from any countries other than Zimbabwe is generally prohibited.

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obstruction in his daily area of movement. That fence and some others have since been removed from the refuge.

* * *

Five female whoopers at the Patuxent Wildlife Research Center in Maryland produced 15 eggs this year. Two of the eggs were broken by the cranes, seven hatched, and the others were infertile or the embryos died before hatching. Four chicks subsequently died of exposure, enteritis, and other problems. Another 15 eggs were shipped to Patuxent from Wood Buffalo National Park. Six of those eggs were infertile or contained dead embryos and one was a sandhill crane egg *(Grus canadensis)*, the first record of "dump-nesting" by cranes. The other eight whooping crane eggs hatched, with seven chicks surviving.

* * *

Several new populations of the threatened Navajo sedge *(Carex specuicola)* were located in August. Previously, this sedge was known from only two canyons within a large canyon complex. Some of the newly discovered populations are inaccessible to livestock, one of the species' threats.

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Thirty-eight of the Kearney's blue star *(Amsonia kearneyana)* plants transplanted in April survived the spring drought (with some supplemental water) and put on some summer growth. A contractor has been monitoring the transplants since their planting. These early results indicate that the attempt to establish a second population may be a success. An additional 30 to 50 plants will be added to this new population in February.

* * *

Ongoing surveys for Tumamoc globeberry *(Tumamoca macdougalii)* are refining our understanding of the distribution of this Endangered desert vine, previously known in the United States only from Pima and Pinal Counties, Arizona. Two new discoveries in Arizona have been made, one in Maricopa County and another on Organ Pipe Cactus National Monument, now considered to be the westernmost U.S. population. The Tumamoc globeberry also occurs at a few sites in the state of Sonora, Mexico.

* * *

A total of 29 Sanborn's long-nosed bats *(Leptonycteris sanborni)* were netted and released in one night at Ramsey Canyon in the Huachuca Mountains of Arizona by personnel from The Nature Conservancy, Arizona Game & Fish Department, and U.S. Fish and Wildlife Service, along with interested individuals. These nectar-feeding Endangered bats fly into the Conservancy's preserve to raid hummingbird feeders put out for the seven species of

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hummingbirds that are reported from Ramsey Canyon. The bats easily drain accessible feeders before dawn. Their usual foods is agave and cactus nectar (along with pollen from those plants).

* * *

A study has been initiated to determine the status of six Arizona land snail species. Five of the snails are known to live in areas of localized talus in the Pinaleno Mountains in Graham County, Arizona. They include the Clark Peak talussnail (*Sonorella christenseni*), Pinaleno talussnail (*Sonorella grahamensis*), mimic talussnail (*Sonorella imitator*), Wet Canyon talussnail (*Sonorella macrophallus*), and Pinaleno mountainsnail (*Oreohelix grahamensis*). The sixth snail is the San Xavier talussnail (*Sonorella eremita*), which is known only from a small area of talus on a hill near Tucson. These highly endemic species are typical of the southwestern mountains' "sky islands" ecosystems. Extensive mining may threaten their habitat.

* * *

The bodies of two Endangered Mount Graham red squirrels *(Tamiasciurus hudsonicus grahamensis)* were salvaged from the Pinaleno Mountains in Arizona last July. An adult male was found hit by a car and a radio-collared juvenile was found dead of unknown causes. Both specimens are being transferred to the University of New Mexico in Albuquerque, where they will become part of a species-wide red squirrel study.

* * *

The field season on the Kemp's ridley sea turtle *(Lepidochelys kempii)* nesting beach at Rancho Nuevo, Tamaulipas, Mexico, resulted in some 826 nests being transplanted and protected in corrals for incubation. This was the highest number of nests collected at the project area since 1981, and we hope that it turns out to be a trend. It is too early to know if the increased nest production is natural variation or the result of recruitment to the female population. The hatch rate is running 70 to 75 percent in the corral nests. Meanwhile, in Texas, an excellent hatch rate of 92 percent was obtained at Padre Island National Seashore for the 1,000 eggs that were collected for imprinting and headstarting.

The Kemp's ridley nesting beach at Rancho Nuevo was battered this fall by Hurricane Gilbert. The hurricane moved ashore slowly, causing flooding well inland. The combination of wind, rain, and storm surge obliterated the foredune on much of the beach, but what effect this ultimately will have on the Kemp's ridley is unclear. The ridley's favorite nesting site on the beach is at the base or top of the foredune. Luckily, no adult turtles or nests were affected by the hurricane because the nesting and hatching season had just ended. Whether or not the turtles returning to nest next year will be affected, and how long it will take to reestablish a "normal" beach profile, are matters of conjecture.

Alarmist articles about these beach changes were published in some newspapers after the storm. Although we are concerned about how the changed beach will affect protection of the turtles and eggs, we are not too concerned about the turtles finding places to lay eggs. Beaches are basically ephemeral structures, periodically moving, changing, and being created or destroyed. Sea turtles have existed for many millions of years and they have probably evolved strategies for responding to these natural changes. Our major concern is that the remnant population may not be as able to absorb catastrophic changes to its habitat as its large, ancestral populations. We may have to consider modifying our protection strategies to accommodate whatever behavioral shifts, if any, the turtles make.

* * *

A Kemp's ridley and a loggerhead sea turtle *(Caretta caretta)* also nested at Mustang Island, Texas, this year and their progeny were released there after incubation at Padre Island National Seashore.

* * *

Region 3 — Kirtland's warbler *(Dendroica kirtlandii)* biologists and managers have long debated the significance of occasionals bird found outside the "traditional" nesting areas in the northern part of Michigan's lower peninsula during the breeding season. Perhaps these birds are rare strays who have missed their natal areas on their spring migration from the Bahama Islands. Or perhaps they represent individuals genetically programmed to disperse in search of distant habitats. The latter explanation might call for a change in recovery efforts for the species.

In an effort to learn more about these "stray" individuals, the Service contracted with the Wisconsin Department of Natural Resources to carry out a search for Kirtland's warblers in the jack pine areas of Wisconsin. This search proved to be very successful — eight male Kirtland's warblers were located by State biologists and volunteers assisting in the spring survey. None of these males gave any hints of having a mate, but observations were very limited. Two of the birds were subsequently mist-netted and color banded to aid in their future identification. Because of this success, a larger survey will be run in Wisconsin in 1989, and the Minnesota Department of Natural Resources is planning a similar search in suitable jack pine areas of that State.

* * *

Region 6 — Five young peregrine falcons released July 13, 1988, in downtown Denver, Colorado, captured the attention of the city. By fall, the young birds were continuing to do well. They have been rescued from several urban perils and are learning to hunt pigeons.

* * *

Possible sightings of the Endangered black-footed ferret *(Mustela nigripes)* have been reported from Columbian ground squirrel colonies found in Waterton Lakes National Park, Alberta, Canada. Park officials report that sightings have occurred in this area since 1983 and that the frequency of sightings has increased this year.

In an effort to confirm the presence of black-footed ferrets, Canadian park and wildlife officials have arranged to investigate the sighting reports and to conduct surveys in the area from which the ferrets were reported. U.S. Fish and Wildlife Service biologists with experience in the methods used to find black-footed ferrets were invited to attend a planning meeting and assist with initial surveys. Results from the first survey efforts revealed some possible evidence of ferrets, but no sightings have been confirmed.

* * *

Region 7 — The listing last spring of the Aleutian shield-fern *(Polystichum aleuticum)* as Endangered marked the first addition of an Alaskan plant to the Endangered species list. Despite surveys in each of the past four years, one population consisting of six plants comprised the current known world population for the species at the time of listing. The plants occupied an area of 100 square feet high on Mt. Reed on Adak Island. In July and August of this year, three teams of botanists attempted to find additional populations of the shield-fern on several Aleutian Islands. Although no additional specimens were found on Attu, Kagalaska, Atka, or Unalaska, close to 100 shield-ferns were found on Adak Island in the same general area as the previously known site. Many of the plants contained fronds with spores.

The highly restricted range exhibited by the shield-fern is puzzling because the alpine environment where it grows is essentially undisturbed. *Polystichum aleuticum* may well be a relict species from a pre-glacial era when the climate and flora of the Aleutians was markedly different.

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Recovery activities within the breeding grounds of the Endangered Aleutian Can-

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ada goose *(Branta canadensis leucopareia)* have been completed for the 1988 field season. Biologists surveying Agattu Island, where Aleutian geese were recently reintroduced, found 25 pairs attempting to nest. A survey of Nizki Island also confirmed that a small number of Aleutian geese have been reestablished there; two nesting pairs and about ten non-breeders were observed.

In the annual trap and transplant effort, family groups consisting of 128 Aleutian geese were captured on Buldir Island; 116 were released on nearby Little Kiska Island and 12 were released on Nizki Island.

* * *

Region 8 — Staff from Patuxent Wildlife Research Center's Hawaii Field Station assisted biologists from the State of Hawaii's Department of Land and Natural Resources in conducting the yearly breeding season census of the Endangered palila *(Loxioides bailleui)*. The census was conducted July 25–28 in the mamane-naio woodland of Mauna Kea on the island of Hawai'i. A total of 150 palila were recorded on 17 permanent transects in palila critical habitat that ranged from 1,972 to 3,042 meters in elevation. The population was estimated to be 3,124 birds, with a 95 percent confidence interval of 2,169 to 4,079 birds. This is a slight decrease (13 percent) from the 3,624 birds estimated during the same period last year.

* * *

As of early September, 57 Kirtland's warblers had been caught in mist nets and banded on their summer range in Michigan (this number includes some recaptures). In 1988, Patuxent biologists studying the Kirtland's warbler in Michigan have had a 24 percent return rate of 1987 hatching-year birds that were leg-banded in 1987 and an 8 percent return rate of those that carried radio transmitters in addition to leg bands. Due to concern that the radio transmitters may be causing mortality, biologists do not intend to place any transmitters on birds in 1988 as originally scheduled.

* * *

Patuxent Wildlife Research Center researchers conducted a high-tide count of light-footed clapper rails *(Rallus longirostris levipes)* at Seal Beach National Wildlife Refuge in southern California. A minimum of eight adults and one suspected hatchling were counted. Of 13 known rail nesting attempts, only one pair is believed to have produced young; red fox depredation has been implicated or suspected in all nest failures. Color mark-

(continued on page 16)

Protection Planning Committees as an Approach to Interagency Cooperation

John J. Pulliam, III
Jackson, Mississippi, Field Office

Several southeastern States have formed protection planning committees in recent years as a means of facilitating interagency conservation planning. The first such committee was initiated in 1979 by the Tennessee Natural Heritage Program to compensate for the lack of government funds, prevent the duplication of actions by different agencies, and utilize private actions and funds. In 1986, the Arkansas Natural Heritage Commission put together the Arkansas Protection Planning Committee, an effort that has produced some notable successes.

The interaction and cooperation among more than 20 State, Federal, and private agencies in Arkansas has been gratifying. For the purposes of the Arkansas Committee, protection is defined as the stated intent and effort of an individual or organization to manage a species or its habitat in a manner that will perpetuate that feature's existence in a natural state. The various methods include landowner notifications, purchases or donations of land, easements from landowners, landowner management agreements, leases, environmental reviews, and designations of public lands as protected areas. Protection methods vary from the "hands-off" approach to intensive management.

There are four major reasons for the Arkansas Committee's success. First, the Committee is composed of mid-level representatives who have a personal interest in conservation, a technical knowledge of natural resource management, and a measure of authority to represent their agencies. A second reason is that the Committee defers to higher authorities on controversial issues, thereby increasing the freedom of Committee participants. Third, the Committee does not supersede the processes or goals of the individual agencies. Finally, there is a strong sense of comraderie among the participants.

The Arkansas Protection Planning Committee meets once each quarter. It does not vote on the issues brought before the Committee but does attempt to achieve a consensus. Although the Committee does not take any action in its own name, it does encourage individual agencies to take specific actions. A typical Committee meeting consists of one or more presentations of general interest and a discussion of old and new sites for possible protection. Any member agency may present a site for consideration by the Committee, and the group determines whether or not to add it to the list of sites to be considered for protection. Once a site is placed on the list, the progress toward its protection is discussed and updated at every meeting. One or more conservation actions are recommended, and those responsible report at the next meeting concerning the implementation of those actions.

At the initial meeting in December 1986, the Arkansas Protection Planning Committee established an agenda of about 15 sites in need of increased or enhanced conservation. Some of the sites were already partially protected, while others were entirely unprotected. Staff members from as many as 12 different agencies were able to offer direct actions in response to the needs identified by the group. This activity ranged from landowner contact to cave gating assistance to the development of long-term natural areas inventory plans. No participating agency was asked to undertake activities not in keeping with the charter of the agency or its ability to commit time. As of June 3, 1988, the Arkansas Committee had a list of about 60 sites on its agenda. As sites reach the desired level of protection, they are moved to the "Managed Areas List." The Arkansas Committee, in particular, has been considering stewardship or management issues even after the initial protection phase is completed.

Edgemon Cave is one example of the Arkansas Committee's success. This cave is located on privately-owned property adjacent to land owned by the National Park Service that was considered surplus and therefore subject to sale. However, when the agency was informed of the significance of the cave as an Indiana bat *(Myotis sodalis)* hibernaculum and the importance of its property as a buffer zone for the cave's protection, the Park Service withdrew the property from sale. Negotiations also are underway for protection of the property that contains the cave itself. Other examples of the Committee's efforts include the development of management agreements between the State of Arkansas, the U.S. Army Corps of Engineers, and Weyerhaeuser Company for the protection of two nationally significant areas.

The success of the Tennessee and Arkansas Protection Planning Committees has been outstanding. As a result, the State of Mississippi has taken note and formed its own group. Approximately 20 agencies are involved in the Mississippi Committee, which has developed a list of at least 12 sites for protection.

Regional News

(continued from page 15)

ing of adult rails to assess movements and habitat preferences will be conducted, but because of a shortage of juvenile rails, attempts to use radio telemetry to evaluate juvenile rail movements and dispersal rates will be severely handicapped.

* * *

The reward program for the black-footed ferret has been well publicized throughout the western United States. Most States have experienced an increase in ferret sighting reports due to the $5,000 reward offered by Wildlife Conservation International. Unfortunately, the increase is in quantity, not necessarily quality. No photograph or information has been provided to lead to the confirmation of another wild population.

Eight of the 12 eligible States are participating in the reward program, along with the Navajo Nation (consisting of over 17 million acres in Arizona and New Mexico). Arizona, North Dakota, and Kansas do not offer a reward, but all three States have inventoried black-footed ferret habitat and are undertaking spotlight searches when appropriate. During summer 1988, search teams from the Service's National Ecology Research Center in Colorado responded to sighting reports in South Dakota, Colorado, Utah, and Alberta, Canada. Winter searches for tracks and the characteristic diggings of ferrets may be conducted when snow conditions are optimal.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	31	0	2	0	0	0	33	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	149	6	1	40	6	2	204	84
TOTAL	354	49	467	107	21	39	1037	284 **

Total U.S. Endangered 403
Total U.S. Threatened 128
Total U.S. Listed 531

Recovery Plans approved: 242

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
January 3, 1989 36 plants

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Congress Reauthorizes and Strengthens the Endangered Species Act

Legislation that reauthorizes the Endangered Species Act through fiscal year 1992 and provides significant new protection was passed by Congress on September 26, 1988, and signed by President Reagan on October 7 (Endangered Species Act Amendments of 1988, Public Law 100-478). Among the major provisions of the legislation are increases in funding authorizations; a reinforced commitment to cooperative State programs; increased protection for listed plants; monitoring of listing candidates; monitoring of recovery plan implementation; a delay in the mandatory use by shrimp fishermen of Turtle Excluder Devices (TEDS); and new programs for the conservation of African elephants (*Loxodonta africana*). These and other changes in the Endangered Species Act are summarized below:

Endangered Species Act Funding

Congress authorized the appropriation of up to the following amounts in fiscal years 1990-1992 for activities of the Departments of the Interior, Commerce, and Agriculture relating to the Endangered Species Act: FY 1990, $46.65 million ($38 million for Interior, $6.25 million for Commerce, $2.4 million for Agriculture); FY 1991, $48.85 million ($39.5 million for Interior, $6.75 million for Commerce, $2.6 million for Agriculture); and FY 1992, $50.85 million ($41.5 million for Interior, $6.75 million for Commerce, $2.6 million for Agriculture). These figures, it should be noted, are authorization ceilings; the amounts *appropriated* for spending will be determined each year by Congress.

Cooperative State Programs

Recognizing the value of cooperative State endangered species programs, Congress amended the Act to establish a new source for Federal matching grants, the Cooperative Endangered Species Conservation Fund. General revenues in an amount equal to five percent of each year's total Pittman-Robertson (Federal Aid in Wildlife Restoration Act) and Wallop-Breaux (Federal Aid in Sport Fish Restoration Act) Federal Aid accounts will be deposited each year into the new Cooperative Endangered Species Conservation Fund. The Congressional Budget Office estimates that, under this formula, about $15 million annually will go to the Fund account, from which Congress can make appropriations for endangered species matching grants. The amendments also authorize States to use these grants for monitoring the status of listing candidates and recovered species as well as those species currently listed as Endangered or Threatened.

Protection of Listed Plants

The 1988 Endangered Species Act Amendments increase protection for listed plants on Federal, State, and private lands, and give the Fish and Wildlife Service an expanded role in enforcing import and export restrictions.

- Previously, the Act only made it illegal to "remove and reduce to possession" listed plants, and this applied only to those plants occurring on lands under Federal jurisdiction. The new law, however, includes a prohibition against "maliciously damaging or destroying" any such plants on Federal land.
- Another significant change is that the Act reinforces State plant protection laws. It is now illegal under the Act to remove, damage, or destroy any listed plant on State or private land in knowing violation of State law or in the course of violating a State criminal trespass law.
- The amendments also increase the number of Federal agencies that enforce restrictions on the import and export of plants protected by the Act or by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Agriculture Department's Animal and Plant Health Inspection Service had exclusive authority in this area, but it will now share enforcement with the Fish and Wildlife Service.

Monitoring of Listing Candidates

The Fish and Wildlife Service has identified approximately 4,000 taxa (2,500 plants and 1,500 animals) for possible listing protection under the Endangered Species Act, and it already has enough data on about 950 of this total to warrant listing proposals. Currently, the Service has the resources to complete approximately 50 listings per year. To help prevent substantial declines or extinctions of candidates pending listing actions, Congress directed the Service to more closely monitor the status of these species and, if necessary, to promptly carry out emergency listings.

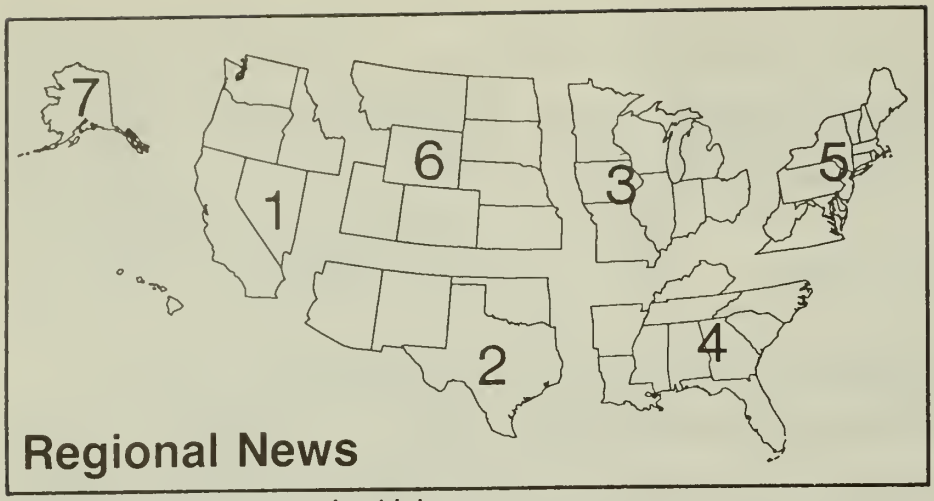
Congress also directed other Federal agencies to work with the Service to ensure that their programs help to protect listing candidates.

Recovery Planning and Implementation

The goal of the Endangered Species Act is to recover Endangered and Threatened species to a secure, self-sustaining status, and the 1988 amendments contain a number of provisions relating to recovery planning and implementation.

- One new requirement is for a report to Congress every 2 years on 1) the progress being made to develop and carry out species recovery plans and 2) the status of all species for which recovery plans have been developed. A tracking system will be set up to facilitate preparation of the report.
- Another provision requires the Secretary of the Interior to submit an annual accounting, on a species-by-species basis, of all "reasonably identifiable" expenditures for the conservation of listed species made by Federal agencies and by the States that receive matching grants. This primarily will be a listing of general information on costs related to recovery planning and implementation. It will also include atypically large expenditures associated with listing actions, Section 7 interagency consultations, research, and law enforcement.
- The amendments also require public notice of all drafts of new and revised recovery plans. Interested persons will have an opportunity to provide comments on the plans, and those comments will be considered before the plans are approved.

(continued on page 11)



Regional News

Regional endangered species biologists have reported the following news and activities for October and November:

Region 1 — Representatives of the Fish and Wildlife Service (Service) and Bureau of Land Management (BLM) recently met to consider protection for Aasea's onion (*Allium aaseae*), an Idaho plant that is a category 1 candidate for listing under the Endangered Species Act. Proposed mining exploration could lead to the transfer of *A. aaseae* habitat on public lands to private ownership for mineral extraction. This population of Aasea's onion is considered to represent the far western edge of the species' range, and is particularly important for preserving the genetic integrity of the plant. As a result of the meeting, the BLM has agreed to protect about 20 percent of the known population. The BLM also will contact the mining company to discuss a possible land exchange to protect the plant, establish at least three Aasea's onion "preserves" on BLM land, and take the lead in negotiating with private landowners for the acquisition of three more preserves.

* * *

Staff of the Service's Sacramento, California, Field Office also met recently with representatives of the BLM, California Department of Fish and Game, California Department of Food and Agriculture, University of California-Riverside, Inyo County, and California Native Plant Society to discuss appropriate methods for the removal of a non-native plant, Russian thistle (*Salsola* sp.), from the Eureka Dunes. The invading thistle may be threatening two federally listed plants, the Eureka dunegrass (*Swallenia alexandrae*) and Eureka Valley evening—primrose (*Oenothera avita* ssp. *eurekensis*), that are endemic to the area. The BLM will consider providing funding to support experimental control of the thistle. Emphasis will be on manual controls, such as hand-pulling or cutting, in a manner that will not disturb the listed plants. No chemical controls will be employed. The Service will consider funding a multi-year monitoring effort to determine the extent of the potential problem and learn more about the ecology and invasive characteristics of the thistle.

* * *

Preliminary results from 1988 surveys for the least Bell's vireo (*Vireo bellii pusillus*) in southern California indicate that virtually all of the larger populations have increased significantly since 1987. Habitat protection, trapping of competing brown-headed cowbirds (*Molothrus ater*), and other management efforts for this Endangered subspecies appear to be paying off. The smaller populations (i.e., those less than 10), however, are still dangerously close to extirpation.

* * *

Negotiations with private landowners will soon begin for acquisition and reforestation of denuded areas of the Sacramento River bank between River Mile 0 at San Francisco Bay and 194 near Chico Landing, California. Such restoration would benefit the Threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Riparian areas were removed by the Army Corps of Engineers during years of effort to contain the river flow. Habitat restoration will ultimately be accomplished on at least 668 acres in dis-

(continued on next page)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-235-2771)
Marshal P. Jones, *Chief,*
Office of Management Authority
(202-343-4968)
Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-235-2407)

Regional Offices

Regional 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Erwin "Wally" Steucke; *Acting Regional Director;* David F. Riley, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director and Acting Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Bettina Sparrow, *Endangered Species Specialist (202-653-8762).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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continuous, narrow strips bordering the river. Congressional funding for the program is based on a report completed in 1976. That report was recently updated to identify and rank suitable lands for acquisition by the California Wildlife Conservation Board. The California Department of Fish and Game will likely manage the lands following acquisition and restoration.

* * *

The second year of the California sea otter (*Enhydra lutris nereis*) translocation project began on September 27. Under more discriminating guidelines than those used last year, only young animals are being captured, immediately transported to San Nicolas Island, and promptly released. It is hoped that this will reduce stress and encourage otters to remain at the island. Many released otters are being fitted with radio transmitters attached to the external flipper tags. These tiny transmitters will allow researchers to monitor the animals' movements.

* * *

Region 2 — This past summer, the Socorro isopod (*Thermosphaeroma thermophilum*) had perhaps its closest brush with extinction in the past million years. Roots clogged the pipe leading to the cement horse-watering trough where the only known population of this tiny, water-dependent crustacean survived, thus drying the habitat. (Its natural habitat had already been lost.) The City of Socorro, New Mexico, subsequently removed the roots and restored the flow, but no isopods could be found. Fortunately, a refugium population had been established at the University of New Mexico under the guidance of Dr. Manuel Molles. Charles W. Painter, an endangered species biologist for the New Mexico Department of Game and Fish, has restocked 555 isopods into the renovated trough. If the refugium population had not existed, the Socorro isopod would now be extinct.

* * *

Joint efforts by the Service, New Mexico Department of Game and Fish, and U.S. Forest Service resulted in the transfer by helicopter of 375 Gila trout (*Salmo gilae*) from South Diamond Creek to two tributaries of the East Fork of Mogollon Creek. The original intent was to stock this Endangered fish directly into the East Fork of Mogollon Creek, which had been chemically treated this past summer to remove non-native species. Rainbow and brown trout (*Salmo gairdneri*and *Salmo trutta*) were still found in the creek, however, so it was re-treated. In early spring, the Gila trout will be moved from the two tributaries into the East Fork of Mogollon Creek.

* * *

The Service's Pinetop Fisheries Assistance Office in Arizona is undertaking a taxonomic evaluation of the Threatened Apache trout (*Salmo apache*). This rare fish is restricted to headwater streams and three small impoundments in the White Mountains of east-central Arizona. One of the threats to the Apache trout is hybridization with rainbow and cutthroat trout (*Salmo clarki*). This past summer, the Pinetop Office collected Apache trout from 31 streams throughout the species' range for electrophoretic and morphometric analyses. The information gained from these studies will help to discriminate between pure and hybrid Apache trout populations as well as to help maintain genetically pure and heterozygous hatchery stock.

* * *

On October 22, the Bureau of Reclamation presented the Arizona Native Plant Society with a "Take Pride in America" award. In presenting the award, Mr. Robert Towles thanked the Society for its volunteer efforts in assisting biologists of the Bureau and the Fish and Wildlife Service to salvage rare plants from the route of the Central Arizona Project, a large pipeline/canal water delivery system. Volunteers transplanted seedlings of an Endangered plant, the Tumamoc globeberry (*Tumamoca macdougalii*), onto preserves and monitored their survival. They also salvaged Thornber's fishhook cacti (*Mammillaria thornberi*) from the same route.

* * *

The surviving 38 plants of the reintroduced Kearney's blue star (*Amsonia kearneyana*) colony that was transplanted into a canyon in southern Arizona in April 1988 have produced buds that the Service hopes will result in stem growth next year.

* * *

The Attwater's Greater Prairie Chicken (*Tympanuchus cupido attwateri*) Recovery Team met September 7 in Texas. Since 1970, the population of this Endangered bird has declined by an average of 90 birds per year. If this rate continues, it will become extinct in 1999. Habitat losses due to changes in land use and management are believed to be causing the decline. The 1988 spring population was 926 birds in 8 counties, but only 3 counties have populations exceeding 34 birds. Drought is accelerating the population decline and small relict populations could disappear from five counties in the next few years. The team recommended that a captive propagation program be initiated to restock suitable unoccupied habitat. This proposal is under review by the Service's Region 2 and the Texas Parks and Wildlife Department.

* * *

The Service has received an interim report from Texas Parks and Wildlife on its golden-cheeked warbler (*Dendroica chrysoparia*) status survey. So far, Texas biologists have collected data on golden-cheeked warbler densities and vegetation characteristics at 11 study sites and estimated available warbler habitat using a geographic information system and LANDSAT data. The authors also plan to use satellite data to look at the rate of habitat change. They will be refining the

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TAKE PRIDE IN AMERICA

Taking Pride in Our Rarest Resources

This edition of the *Endangered Species Technical Bulletin* contains a Regional News note about volunteers in Arizona who illustrated the *Take Pride in America* spirit by assisting biologists of the Fish and Wildlife Service and Bureau of Reclamation in relocating some endangered plants from the path of a large aqueduct construction project to protected areas. I commend these concerned citizens for their efforts. Taking pride in our Nation's public lands and natural treasures includes taking resourceful and creative measures to protect rare animals and plants. Conserving these vulnerable resources is a job that government agencies cannot do alone, and the active assistance of people from all segments of society is needed. Remember, this land is *your* land.

Director, Fish and Wildlife Service

Protection Recommended for Three Plants and One Insect

Four rare species—three plants and one insect—were proposed by the Fish and Wildlife Service in October and November of 1988 for listing as Threatened or Endangered. If these proposals are made final, Endangered Species Act protection will be extended to the following:

Prairie Fringed Orchids

Two closely related species of grassland orchids have been proposed for listing as Threatened (F.R. 10/11/88). The **eastern prairie fringed orchid** (***Platanthera leucophaea***) occurs primarily east of the Mississippi River, while the **western prairie fringed orchid** (***Platanthera praeclara***) is restricted to States west of the Mississippi. Until recent years, they were thought to comprise a single species.

Prairie fringed orchids are perennial herbs that regenerate in May from a tuberous rootstock. Showy clusters of up to 40 white flowers appear from late June to early July, arranged on an inflorescense that can reach 47 inches (12 decimeters) in height. The blossoms are fragrant after sunset and adapted to pollination by night-flying hawksmoths. Because of the attractive floral displays, some populations of prairie fringed orchids have been reduced by collectors.

The main threat to these orchids, however, is the modification of their prairie habitat. Grazing and intensive mowing of native grasslands for hay production prevent orchid flowering and seed dispersal unless limited to seasons when the species are dormant. Because the prairie fringed orchids need open, sunny habitat, they also are affected when the suppression of wildfires promotes encroachment on grasslands by brushy vegetation. Other former orchid habitat has been converted to cropland, and some wetland sites that supported the eastern species have been drained.

The western prairie fringed orchid has declined 60 percent from the historical levels indicated in county records. It apparently has been extirpated from South Dakota. Forty populations are known to remain within remnants of tallgrass prairies in: North Dakota (1), Minnesota (9), Iowa (13), Kansas (8), Nebraska (5), Missouri (2), and Oklahoma (2), and the species was recently discovered in Manitoba, Canada. Many of the surviving populations, however, are small. One of Nebraska's two populations is on Valentine National Wildlife Refuge, but it numbers fewer than 20 individuals and its open habitat is undergoing vegetative succession. North Dakota's single population, consisting of 1,000-2,000 plants, is on the Sheyenne Valley National Grassland, which is managed by the U.S. Forest Service for grazing. Research is under way to determine how current management is affecting the orchid.

The eastern prairie fringed orchid has declined over 70 percent from levels described in original county records. Recent surveys located 51 surviving populations in: Michigan (18), Illinois (18), Wisconsin (10), Ohio (2), Maine (1), Iowa (1), and Virginia (1). Populations also are known from Ontario and New Brunswick, Canada. This species has not been seen recently in Oklahoma, Indiana, Pennsylvania, New Jersey, and New York, and it may be extirpated from these States.

Listing the prairie fringed orchids under the Endangered Species Act would complement the protection these plants already receive from nine of the States within their range. Under Section 7 of the Act, Federal agencies would be required to determine if their activities—including grazing management programs—are affecting the orchids. Cooperative discus-

(continued on next page)

eastern prairie fringed orchid

sions among representatives of the Fish and Wildlife Service, the U.S. Forest Service, and the Sheyenne Valley Grazing Association have already begun. One possibility being considered is whether or not grazing, if managed to avoid seasons of orchid growth and flowering, may benefit the species by helping to keep its grassland habitat open.

Shale Barren Rock Cress (*Arabis serotina*)

Shale barrens are "islands" of unique habitat within the central Appalachian woodlands that are characterized by sparse vegetative cover, steep south-facing slopes, and high temperatures with low moisture in the summer. Eighteen endemic plant taxa are recorded from the shale barrens, including *Arabis serotina* and three other candidates for listing under the Endangered Species Act (*Allium oxyphilum*, *Taenidia montana*, and *Trifolium virginicum*).

The shale barren rock cress is a biennial herb in the mustard family (Brassicaceae). Populations usually consist of two age-classes: 1) young, nonreproductive individuals in a basal rosette form and 2) erect, second-year flowering plants. At maturity, *A. serotina* grows to a height of one to two feet and produces a spreading, compound inflorescence bearing many tiny whitish flowers.

Currently, the shale barren rock cress is known from only 26 populations in 5 Virginia counties (Allegheny, Augusta, Bath, Highland, and Rockbridge) and 3 West Virginia counties (Greenbrier, Hardy, and Pendleton). Five of the shale barrens supporting the species in West Virginia have been damaged by road construction and a sixth was degraded by a small flood-control dam. Two of West Virginia's populations also were grazed in the past by sheep or goats. In Virginia, three shale barrens were almost destroyed by road building, two were degraded by railroad construction, and one is crossed by a hiking trail.

The two main threats currently facing *A. serotina* are the small size of most populations and browsing of the plants by deer. A 1986 status survey revealed that 15 populations of the shale barren rock cress numbered 20 or fewer individuals of flowering age. Some colonies have been heavily browsed by white-tailed deer, which are increasing in Virginia and West Virginia. Because the plant is a biennial and is restricted to a stressful environment, its reproductive potential already is naturally limited. Increased pressure from deer or other threats could make it impossible for *A. serotina* to survive. Accordingly, the shale barren rock cress has been proposed for listing as Endangered (F.R. 11/17/88).

The U.S. Forest Service, with 16 populations partially or completely within the George Washington and Monongahela National Forests, supports listing the shale barren rock cress. Conserving the specialized habitats where this plant occurs is not expected to significantly affect the agency's forest management.

American Burying Beetle (*Nicrophorus americanus*)

Also known as the giant carrion beetle, this flying insect is the largest member of its genus in North America, measuring up to about 1.5 inches (3.6 cm) in length. In addition to its size, the species is distinguishable from other species in the genus by a large orange/red spot on its upper back. Other orange/red markings on the front of the head, antennal clubs, and wing covers also contrast sharply with the species' black background.

As its common names imply, this beetle collects carrion and carries it below ground. Apparently any vertebrate carrion between 1.8 and 7.1 ounces (50 and 200 grams) is acceptable, although the beetles also capture and consume live insects. Beetles of both sexes are attracted to appropriate carrion soon after dark, and they will apparently fight among themselves until a dominant pair remains. This pair then will claim the carcass and bury it before dawn. After a chamber is constructed, eggs are laid on the carrion, which the hatching larvae will consume as food.

This beetle once was widely distributed throughout North America. It was reported from 32 States, the District of Columbia, and 3 Canadian provinces. For unknown reasons, however, the species has experienced a catastrophic decline. It is now known to survive at only two locations, a small island off the New England coast and a site in eastern Oklahoma. In its 1983 *Invertebrate Red Data Book*, the International Union for the Conservation of Nature and Natural Resources said the American burying beetle has exhibited "... one of the most disastrous declines of an insect's range ever recorded."

American burying beetle

Although several hypotheses have been advanced, there is no proof as to what has eliminated *N. americanus* from most of its range. This lack of knowledge obviously makes conservation and recovery planning difficult. If this beetle is listed, initial recovery efforts will focus on research to determine the factors responsible for its decline. If the problem(s) can be identified, later efforts could include moving beetles to reestablish populations at other sites within the species' former range. Continued surveys for any other populations that may remain are planned.

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are *proposed* for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are nonbinding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species found on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants.

Undercover Investigation Breaks Rhino Horn Trafficking Ring

Michael D. Rees
Division of Endangered Species and Habitat Conservation
Washington, D.C.

What is believed to be a significant international group trafficking in the black market for rhino horns has been uncovered in the United States. As of February 2, 10 people had been indicted on a variety of charges relating to the illegal importation and sale of rhinoceros horns and other parts of endangered wildlife species, as well as Communist-bloc AK-47 machine guns, into the United States. Three South Africans were among the 10 individuals charged in the conspiracy. (The U.S. Attorney is working with the U.S. Departments of Justice and State to extradite the South Africans.) The indictments culminated an 8-month undercover investigation involving agents from the Fish and Wildlife Service, Customs Service, and Bureau of Alcohol, Tobacco and Firearms.

The investigation began in February 1988, when the Fish and Wildlife Service learned that one of the defendants was attempting to sell a leopard (*Panthera pardus*) mount. Between April and June, an undercover agent was sold two leopard rugs for $2,000, a leopard head mount for $550, and a cheetah (*Acinonyx jubatus*) rug and cheetah head for $2,400. These sales were in violation of both the Endangered Species Act and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

One of the defendants subsequently indicated that he could obtain an "unlimited" number of rhino horns. The defendants agreed to sell five to seven rhino horns to the Service undercover agent for $40,000 each. One 8-pound horn was sold to the agent in August for $40,000. At the time of his arrest, one of the defendants had two rhino horns in his possession that were obtained in Angola. Recorded telephone conversations revealed that two of the defendants had obtained a total of 14 rhino horns in Angola, and that these horns were being transported to Namibia (Southwest Africa) from Angola via South African military vehicles for subsequent shipment to the United States.

Reports received by the Fish and Wildlife Service during the past year indicate that members of the South African Defense Force on duty in Angola and Namibia have been killing and smuggling rhinos, African elephants (*Loxodonta africana*), and other wildlife for personal gain. This investigation confirmed those allegations.

Rhino horn is not actually a horn but a growth of densely packed fibers of keratin, the same kind of protein that makes up human hair and fingernails. The horns weigh an average of 6 to 7 pounds and are from 1 to 3 feet in length. They are used primarily as handles for ceremonial daggers in some Arab countries, and in powdered form in Asia as a fever reducer and an aphrodesiac. Rhino horn is sold on the black market throughout the world. Published reports indicate that a rhino horn usually sells in the United States for

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Fish and Wildlife Service photo

Evidence seized during the investigation included illegally imported rhinoceros horns, spotted cat trophies, and AK-47 machine guns.

photo by Bruce F. Wolfe, courtesy of the World Wildlife Fund-U.S.

The black rhinoceros population has plummeted from over 65,000 in 1970 to fewer than 4,000 today, and the illegal killing of this Endangered animal for its "horn" continues at an alarming pace.

Rhino Horn

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$450 an ounce—about the price of gold. In some countries in the Middle East and eastern Asia, the price has been reported to approach $1,000 per ounce.

Rhinocerous populations in Africa have been decimated by poaching in recent years. The black rhino (*Diceros bicornis*) of Africa, from which the horns involved in this case are believed to have come, numbered over 65,000 in 1970. By 1985, the population had shrunk to 11,000, and today fewer than 4,000 of these rhinos remain. The population is estimated to decline by half every 4 to 5 years. Some have been collected for captive breeding, but many people believe the species could shortly become extinct in the wild.

All species of rhinos are on Appendix I of CITES, to which both the United States and South Africa are signatory countries. Pursuant to this treaty, the importation of a rhinocerous, or any part thereof, into the United States is illegal without the proper permits from the U.S. and the exporting country. Except for the southern population of the white rhino in Africa, all rhinos of Africa and Asia also are listed as Endangered under the U.S. Endangered Species Act.

Rhino experts have stressed the need for 1) greater international cooperation to stop illegal trade, 2) improved management of major rhino populations, and 3) protected sanctuaries if the rhino is to survive in the wild.

Federal Investigation Documents Illegal Trade in Rare Parrots

The U.S. Fish and Wildlife Service recently concluded "Operation Psittacine," a 2-year investigation that documented extensive illegal importation of parrots from Mexico and Central and South America into the United States. Information gathered during the investigation indicated that as many as 26,000 birds per year are smuggled across the U.S./Mexico border near Brownsville, Texas, alone.

This was the first major covert effort by the Service to target illegal parrot dealers operating away from the country's border areas. Agents from six districts of the Fish and Wildlife Service's Law Enforcement Division and U.S. Customs Service worked on the investigation. The agents represented themselves as bird buyers for a local chain of pet stores in Dayton, Ohio, which cooperated with the investigation. This enabled the agents to document the activities of illegal parrot dealers. As a result of this investigation, 36 people in 6 States (Indiana, Missouri, Illinois, Wisconsin, Texas, and California) will be prosecuted for felony violations of Federal smuggling statutes and the Lacey Act. The Lacey Act is aimed at preventing illegal trade in protected wildlife.

Smuggled parrots valued at an estimated $468,000, along with an airplane and vehicles valued at $93,000, were seized during the investigation. The confiscated birds included scarlet macaws (*Anodorhynchus macao*), palm cockatoos (*Probosciger aterrimus*), thick-billed parrots (*Rhynchopsitta pachyrhyncha*), and several other parrot species (*Amazona* sp.). Trade in these species is regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The thick-billed parrot also is protected under the Endangered Species Act.

The smuggling of parrots is not only a threat to wild parrot populations but also to birds in the United States. Smuggled parrots are not put through normal quarantine procedures and can carry the highly contagious Newcastle's disease. This viral disease can infect poultry and other bird species.

palm cockatoo

photo by Jorgen Bent Thomsen, courtesy of the World Wildlife Fund-U.S.

Black-footed Ferrets Moved to New Facilities

Sharon Rose
Public Affairs Assistant
Denver Regional Office

The black-footed ferret (*Mustela nigripes*) moved a step closer to recovery following a decision by Fish and Wildlife Service and State of Wyoming endangered species authorities to take animals from the world's only known black-footed ferret population and establish two additional captive breeding populations.

Following 2 successful years of captive breeding at the Sybille Wildlife Research and Conservation Education Unit near Wheatland, Wyoming, during which the black-footed ferret colony grew from 18 to 58 captive animals, officials worried that a catastrophe, such as a fire or disease, might wipe out the entire colony. To prevent this, the Wyoming Game and Fish Department began a systematic search for institutions having suitable expertise, caging structures, and willingness to assist with the captive-breeding program.

After a series of studies and interviews, two facilities were deemed best qualified to house ferrets from the Sybille colony: the National Zoological Park's Conservation and Research Center in Front Royal, Virginia, and the Henry Doorly Zoo in Omaha, Nebraska. Officials at both zoos have agreed to cover all expenses related to the care and breeding of the captive ferrets while in their care. The Wyoming Game and Fish Department, through the Sybille Unit, agreed to supply each zoo with a total of 20 individuals (10 males and 10 females) for each breeding program. With the establishment of these new breeding populations, the hope is to reach a total of 250 breeding pairs, or 500 individual animals, by 1991.

Preparations were begun in the summer to establish the new population at Front Royal. Seven young ferrets from the Sybille Unit, born in 1988, were carefully selected to ensure that the new population would represent a a substantial portion of the gene pool of the original population captured at Meeteetse, Wyoming. Complicating the move was the susceptibility of the ferrets to canine distemper, human influenza, and other diseases. The ferrets at the Sybille Unit have been raised in isolation during the last few years for this reason. Transporting the animals to Virginia in a commercial carrier that frequently transports pets could have exposed the ferrets to distemper and human influenza. With this concern in mind, permission was sought from the Department of Defense to enable the Wyoming Air National Guard to airlift the ferrets to Virginia. This permission was granted.

On October 18, 1988, a cool, wet morning, seven ferrets (four females, three males) were moved in specially constructed boxes by ground transportation from Sybille to Cheyenne, Wyoming. The animals were monitored by attendants wearing masks to prevent the possible spread of disease. A C-130 plane from the Wyoming Air National Guard's 153rd Tactical Airlift Group, on its way to Virginia for a training mission, flew the ferrets and staff from the Wyoming Department of Fish and Game and the Service to Andrews Air Force Base in Maryland. The ferrets were then driven to Front Royal. All the ferrets made the trip safe and sound and are doing well in their new residence.

Special accommodations for the ferrets' new home in Virginia included wooden "houses" similar to those they had occupied in Wyoming, placed in the ferrets' new outdoor enclosures. Each enclosure, measuring 10 x 20 feet or larger, has a concrete floor covered with 6 to 10 inches of pine bark, peat moss, and solite. The roof of the enclosure is a corrugated plastic that allows light to pass through, but keeps out rain, snow, and attacks by great horned owls, which have been known to make a meal out of a ferret.

Yards of black, flexible tubing for the ferrets to use as "tunnels" throughout the enclosure lie on top of the floor. Zoo officials are experimenting with leaving the tubing on top of the soil for easier observation, but if the ferrets seem hesitant to use it this way, it will be buried. Each enclosure has a circular opening in the wall that allows entry into an adjoining "room." The opening can be closed when not needed.

Eight ferrets (4 males and 4 females) from Sybille were successfully moved on December 15 to establish the third captive breeding population in Omaha. The Omaha zoo is in the process of building a new facility to hold the ferrets.

The first release of black-footed ferrets into the wild may occur in 1991. In preparation for this event, an Interstate Coordinating Committee has set up individual State working groups in Regions 6 and 2 of the Service. Each State working group includes members from the State natural resources agency, State game and fish department, and such Federal agencies as the Forest Service, Bureau of Land Management, Soil Conservation Service, Fish and Wildlife Service, military, and any other agency that has a stake in prairie dog management.

Each State working group is charged with the mapping of prairie dog colonies to aid in identifying possible ferret relocation sites. Once identified, the sites will be evaluated and a management plan will be developed to protect these areas.

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habitat description and estimate of available habitat before submitting their final report.

The golden-cheeked warbler's habitat, which consists of mixed evergreen-deciduous forests, is most abundant and contiguous on the eastern edge of the Edwards Plateau in Texas. The birds depend on ashe juniper (*Juniperus ashei*) for nesting material and require stands more than 20 years old for nesting. Oak (*Quercus* spp.) trees apparently provide essential foraging substrate. After the habitat estimates are refined, the authors will use this information in combination with their density estimates to calculate the population size. The Service will evaluate the final information to determine whether or not to propose listing the golden-cheeked warbler for Endangered Species Act protection.

* * *

Region 4 — The National Park Service, in cooperation with the North Carolina Wildlife Resources Commission, has reintroduced 250 spotfin chubs (*Hybopsis monacha*) into historical habitat in Abrams Creek, Tennessee, within the Great Smokey Mountains National Park. The reintroduction was successful, and subsequent observations indicate that the fish are still in the transplant area. All of the transplanted fish were collected from the Little Tennessee River in North Carolina.

Current plans are to make additional transplants annually over the next 4 years. If the Abrams Creek reintroduction effort continues to be successful, it will increase the overall number of spotfin chub populations from four to five. The Spotfin Chub Recovery Plan calls for at least six viable populations before the species can be considered for removal from Endangered Species Act protection.

* * *

The Service has been petitioned to list the Louisiana black bear (*Ursus americanus luteolus*) as Endangered. There is a question, however, about whether or not genetically pure individuals of this subspecies remain. In the 1960's, black bears of a different subspecies (*Ursus americanus americanus*) were introduced from Minnesota into Louisiana for sport hunting purposes after the native subspecies had declined. To answer questions about the genetics, the Service has contracted with Dr. Mike Pelton of the University of Tennessee to coordinate the gathering, processing, and interpretation of black bear data in Louisiana. Blood and tissue samples are being collected from bears in the Tensas and the Atchafalaya River basins in Louisiana. Electrophoretic and mitochondrial DNA techniques will be employed in conducting the investigation.

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Final Listing Rules Approved for Three Species

Michael Rees

During October and November of 1988, one plant and two animal species were added to the Federal list of Endangered and Threatened Species. The following now receive protection under the Endangered Species Act:

Decurrent False Aster (*Boltonia decurrens*)

This wet prairie perennial, a member of the family Asteraceae, grows up to 79 inches in height and produces clusters of attractive aster-like flowers with yellow disks and white to (more commonly) purple rays. Historically, this plant was known to occur along a 250-mile stretch of the Illinois River floodplain from LaSalle, Illinois, downstream to St. Louis, Missouri, where it also grew along the Mississippi River. Seventeen populations are now known to occur in five Illinois counties, and there are two populations in one Missouri county. The aster is believed extirpated from 13 other counties in Illinois and 3 counties in Missouri. It is threatened by destruction and modification of the floodplain forest along the two rivers due to wetland drainage and agricultural expansion. The main threat to the species is heavy siltation, resulting from extensive row crop cultivation and altered flooding regimes. The decurrent false aster was proposed on February 25, 1988, for listing as a Threatened species (see summary in BULLETIN Vol. XIII, No. 3), and the final rule was published November 14, 1988.

Little-wing Pearly Mussel (*Pegias fabula*)

The little-wing pearly mussel, the only member of its genus, is a small freshwater mollusk. It inhabits small, cool, free-flowing streams and is usually found in the transition zone between pools and riffles. Of the 27 river reaches in Alabama, North Carolina, Kentucky, Tennessee, and Virginia in which this species once occurred, only 6 (3 in Kentucky, 2 in Virginia, and 1 in Tennessee) are still known to support the mussel. This species' decline has resulted primarily from habitat deterioration and modification caused by impoundments and by mining, agricultural, and construction runoff. Four of the six populations are threatened by coal mining and/or oil and gas development, and all of the populations are vulnerable to toxic spills and other accidents that could affect water quality. It is likely that most of the remaining populations have fallen below the generally accepted level required to maintain long-term genetic viability. The little-wing pearly mussel was proposed for listing as an Endangered species on April 21, 1988 (see summary in BULLETIN Vol. XIII, No. 5), and the final rule was published on November 14, 1988.

California Freshwater Shrimp (*Syncaris pacifica*)

This crustacean, the only surviving member of its genus, is nearly transparent in water and can reach 2.5 inches in length. The species is endemic to gentle gradient, low elevation freshwater streams in Napa, Marin, and Sonoma Counties, California. Once common, it now occurs only within restricted portions of 12 streams. The shrimp is threatened by introduced predatory fish and deterioriation or loss of habitat resulting from water diversion, stream channelization, dam construction, livestock grazing, agricultural and residential development, and water pollution. On April 22, 1987, the California freshwater shrimp was proposed for listing as an Endangered species (see BULLETIN Vol. XII, No. 5-6), and on October 31, 1988, the listing was made final.

BULLETIN Available by Subscription

Although we would like to send the BULLETIN to everyone interested in endangered species, budgetary constraints make it necessary for us to limit general distribution to Federal and State agencies and official contacts of the Endangered Species Program. However, the BULLETIN is being reprinted and distributed to all others, on a non-profit subscription basis, by the University of Michigan. To subscribe, write to the *Endangered Species Technical Bulletin Reprint*, School of Natural Resources, University of Michigan, Ann Arbor, Michigan 48109-1115, or telephone 313/763-1312. The price for 10 issues is $15.00 (in Canada, $18 US).

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These data will be interpreted in the context of other available black bear data, including samples from Minnesota bears.

* * *

The Service's Asheville, North Carolina, Field Office and the North Carolina Natural Heritage Program have conducted field surveys in North and South Carolina for Schweinitz's sunflower (*Helianthus schweinitzii*). Two populations of this Category 1 listing candidate have been decimated by quarrying and road construction. However, 5 previously unknown populations were discovered during the surveys, bringing the rangewide total to 16. Schweinitz's sunflower depends on periodic disturbances, such as fire, to maintain its open habitat. Because of several decades of fire suppression, the species is confined to habitat remnants adjacent to powerlines and highway rights-of-way, where the natural disturbance regime is artificially duplicated by maintenance operations.

* * *

The drought of 1988 appears to have harmed many populations of the Endangered green pitcher plant (*Sarracenia oreophila*), a species that occurs in boggy areas. Populations in northeast Alabama were visited by the Service's Jackson, Mississippi, Field Office botanist in October, and many showed a reduction in seed production. The effects of the drought were most evident on the recently reestablished green pitcher plant population in the Coosa Valley region of Alabama. Because of inadequate rainfall following the planting of seedlings in May, there was over 80 percent mortality. Additional seedlings from the greenhouse at the University of Georgia were planted at the site this fall and their status will be evaluated in spring 1989.

Region 6 — The Service recently issued an Interim Wolf Control Plan to manage potential gray wolf (*Canis lupus*)-livestock conflicts as part of the recovery effort outlined in the revised Northern Rocky Mountain Wolf Recovery Plan. Although studies have shown that the percentage of livestock killed by gray wolves is low where their ranges overlap, the possibility of predation on livestock remains. The main objectives of the wolf control plan are to: (1) provide uniform interagency guidelines for determining and controlling problem wolves, and (2) guide managers in making prompt and responsible decisions on wolf control by integrating wolf recovery objectives with other land uses and values.

The interim control plan includes guidelines for determining problem wolf status, conducting wolf control actions, and deciding the ultimate disposition of problem wolves in Montana and Wyoming.

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New Hope for Survival of the 'Alala

Thane K. Pratt
Hawaii Department of Land and Natural Resources

On June 11, 1988, a tiny hatchling crow emerged from its egg, marking a turning point in the program to breed in captivity the critically endangered 'alala or Hawaiian crow (*Corvus hawaiiensis*). Named "Ho'oku," a Hawaiian word meaning "to continue [in the perpetuation of a lineage]," the 'alala chick does indeed inspire new hope for a species that numbers nine birds in captivity and perhaps fewer in the wild.

Although now extremely rare, the 'alala was once abundant in the forests along the leeward slopes of the island of Hawaii (and, prehistorically, Maui). The species' decline has been blamed on a variety of factors, including killing of the birds, deforestation, and avian diseases transmitted by mosquitos that have become established on the island. By the late 1970's, only 76 'alala were estimated to survive in remote mountain forests.

Concerned for the plight of the 'alala, Jon Giffin, a biologist with the Hawaii Department of Land and Natural Resources (DLNR), David Jenkins of the University of Wisconsin, and C. J. Ralph of the U.S. Forest Service began field studies to determine the causes of the species' decline. They discovered that, although most adults survived from one year to the next, the birds' poor productivity was responsible for the population's collapse. Data revealed low hatching rates and losses of young birds to disease and predators. Fearing that the 'alala population would not last much longer, biologists collected young 'alala that were suffering from disease or vulnerable to predators. These birds became the nucleus for a captive flock stationed at Pohakuloa, a bird propagation facility operated by the DLNR and situated between high volcanic peaks on the island of Hawaii.

While the wild population continued to plummet, initial optimism that the captive flock would reproduce dampened as these birds, too, showed little success at breeding. Over a 10-year period, the captive flock produced only three offspring, all from one nest in 1981. Alarmed by this lack of success, the State in 1984 hired a consultant, Dr. Fern P. Duvall II, to study and take charge of the 'alala breeding program. The State also decided to move the captive 'alala flock away from Pohakuloa. Duvall soon discovered that the high altitude of the site and disturbance from a nearby military training camp made the Pohakuloa facility unsuitable to the birds. Another consultant, Stanley Temple, had earlier recommended that a new facility be established at an abandoned prison facility at Olinda on the island of Maui. Elaborate new aviaries were constructed there in 1986 with the help of the U.S. Army, and the Fish and Wildlife Service contributed funds through the Endangered Species and Pittman-Robertson Acts.

In November 1986, the captive flock was transferred to its new quarters. Though the 'alala began to settle in well at Olinda, the 1987 breeding season arrived before the birds had fully adjusted to their new surroundings. Only two eggs were produced, and tragedy struck when one of the females died of complications resulting from egg laying. Meanwhile, a census of the wild population turned up only two birds, although a few others were thought to survive in areas inaccessible to researchers.

Thus, the 1988 breeding season began with considerable apprehension. Concerned that certain pairs had become incompatible, Duvall rematched all eight birds. In all but one pair, the birds accepted their new partners and began the breeding season on schedule, actively courting. By late April, the two older and experienced females (Mana and Lu'ukia), assisted by their mates, had completed their nests. Both females laid a clutch of eggs, which were placed into an incubator for safe hatching. Discovering their losses, both females then refurbished their nests and laid second clutches. These eggs also were removed, with immediate replacement by wooden ones. Eventually, Lu'ukia laid a third clutch of three eggs.

Never before had the captive flock produced so many eggs in one season. Unfortunately, the three eggs laid by Mana proved to be infertile. This was not unexpected because this female has a history of laying infertile, often deformed eggs. Lu'ukia did much better; the eight eggs examined were all fertile. (Two of her eggs disappeared in the nest and probably were eaten by one of the parents.) The two fertile eggs of Lu'ukia's first clutch continued to develop up to the projected hatching date, which arrived and passed without the emergence of a chick. The death of both eggs at this critical stage was an unexpected setback, but it caused Duvall to reconsider the incubation temperature that had been recommended on the basis of past experience with this species. When it was clear that the two eggs from Lu'ukia's second clutch were developing properly, Duvall moved one to a different incubator and raised the temperature by a fraction of a degree. To the delight of all involved, a baby crow hatched from the experimental egg, confirming that the new temperature was correct. The other egg failed. Lu'ukia's third clutch also did not hatch; the eggs showed signs of developmental stress, probably because of coming so late in the breeding season.

Meanwhile Ho'oku, the first chick, flourished on a diet of bee pupae, baby rats, and other selected food items. Though now fully grown, the bird will not become sexually mature until it is 2 1/2-years-old. It will then exhibit the social behaviors characteristic of its sex, and biologists will be able to determine its gender.

Reflecting on the events of the 1988 breeding season, DLNR biologists feel more confident about the captive breeding project. However, the fate of the 'alala is still uncertain because of the very small number of females. If the program continues to be successful and a captive population becomes firmly established, biologists can begin efforts to return birds to the wild. The breeding season began again on February 1, so watch and hope for more good news on the 'alala.

photo by Dr Fern P. Duvall II

Ho'oku, the first 'alala produced in a captive propagation facility since 1981, represents new hope for the survival and eventual recovery of this critically endangered species.

Reauthorization

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Turtle Excluder Devices (TEDS)

TEDS are devices that are inserted into shrimping trawls to deflect sea turtles out of the nets and prevent these air-breathing reptiles from drowning. Because incidental drowning in nets is believed to have a significant impact on sea turtle populations, regulations requiring the use of TEDS at certain times in certain waters have been developed. (See BULLETIN Vol. XII No. 4 and Vol. XII No. 9.)

- Controversy about TED requirements resulted in an amendment that delays until May 1, 1989, the time when shrimpers must begin using the devices in offshore waters. Implementation in in-shore waters (bays and sounds landward of the coastline) is postponed until May 1, 1990. Regulations already in place for the Cape Canaveral area of Florida, however, remain in effect.
- The amendments also require the Department of Commerce to contract with the National Academy of Sciences for an independent review of scientific information on TEDS and sea turtle conservation in general. The target date for completion of the review is April 1, 1989. On the basis of this review or any new information, the Secretary of Commerce may modify the TEDS regulations as appropriate.

Pesticides Labelling

Concerns have been raised about the possible impacts of agricultural pesticides on listed species and about potential changes in regulations affecting pesticide use. Several of the new amendments address these concerns:

- The Environmental Protection Agency (EPA), in cooperation with the Departments of Agriculture and the Interior, is directed to set up a system for informing farmers of any proposed pesticide labelling programs or requirements that may be imposed in compliance with the Endangered Species Act. The public will have an opportunity to review and comment on any such programs or requirements. Labelling could affect how, when, and where certain pesticides are used.
- Congress also required the EPA to work with the Departments of Agriculture and the Interior to conduct a study to identify reasonable and prudent alternatives for implementing the labelling program without pesticide bans. A report is due to Congress within one year of the amendments.

Penalties and Enforcement

Congress more than doubled the civil and criminal fines for willful violation of the Act. The previous penalties had not been changed since 1973.

- Civil penalties jump to a maximum of $25,000 in the case of Endangered species and $12,000 for Threatened species.
- Criminal penalties are increased to a maximum of $50,000 for Endangered species and $25,000 for Threatened species.
- If the amount of funds collected from penalties, fines, and forfeitures of property exceeds $500,000, the excess will be added to the new Cooperative Endangered Species Conservation Fund.

African Elephants

In 1978, the African elephant was listed by the United States as a Threatened species. Limited importation of elephant ivory has been allowed since that time under Endangered Species Act and CITES permits. African elephant populations continue to decline, however, due primarily to poaching for the uncontrolled trade in illegally taken ivory. Because of growing concern about the survival of this impressive animal, Congress passed an African Elephant Conservation Act and appended it as Title II to the Endangered Species Act. The measure authorizes a special U.S. fund to provide assistance to African governments in elephant research, management, and conservation activities. It also requires the Department of the Interior to review existing conservation programs in Africa and restrict trade in ivory from countries that have inadequate conservation systems or that are not complying with CITES requirements.

- There will be a complete moratorium on ivory trade from any *source* country that 1) is not a party to CITES; 2) is a party but is not adhering to CITES rules; or 3) is not effectively managing its elephants.
- There also will be a complete moratorium on ivory from any *intermediary* country that 1) is not a party to CITES; 2) does not adhere to CITES controls; 3) imports ivory from a non-party; or 4) imports ivory from a source country that is under moratorium.
- Congress authorized the appropriation of up to $5 million annually for implementation of the African elephant amendments and for the African Elephant Conservation Fund, although no funds have been appropriated yet. The Fund also can receive private donations, civil and criminal fines collected for violation of the African elephant amendments, and money from sales of ivory forfeited under the Act.
- The Secretary of the Interior is required to gather information on the elephant conservation programs of all ivory-producing countries and report to Congress annually on the status of the African elephant, the elephant conservation projects funded, and the effectiveness of the international ivory control system.
- Violators of the elephant protection provisions face a maximum civil penalty of a $5,000 fine; for a criminal violation, the penalty can be as high as a $200,000 fine and one year in jail.

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The goal of control actions will be to take the minimum number of wolves necessary to resolve wolf-livestock conflicts while progressing toward wolf recovery. The interim plan is designed to promote wolf conservation by demonstrating that responsible Federal agencies can act quickly and effectively to resolve depredation problems. This should enhance the survival chances of nonproblem wolves in Montana and thus contribute to the ultimate recovery of the wolf in the Northern Rocky Mountains.

* * *

Region 8 — Coccidiosis has been diagnosed as the cause of recent deaths of young masked bobwhites (*Colinus virginianus ridgwayi*) being conditioned for release at the Buenos Aires National Wildlife Refuge in southern Arizona. The source of the infection has not been determined, but fecal samples from birds hatched at the Patuxent Wildlife Research Center have been negative. The National Wildlife Health Research Center is assisting refuge personnel in determining the origin of the infection and a course of action for controlling the disease.

* * *

Two gray wolves radio-tagged during September by Patuxent Wildlife Research Center biologists in the Superior National Forest, Minnesota, study area are the fifth generation of wolves in their blood line to be radio-outfitted. Radios have been worn by their mother, grandmother, great-grandfather, and great-great-grandmother. Studies such as these are important to understanding genetic, genealogical, and spatial relationships among wolf packs.

* * *

Mist-netting and banding efforts were intensified in the Mauna Kea, Hawaii, study areas following the completion of the palila (*Loxioides bailleui*) nesting season. Forty-four of these Endangered birds were captured during September. Nineteen of the birds were mature and 25 were immatures that fledged during the

(continued on page 12)

Regional News

(continued from page 11)

past summer. Since January 1988, 104 palilas have been banded in the study areas. This effort by the Patuxent Wildlife Research Center's Hawaiian Field Station is expected to complement ongoing studies of palila nesting success, survivorship, and movement patterns.

* * *

The only known population of the Wyoming toad (*Bufo hemiophrys baxteri*) occurs around a small lake near Laramie, Wyoming. Personnel from the Service (including a National Ecology Research Center biologist), University of Wyoming, and Wyoming Game and Fish Department cooperated in the 1988 population survey. Preliminary results indicate a population of more than 600 individuals, mostly young-of-the-year.

* * *

One of the Service's Office of Information Transfer biologists provided assistance to Region 6 for the third annual survey of a Threatened butterfly, the Pawnee montane skipper (*Hesperia leonardus montana*), in Colorado's Platte River Canyon west of Denver. These surveys are intended to determine a population baseline prior to any possible site preparation activities for the proposed Two Forks Dam project. The 3 years of data indicate a population level of about 82,000 to 116,000, remarkably constant for an insect. Surveys are conducted under the auspices of the Denver Water Department with guidance and direction from a Service Region 8 expert.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	31	0	2	0	0	0	33	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	149	6	1	40	6	2	204	84
TOTAL	354	49	467	107	21	39	1037	284 **

Total U.S. Endangered **403**
Total U.S. Threatened **128**
Total U.S. Listed **531**

Recovery Plans approved: 242

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
January 3, 1989 36 plants

November/December 1988 **Vol. XIII Nos. 11–12**

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

1988 INDEX Vol. XIII Nos. 1–12

ENDANGERED SPECIES

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ENDANGERED SPECIES

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Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Pesticides and Endangered Species: New Approaches to Evaluating Impacts

Larry Thomas
Division of Endangered Species and Habitat Conservation
Washington, D.C.

It is becoming increasingly apparent that pesticides can have a significant impact on some plant and animal populations. For example, an analysis by the Environmental Protection Agency (EPA) of recent pesticide studies (EPA 1989) and mortality rates from field studies (Balcomb et al. 1984) estimated that 1-2 million bird deaths per year result from the use of carbofuran alone. Further, a review of the Fish and Wildlife Service's Endangered Species Information System (ESIS) database in 1988 for 313 of the Endangered and Threatened species listed in the United States shows that 52 were listed, in part, because of herbicide use and that 61 species were listed, in part, because of pesticide use in general (Halvorson 1988). Impacts from pesticides, including herbicides and insecticides, are 2 of 63 kinds of reasons given in the ESIS database as causes for listing species as Endangered and Threatened. Notable examples of species negatively impacted by pesticides include the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), brown pelican (*Pelecanus occidentalis*), and Wyoming toad (*Bufo hemiophrys baxteri*).

The EPA is responsible for evaluating pesticides and registering them for use. Any appropriate use limitations are included on the product labeling. Since it is a Federal agency, the EPA is required to conduct these activities in compliance with Section 7 of the Endangered Species Act, as amended. Section 7 states, in part, that every Federal agency "... shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered or threatened species ... " or adversely its critical habitat. When an agency determines that one of its proposed actions may affect a listed species, it is required to consult with the Fish and Wildlife Service. The Service then issues a "biological opinion." If the biological opinion finds that the proposed action is likely to jeopardize the survival of a listed species or adversely modify its critical habitat, the Service attempts to identify "reasonable and prudent" alternatives that would avoid such impacts.

In 1982, the Endangered Species Act was amended to authorize permits in certain cases for the "taking" of listed species incidental to a proposed action, provided such incidental taking is not at a level that jeopardizes the survival of the species. If such taking is anticipated, the 1982 amendment requires that the biological opinion contain an "incidental take statement" that specifies the anticipated amount or extent of incidental take and provides "reasonable and prudent measures," with implementing terms and conditions, for minimizing the take. Additional instructions describing monitoring and reporting requirements if taking occurs are to be included in the statements.

Between 1977 and 1982, the EPA conducted over 2,500 pesticide registration actions. It requested formal Section 7 consultation with the Service on 56 of these actions, resulting in 36 jeopardy biological opinions. By 1982, it was recognized that a great deal of time would be required to adequately ensure that pesticide registration actions would not jeopardize listed species. In an attempt to remedy this and other problems, a new approach to the consultation process was initiated: groups or "clusters" of chemicals were selected for review based on their registered use patterns (e.g., chemicals used to grow corn). This approach was intended to give a comprehensive, consistent review of all pesticides with common use patterns. It was also intended to provide labeling consistency, which would reduce economic impacts caused by the selective labeling associated with individual registration reviews.

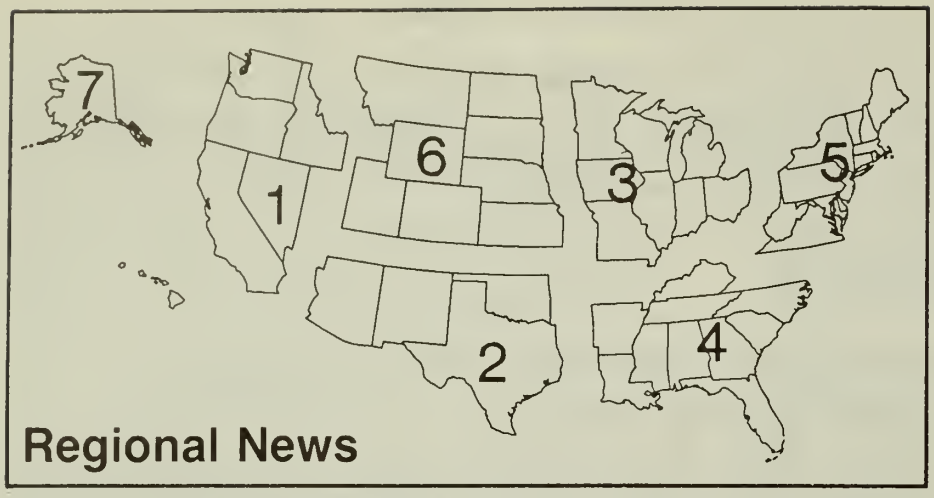
In 1983 and 1984, five "cluster consultations" were conducted in which 180 active ingredients were reviewed. These cluster consultations resulted in 305 findings where listed species could be jeopardized. As required by the Endangered Species Act, the biological opinions included reasonable and prudent alternatives to avoid jeopardizing the species or adversely modifying its critical habitat. In some cases, the alternatives were prohibitions on the use of the pesticide in the habitat occupied by the species. These areas of occupied habitat were to be identified by the Service. After these biological opinions were formulated, it became the responsibility of the EPA to implement the reasonable and prudent alternatives.

In 1986, the Center for Environmental Education issued a report, *The Environmental Protection Agency's Implementation of the Endangered Species Act with Respect to Pesticide Registration*, which was prepared for the President's Council on Environmental Quality. The report was critical of the EPA for not implementing reasonable and prudent alternatives identified in the Service's biological opinions. It concluded that neither the case-by-case nor the cluster approach alone offered a consultation mechanism that was both detailed and expeditious. The report recommended that a combination of the two approaches be adopted and that a pesticide that exceeds a trigger in the cluster analysis be reviewed in a single case study to identify problems involving other uses of the pesticide. It also recommended that immediate steps be taken to implement reasonable and prudent alternatives identified in existing jeopardy opinions.

In late 1986, the EPA initiated an accelerated effort to complete its Endangered Species Protection Program. A key facet of this effort called for maps detailing occupied habitat for a select group of listed species, combined with bulletins that would establish certain limitations for pesticide use in these areas. Unfortunately, in an attempt to make the maps more understandable, some were expanded far beyond the borders of occupied habitat. For example, proposed boundaries for restricted use areas were extended to the nearest highway or other recognizable feature, occasionally including hundreds of acres that were not intended to be identified as occupied habitat.

A number of pesticide user groups responded to the proposed maps and the EPA's plan to implement its Endangered Species Protection Program. Unfortunately, much of the information was misinterpreted. In part because of the user groups' concerns, Congress ex-

(continued on page 7)



Regional News

Regional endangered species staffers have reported the following recent news:

Region 1 — Recovery activities continue for the Threatened Paiute cutthroat trout (*Salmo clarki seleniris*) in the Toiyabe National Forest, California. Activities completed in 1988 include: (1) the installation of several instream structures to improve rearing habitat, (2) the enhancement of a barrier on Fourmile Creek to minimize upstream migration of competing trout species, (3) the installation of erosion control structures along several river bends to reduce bank sloughing and promote natural revegetation, (4) recontouring a deeply incised intermittent tributary to reduce sedimentation in Silver King Creek, and (5) maintenance of the solar-powered electric fences that were installed to exclude cattle and thereby promote willow regrowth in the riparian corridor. For the third straight year, volunteers from Trout Unlimited assisted in this habitat restoration project, contributing over 1100 hours of labor.

* * *

The Fish and Wildlife Service's Sacramento, California, Enhancement Field Station concluded a 3-year monitoring program for the Army Corps of Engineers to evaluate an experimental bank protection method. Known as the "palisades method," it consists of nylon webbing placed in a river channel perpendicular to the bank. The webbing traps debris and silt in a manner that stops bank erosion. The Service has been concerned for years that traditional methods of using rock rip-rap to stabilize banks have destroyed fishery habitat values, particularly juvenile salmon rearing habitat, and the elderberry plants needed by the Threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). The concluding report indicates that the "palisades method" is environmentally superior to rock revetment.

* * *

Region 2 — By February 1, 137 whooping cranes (*Grus americana*) had arrived at Aransas National Wildlife Refuge on the Texas Gulf Coast. One other had stopped about 50 miles north of the refuge, for a total of 138 whoopers that are known to have arrived in Texas.

In the Rocky Mountain cross-fostered whooper population, 13 birds were confirmed wintering in New Mexico and one or two reportedly were seen in the State of Chihuahua, Mexico. Neither of the two birds that fledged at Gray's Lake National Wildlife Refuge last summer have been seen since they left the refuge.

* * *

On January 3, 1989, two hunters were hunting waterfowl near San Jose Island, a

(continued on page 13)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Frank Dunkle, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief,*
Office of Management Authority
(202-343-4968)
Clark R. Bavin, *Chief,*
Division of Law Enforcement
(202-343-9242)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director; David Fleming, Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide.

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Corrections

Due to a printer's error, a photo of the prairie fringed orchid on page 4 of BULLETIN Vol. XIII, No. 11-12, was printed upside down.

"Breakthough in Recovery of the Puerto Rican Plain Pigeon," a story in BULLETIN Vol. XIII, No. 9-10, should have been credited to Mary Conser of the U.S. Fish and Wildlife Service's Caribbean Field Office and Raul A. Perez-Rivera of the University of Puerto Rico at Humacao. We regret the error.

Red Wolf Recovery Effort Intensifies

Michael D. Rees
Division of Endangered Species and Habitat Conservation
Washington, D.C.

photo by Bob Campbell, South Carolina Wildlife and Marine Resources Department

captive red wolves at the Bulls Island captive breeding facility

The effort to recover the Endangered red wolf (*Canis rufus*) is expanding on a variety of fronts. In 1980, the species was extinct in the wild. As of February 1, 1989, there were a total of 84 red wolves, 45 of which were in the Fish and Wildlife Service/Point Defiance Zoo captive breeding project in Graham, Washington. The remaining wolves were in other captive breeding facilities, acclimation pens, and the wild. The Service is moving ahead to increase both the number of wolves in the wild and the number of facilities and island sites used to propagate wolves.

Eleven red wolves are being held in acclimation pens and four are free on Alligator River National Wildlife Refuge in eastern North Carolina, the first mainland site where the species has been released back into the wild (see BULLETIN Vol. XII, No. 11-12). Of the four pairs of captive-raised wolves released originally in September 1987, two females died from uterine infections, two males were killed by automobiles, one female had to be euthanized after being injured in a fight, and one male choked to death on part of a raccoon—a very unusual occurrence. (The Service's National Wildlife Health Research Center in Madison, Wisconsin, examined the wolf's tissues and discovered no abnormalities.) The remaining male and female were recaptured and placed temporarily back into the acclimation pens to be bred. Biologists have determined that the best way to propagate captive-raised red wolves is to breed them in acclimation pens.

In April 1988, two female wolves from Graham, Washington, were released on the refuge to replace the two females that had died in the wild. These females, however, failed to pair with the two adult males then free on the refuge. One female was recaptured a few months after being released when she started showing aberrant behavior. It turned out this wolf also had a serious uterine infection. The other female was recaptured in January, after having paired with the adult male that later died from choking. Both females are being bred in the acclimation pens on the refuge.

The four red wolves still free on the refuge are all pups. Two of these pups were born in the wild in separate litters. The other two were brought up from Bulls Island at Cape Romain National Wildlife Refuge, South Carolina, and released in December 1988. The two Bulls Island pups were born on the island in captivity, but had been in the wild there with their parents since July 8, 1988.

The wolves in the Alligator River Refuge acclimation pens should have pups in late April or early May of 1989. About 10 weeks after the pups are born, they will be surgically implanted with radio transmitters, a relatively simple operation, so biologists can track them when they are released. About a week later, assuming there are no problems, the doors to the pens will be opened and the wolves can leave. The recovery team plans to release three pairs of adult wolves and their pups from the acclimation pens into the refuge in early summer of 1989. The wolves will be released as family units into different parts of the refuge.

It is thought that the high mortality rate experienced by the captive-raised wolves when they are released into the wild is due at least in part to a lowered immunity to infection. After two or three generations in captivity, the animals may be faced with immune systems that cannot cope with various diseases encountered in the wild. To overcome this potential problem, the Service is trying to move away from releasing only captive-raised animals and focus more on using animals raised in the wild. This strategy entails releasing captive-born pups into the wild as soon as possible. The use of islands as propagation sites also shows much promise.

In November 1987, an adult male and female from Graham, Washington, were placed in an acclimation pen on Bulls Island. The pair had 4 pups, 2 of which died. In July 1988, the 2 adults and 2 pups were set free on the 5,000-acre island. In December, all of the animals were recaptured. The 2 pups, now wild, were sent up to Alligator River Refuge, while the adults were put back in their pen to breed again.

Another propagation island site was established on January 10, when a pair of adult wolves were placed in an acclimation pen on Horn Island, part of the Gulf Islands National Seashore administered by the National Park Service. The 3,500-acre island, part of the National Wilderness Preservation System, is 8 miles from the coast of Mississippi. After pups are born, the wolves will be free to roam the island for 8 to 9 months. Then the adults will be recaptured and bred again; the pups will be recaptured, moved to the Alligator River Refuge, and released.

The Service also is trying to increase the captive red wolf population in order to expand the species' gene pool. Some of these animals will be bred with wild wolves, but most will remain in captivity for their lifetime. Eight facilities are cooperating with the Service in its captive breeding project: Audubon Park, New Orleans; Alexandria Zoological Park, Alexandria, Louisiana; Texas Zoo, Victoria, Texas; Burnett Park Zoo, Liverpool, New York; Tallahassee Junior Museum, Tallahassee, Florida; Wild Canid Survival and Research Center, Eureka, Missouri; and the Los Angeles Zoo. The Fossil Rim Wildlife Center at Glen Rose, Texas, will be joining the program shortly, and a number of other facilities probably will be participating in the future. All of these cooperating facilities have agreed to breed red wolves and pay for their upkeep. In addition, the Service is continuing to fund the captive breeding effort in Graham, Washington, operated by the Point Defiance Zoo.

The Service is in the process of rewriting the Red Wolf Recovery Plan. A draft of the plan should be available for public comment in the spring of 1989. In addition, the Service is identifying new propagation islands. A potential new mainland release site also may be identified later this year. In the future, Alligator River Refuge will probably serve in part as a "half-way house": wild wolf pups from the propagation islands will be temporarily placed in the refuge and then translocated to other mainland release sites as they become available. Although the red wolf has a long way to go before it can be considered a recovered species, the future is beginning to look promising.

New Animal Notice of Review Published

James Tate, Jr.
Division of Endangered Species and
Habitat Conservation
Washington, D.C.

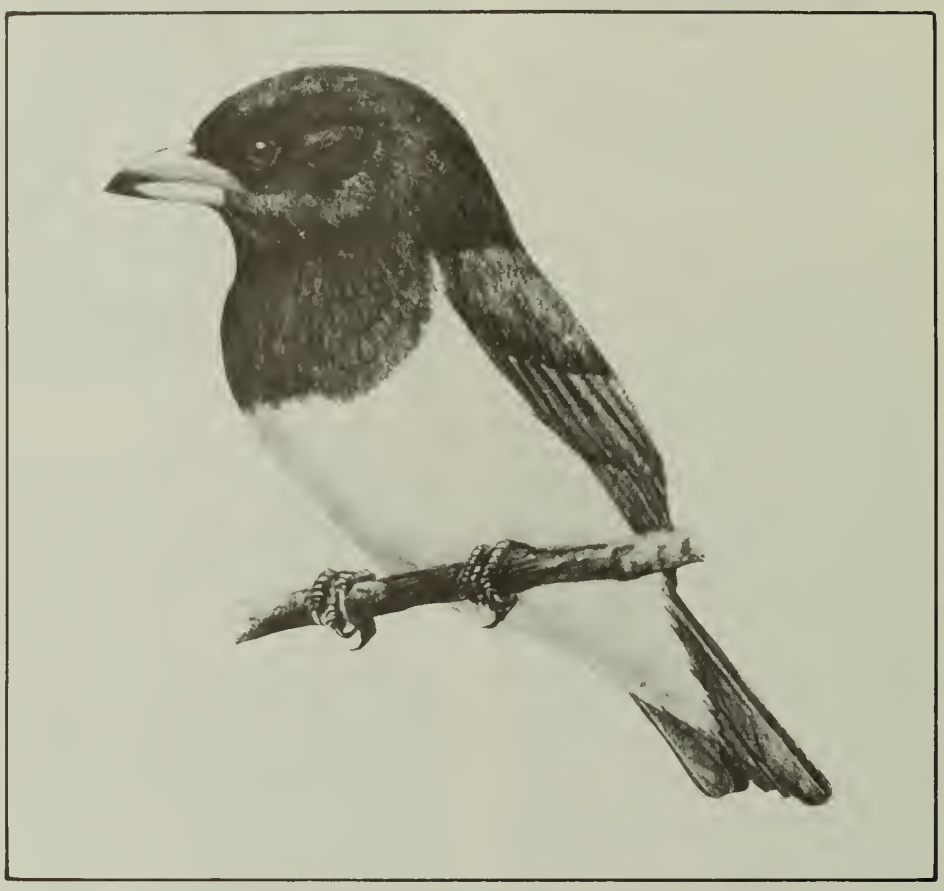
In May of 1984, the *Federal Register* carried a review of the invertebrate wildlife under consideration by the Fish and Wildlife Service for addition to the List of Endangered and Threatened Wildlife. Later, in September of 1985, the review of vertebrate wildlife was published. The two separate lists have now been updated, revised, and published jointly in the January 6, 1989, *Federal Register* as the Animal Notice of Review.

The new notice identifies those native U.S. animal taxa, invertebrates (sponges, hydroids, flatworms, earthworms, arthropods, and mollusks) and vertebrates (fishes, amphibians, reptiles, birds, and mammals), that are considered candidates for possible addition to the Federal List of Endangered and Threatened Wildlife. In addition, the animal notice identifies those taxa that were once being considered for listing but are not currently receiving such consideration. A separate notice of review is published periodically for plants.

The 1988 amendments to the Endangered Species Act (Act) allow the Service to spend money toward the recovery of species it has identified as candidates for listing as Endangered or Threatened. The potential for species conservation that can come from such pre-listing recovery actions is great. Identifying vulnerable species in a notice of review also allows other Federal agencies to consider the needs of these animals and plants during the planning of agency activities. Because setting up a mechanism for regular monitoring of vulnerable species was another goal of the 1988 amendments, the Service plans to publish a revised animal notice every other year. On alternate years, a notice of review for vulnerable plants can be expected.

Because a primary purpose of this new animal review notice is to provide lists of the species being considered as candidates for possible listing proposals, it is often referred to as the "candidate notice." The notice puts wildlife into one of several categories:

- Category 1 species—those for which the Service has enough information to support listing as soon as time and resources allow the developing and publishing of the requisite regulations in the *Federal Register*. (With current resources, the Service expects to be able to list about 50 species of animals and plants annually.)
- Category 2 species—those for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals until status reviews can be done to better determine the species' distributions, vulnerabilities, and threats to their survival.



The Palau white-breasted wood swallow* (Artamus leucorhynchus pelewensis) *is a category 1 listing candidate in the Caroline Islands, U.S. Trust Territories.

drawing by H. Douglas Pratt, reprinted from *The Birds of Hawaii and the Tropical Pacific* with permission

A strict constructionist could say that only the Category 1 species are true candidates for listing. More often, however, Category 2 species are combined with Category 1 species and generally referred to as "the candidates." This is because many of the Category 2 species will become Category 1 species after status reviews are completed on them. As new information becomes available, most Category 2 candidates probably will be proposed for listing, some of them even possibly prior to some of the current Category 1 species.

There remains a Category 3 to be considered as well. Category 3 is a compilation of those species that have been suggested at one time or another as possibly being in need of protection. It is subdivided into three parts:

- Category 3A—those species thought to be extinct.
- Category 3B—those found to be taxonomically invalid.
- Category 3C—those found to no longer be subject to substantial threats.

Species in Category 3A could be considered to be candidates for listing as well. This is because it is not always possible to know when a species becomes extinct, or even if it is extinct, just because it has not been seen for a while.

For example, the ivory-billed woodpecker (*Campephilus principalis*) in continental North America was declared extinct by various authorities many times in the last 50 years. Yet, as recently as April of 1988, a provocative sighting of a large woodpecker with distinguishing field marks of the ivory-bill was received. How will we know for sure if and when the last continental ivory-bill has died?

The problem of documenting extinction or survival can be even more difficult for plant species. The Rydberg milk-vetch (*Astragulus perianus*) was first collected in Utah in 1905. The specimens resided in a museum collection until 1964, when they were recognized as a species new to science. When the original collection location was revisited, the species could not be found. It was rediscovered elsewhere in 1976, and was listed in 1978 as Threatened with only two known populations.

(continued on next page)

Over the last 9 years, however, 10 additional populations have been discovered. Because the Rydberg milk-vetch is no longer considered to be in danger of extinction, it has been proposed for delisting. (See story in this edition of the BULLETIN.)

One hundred and nineteen U.S. species of animals are noted in the new notice of review as almost certainly extinct, but most of these were probably gone before passage of the Endangered Species Act in 1973. Two species that have been mentioned in the media as examples of animals that have gone extinct while Congress was considering reauthorization of the Endangered Species Act, the Texas Henslow's sparrow (*Ammodramus henslowii houstonensis*) and the Guam broadbill (*Myiagra freycineti*), present a similar problem. The Texas Henslow's sparrow was last reported in 1982, but was not recognized as a distinct subspecies until 1983; thus, it presumably was extinct by the time it had been described scientifically. In the case of the Guam broadbill, this bird was already undergoing a population decline in the late 1970s. To the best of our knowledge, it has not been seen since 1981. In any case, neither of these taxa became extinct while awaiting reauthorization of the Endangered Species Act.

To be thorough in the tally of all candidate species, those in Category 1 need to be added to those in Category 2 that we expect will be changed to Category 1 as a result of status surveys and to those in Category 3A that are now thought to be extinct but that we expect to be rediscovered. Because coming up with a firm estimate of such future changes would require the prescience of a fortune teller, it would appear that there is no such thing as a strictly quantifiable candidate list. Being practical, however, most of us use the totals of Categories 1 and 2 as a rough estimate of the number of candidate species that have to be reviewed and possibly listed.

The regal fritillary butterfly* (Speyeria idalia), *a category 2 candidate, is one of many butterflies and moths on the new animal notice of review.

photo by Merlin D. Tuttle, courtesy of Bat Conservation International

The Mariana flying fox* (Pteropus mariannus mariannus), *a fruit bat shown here feeding on the pollen of a* Freycinetia *inflorescence, occurs in the Mariana Islands of the western Pacific. The Service considers it a category 1 listing candidate in the northern islands and a category 2 candidate to the south.

photo by C. Kenneth Dodd, Jr.

short-tailed snake* (Stilosoma extenuatum), *a category 2 candidate

In indicating exact numbers of candidate species, however, there is one more complication. Some of the entries in the Animal Notice of Review are not by species, even under the wide definition of "species" given in the Endangered Species Act. For example, some Hawaiian insects and snails are reported only at the generic level. According to some authorities, there appear to be 23 species of Hawaiian snout beetles in the genus *Rhyncogonus*. You will find this entry on page 550 of the Animal Notice as:

> Category 2, Hawaiian rhyncogunus snout beetles, *Rhyncogonus* 23 species, Family Curculionidae, HI.

Despite the problems of making an exact count, the totals in the 1989 Animal Notice of Review are:

ANIMAL CANDIDATE SPECIES (by notice entry)

Category 1	75	
Category 2	1397	(1566 species)
Total animal candidates	1472	(1641 species)
NON-CANDIDATE ANIMAL SPECIES		
Believed extinct (3A)	119	
Invalid names (3B)	40	
Status review indicates species not under threat (3C)	124	
Total non-candidate animals	283	

Listing Protection Proposed for Three Plant Species

During January 1989, three species of plants were proposed by the Fish and Wildlife Service for addition to the List of Endangered and Threatened Wildlife and Plants. If the listings become final, Endangered Species Act protection will be extended to the following:

Two Colorado Plants

The **Dudley Bluffs bladderpod (*Lesquerella congesta*)** and the **Dudley Bluffs twinpod (*Physaria obcordata*)** are small herbaceous perennials in the mustard family (*Brassicaceae*). They are restricted to barren outcrops of weathered shale strata in the Piceance Basin of northwestern Colorado. Because their habitat is overburden on land that may be subject to surface mining for oil shale, the Service has proposed to list both plants as Threatened species (F.R. 1/24/89).

There are five known populations of each species, all within Rio Blanco County. Most of the sites are on public land administered by the Bureau of Land Management (BLM). Nearly the entire range of both species is in an area containing rich deposits of oil shale and two sodium minerals, nahcolite and dawsonite.

Current BLM management provides protection to two sites that total about 20 percent of the already limited habitat. Most of the remainder is subject to mineral development. If mining were to occur without adequate safeguards, both species could be threatened with extinction. Listing these plants as Threatened species would require that their welfare be ensured in any proposed BLM mineral leasing or land exchanges. The Service and BLM will work together to help ensure that mineral development plans for the area are compatible with conservation of these plants.

Michaux's Sumac (*Rhus michauxii*)

This deciduous, rhizomatous shrub is sometimes called "false poison sumac" because of its superficial resemblance to *Rhus vernix*. Michaux's sumac is endemic to the eastern coastal plain and lower piedmont of North Carolina, South Carolina, and Georgia. Almost half of the 30 historically known populations have been lost, due at least in part to conversion of native habitat to agricultural and silvicultural operations; residential and commercial development; and the suppression of wildfires. Because these and other threats continue to face the remaining populations, the Service has proposed to list *R. michauxii* as Endangered (F.R. 1/6/89).

Currently, 16 populations are known to survive, 15 in North Carolina and 1 in Georgia. South Carolina's one historically reported population has disappeared, and the species is believed to be extirpated from that State. Only 7 of the 16 remaining populations are of significant size (100 or more plants). Further clouding the species' future is the fact that *R. michauxii* is dioecious—having separate male and female plants—and that only two of the remaining populations now contain individuals of both sexes.

Fire or some other suitable form of disturbance, such as mowing or careful clearing, is essential for maintaining the open habitat preferred by *R. michauxii*. Without such periodic disturbance, the habitat of this shade-intolerant species is gradually overtaken by vegetational succession. In addition to sites opened by fire, many of the areas where Michaux's sumac survives are on the edges of highway or railroad rights-of-way or cultivated fields. The nine populations located on roadsides, however, are vulnerable to the effects of highway widening projects or certain right-of-way maintenance practices (e.g., herbicide applications).

Listing *R. michauxii* under the Endangered Species Act would complement the protection already given this species under North Carolina's own endangered species legislation. The North Carolina Wildlife Resources Commission manages the land on which almost half of the remaining populations occur. With the careful use of prescribed burning and other techniques, this State agency is managing for the good of Michaux's sumac as well as for game animals. Most of the other public agencies and private landowners with *R. michauxii* habitat also have indicated a willingness to cooperate in the species' conservation.

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopard-

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photo by Steve O'Kane, Jr.

***Dudley Bluffs twinpod* (Physaria obcordata)**

Michaux's sumac (Rhus michauxii)

Listing Protection

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ize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are nonbinding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species found on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants.

Pesticides

(continued from page 1)

pressed substantial interest in the program. Specifically, it prohibited the EPA from enforcing the labeling program before September 15, 1988. Congress gave additional attention to the program in the 1988 Endangered Species Act Amendments, in which the EPA, in cooperation with the Departments of Agriculture and the Interior, was directed to set up a program for educating and fully informing the agricultural community about the pesticide labeling program. The amendments also require the EPA, Agriculture, and Interior to conduct a study of:

1) reasonable and prudent means to implement an endangered species conservation program that would allow continued production of food and fiber commodities;
2) the best methods for mapping restricted use areas;
3) alternatives to prohibitions of pesticides;
4) methods to improve coordination among agencies; and
5) means to implement the program to promote conservation and minimize impacts on pesticide users.

It must be emphasized that all existing biological opinions issued under Section 7 of the Act remain in effect. For various reasons, however, a number of consultations should be reinitiated, and the Service has so requested. For example, some biological opinions lack statements allowing for "incidental take" of listed species. For others, new biological and/or chemical data have become available.

Implementing existing and future biological opinions is the responsibility of the EPA. The Service is cooperating in every way possible to help ensure the success of the EPA's implementation program. The method of implementation should be one that provides the greatest degree of protection for the greatest number of species in the shortest time, consistent with the Act and the 1988 Amendments. It is probable that a variety of means will be appropriate. Preliminary indications are that some States will be able to provide protection to the species by working with the EPA to develop customized State programs (e.g., conservation agreements with private landowners). Maps designating restricted use areas will be required in other situations.

The Service is now completing a broad-based consultation involving 108 chemicals and over 160 species that were reviewed in earlier cluster consultations. This consultation is being conducted by an Interim National Pesticide Consultation Team that includes representatives from each of the Service's contiguous Regions. The team is using a novel method of analysis devised by the Service's Division of Environmental Contaminants. Particular attention will be given to the sections on reasonable and prudent alternatives and measures. The team will have a draft of the biological opinion ready for review shortly.

Balcomb, Richard, C. A. Bowen, D. Wright, and M. Law. 1984. Effects on wildlife of at-planting corn applications of granular carbofuran. Journal of Wildlife Management. 48:1353-1359

EPA. 1989. Notice of preliminary determination to cancel registrations of carbofuran products. OPP-30,000/48A. p. 47.

Halvorson, Gary L., 1988. "Federal Endangered Species and Pesticides—Past, Present, and Future." *Proceedings of Great Plains Agricultural Council, New Mexico*. 121-132.

Andean Condors Released in Experiment to Aid the California Condor

Michael D. Rees

Over remote, wind-swept mountains in Ventura County, 50 miles northwest of Los Angeles, California, some of the world's largest birds, with 9½-foot wing spans, are soaring where they never have been seen before. The birds are Andean condors (*Vultur gryphus*)—a species native to the high Andes of western and northern South America. The Fish and Wildlife Service released the birds at Hopper Mountain National Wildlife Refuge and an adjacent Nature Conservancy property to test various release and tracking techniques. Biologists hope to collect enough knowledge and experience in handling condors from this experiment to pave the way for the eventual reintroduction of the Endangered California condor (*Gymnogyps californianus*) in the mid-1990's. Only 28 California condors exist, all of them in captivity, while several thousand Andean condors survive in the wild in South America.

Three female captive-bred Andean condor chicks, approximately 3 months old, were brought to the release site in August 1988 so they could adjust to the area before they reached fledgling stage. The oldest of the condors, labeled Y-1, hatched at the San Diego Wild Animal Park on April 1, 1988. Y-2 came from the Service's Patuxent Wildlife Research Center in Laurel, Maryland, and Y-3 came from the Buffalo, New York, Zoo. The birds were housed for nearly 4 months in a net-covered enclosure on a rock outcrop, and were kept isolated to prevent them from becoming habituated to the presence of people. Biologists entered and left the area only when rocks and structures or the cover of darkness shielded them from view of the birds.

On the night of December 16, while the three Andean condors were in the roost box portion of their release site, biologists removed the netting that had previously confined the birds. Researchers from the Service, Los Angeles Zoo, and San Diego Wild Animal Park monitored the condors round-the-clock from six blinds strategically hidden in the area. Each of the birds was equipped with radio telemetry equipment to permit continued monitoring from a distance once they began longer flights.

On the morning of December 17, the birds emerged from their roost box. At first, they merely stared at their surroundings, aware that something was amiss. But within a half-hour, Y-1 began flapping her wings and eventually hopped up to the top of the roost box. A short time later, she turned toward the wind and took her first flight, a 2-minute soar of 350 feet, before landing in the rocks below the release site. Y-1 remained in the rocks to sun most of the day and roosted there that night. She then slowly "jogged" back up the bluff, through the chaparral, taking over another day to rejoin the other birds. Not long afterward, however, Y-1 took off on another flight. Y-3, a younger condor, took a much longer time getting airborne. But on December 22, she took off on her first solo flight, repeating the same flight down slope that Y-1 had taken earlier. She, too, then made her way back to the release site.

Y-1 and Y-3 have now gained experience and confidence in flying and are making longer trips, both in time and distance, to explore their new environment. As of February 15, they still returned to their release site at night, where they have been given food. The two birds have begun roosting in a tree away from the release site. Y-2, however, did not progressed as rapidly as the other two birds.

As the second stage of the experiment, three more Andean condors were re-

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photo by David Clendenen

Andean condors at the release site within the Sespe Condor Sanctuary

leased on January 21 at the adjacent Sespe Condor Sanctuary in the Los Padres National Forest, approximately 3 miles from the refuge site. A fourth condor is still being held at the site until she matures. To prevent the reproduction and establishment of an Andean condor population in California, biologists are releasing only female birds. For the next 2 years, the non-native condors will be followed to document their daily movements and adjustment to the new area.

Although there are more Andean condors than California condors, the Andean condor also is listed as an Endangered species in its native South America and is on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). When the Andean condor release experiment ends in the fall of 1990, all of the Andean condors will be recaptured and taken to Colombia for reintroduction into areas where the species was extirpated several decades ago. Six male Andean condors, which also hatched in captivity in 1988, are currently at the Los Angeles Zoo and San Diego Wild Animal Park awaiting their release into Colombia later this year. The Fish and Wildlife Service will be training three Colombian biologists on release techniques.

As the BULLETIN went to press, we received word that Y-2 and Y-3 have been lost to the release experiment. Y-2 was captured on February 19 due to physical and behavioral problems. She was taken to the Los Angeles Zoo where she will be examined to determine the extent and possible reasons for her "deficiencies." Y-3 was found dead on February 24 directly underneath a power line. It is believed that she brushed or collided with the lines during flight and was electrocuted.

Y-1 and the remaining four Andean condors at the Sespe Condor Sanctuary site are doing well. Immediately following the death of Y-3, Y-1 flew to the Sespe Condor Sanctuary site and began interacting with the other birds. As of March 1, the three older Sespe Condor Sanctuary birds (R-4, R-5, and R-6) were all flying and exploring the surrounding area. The youngest bird, R-7, had begun exercising its wings in preparation for flight.

Meanwhile, the Service's California condor propagation effort is proceeding. On February 20, researchers at the Los Angeles Zoo noticed that one of its California condors had laid an egg, but it later proved to be infertile. Two more eggs were laid by California condors at the San Diego Wild Animal Park on February 21 and sometime during February 23-24. Only one of these eggs is fertile, and it was laid by the same condors that successfully produced a chick last year. If all goes well, the new egg should hatch in mid-April.

Endangered Beach Mice Repopulate Florida Beaches

Karen Fleming and N. R. Holler
Alabama Cooperative Fish and Wildlife Research Unit
Auburn University, Alabama

A trapping survey for the Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) was conducted last summer at Gulf Islands National Seashore on Perdido Key, Florida. The survey indicates that this population, which was reintroduced during 1986-1988, is successfully reproducing and expanding into available dune habitat. In July 1988, 55 individual mice were live-trapped in 2,185 trap-nights. Mice were trapped along a 3.9-mile (6.2-kilometer) stretch of dunes, and mouse sign was found along the dunes for an additional 2.9 miles (4.6 km).

Historically, this subspecies inhabited dune habitat extending from Perdido Bay, Alabama, to Pensacola Bay, Florida. Ideal habitat for beach mice consists of well-developed dunes vegetated with sea oats (*Uniola paniculata*), beach grass (*Panicum amarum*), and bluestem (*Andropogon marinus*). Beach mice live in burrows constructed in the dunes and are believed to feed primarily on beach grass seeds, herb seeds, and insects. Extensive development, heavy human traffic along Perdido Key, and tropical storm damage to the dunes led to the subspecies' decline, and it was listed in 1985 as Endangered. (See summary in BULLETIN Vol. X, No. 7.)

Perdido Key was surveyed for beach mice in July 1979, and researchers used trap data to extrapolate population numbers. At the time, the estimated number of remaining Perdido Key beach mice was 78 individuals—26 at Gulf State Park (Baldwin County, Alabama) and 52 at Gulf Islands National Seashore (Escambia County, Florida). No mice were found on the central portion of the Key, although about 1.4 miles (2.3 km) of dune habitat (Perdido Key State Preserve) is publicly owned.

Perdido Key beach mouse numbers declined considerably following damage to the dune habitat from Hurricane Frederick in September 1979. Because of the Key's narrow configuration, its dune system is particularly vulnerable to hurricanes. In 1982, only 13 beach mice were trapped at Gulf State Park; no beach mice were found on any other area of the Key, and the Gulf Islands National Seashore population was assumed to be extirpated. Population growth may have occurred at Gulf State Park following the 1981 survey, but the estimated population for this area in April 1986 remained at 31 or fewer individuals.

Recovery efforts for the Perdido Key beach mouse began in November 1986, when the first three pairs were translocated from Gulf State Park to Gulf Islands National Seashore (see BULLETIN Vol. XII, No. 8). Twelve additional pairs were relocated between January 1987 and April 1988. Initially, the translocated mice were released into a large protective enclosure and allowed to establish burrows before outlets were made in the structure. Later releases were made into small enclosures where mice were held for one night. Sunflower seeds and water were provided for the enclosed mice. A follow-up survey in November 1987 revealed that the reintroduced population was reproducing. In addition to the one released mouse that was trapped, three unmarked mice were captured. Two of these unmarked mice were females, one of which was pregnant and lactating. Furthermore, mice or mouse sign were found along about 0.7 miles (1.2 km) of dune habitat on Gulf Islands National Seashore.

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photo courtesy of the Alabama Cooperative Fish and Wildlife Research Unit

***Perdido Key beach mouse* (Peromyscus polionotus trissyllepsis)**

Status of the Red Hills Salamander is Reassessed

C. Kenneth Dodd, Jr.
National Ecology Research Center
Gainesville, Florida

The Red Hills salamander (*Phaeognathus hubrichti*) is a fossorial (or burrowing), monotypic species confined to the Red Hills area between the Alabama and Conecuh Rivers in south-central Alabama. In the early 1970's, concern grew about the effects that certain forestry practices (particularly clear-cutting) and salamander collecting were having on the few populations known at the time. Responding to this concern and to the results of a status survey conducted by Thomas French of Auburn University, the Red Hills salamander was listed in 1976 as a Threatened species (see BULLETIN Vol. II, No. 1).

Despite Federal protection, some biologists have expressed concern that certain forestry practices continue to adversely affect the salamander. In response, the Fish and Wildlife Service's Jackson, Mississippi, Field Office contracted the National Ecology Research Center to reevaluate the status of salamander populations and recommend areas for habitat acquisition.

photo by C. Kenneth Dodd, Jr.

***Red Hills salamander* (Phaeognathus hubrichti)**

During the spring and summer of 1988, I surveyed 144 sites within the salamander's range. French's earlier survey had located Red Hills salamander burrows at 73 of 145 sites examined. In contrast, I found burrows at 124 of 144 sites. Ninety-two of the sites were surveyed by both studies. Both surveys found burrows at 72 of these 92 sites and none at 12 other sites. In addition, at the same 92 sites, each survey located burrows at 4 sites where the other survey did not.

Data for comparison of habitat changes between 1976 and 1988 were available for 91 of the 92 jointly surveyed sites. Of these 91 sites, 54 appeared similar to earlier descriptions, 19 had improved habitat conditions, and 18 were adversely affected by timber cutting since 1976. Of the 19 sites judged to have improved, 18 had been cleared of trees or had been selectively cut prior to French's survey but have since regrown a full tree canopy. (None of these improved sites had been mechanically prepared for replanting.) In addition to these 91 sites, 14 others examined in the latest survey were damaged by timber cutting; their status in 1976, however, was unknown.

At sites that were unchanged or where conditions have improved since 1976, Red Hills salamanders were common at 64.8 percent and 52.6 percent, respectively. However, at the sites that have deteriorated, salamanders were common at only 16.7 percent. Most (61.1 percent) of the sites where Red Hills salamanders were uncommon in the latest survey had been altered since 1976. In contrast, salamanders were uncommon at only 18.5 percent of the unchanged sites and 36.8 percent of the sites where habitat conditions had improved.

During the latest survey, additional data were gathered and quantified on such variables as slope height, angle, moisture, soil pH, and various characteristics of the burrows. This information can be used to predict with greater accuracy the location of other viable Red Hills salamander populations and the probable impacts of various land use practices.

Ideal Red Hills salamander habitat consists of steep north-facing slopes in the Tallahatta Formation under a full canopy of hardwood trees. These conditions allow considerable retention of soil moisture and probably enhance surface activity by the salamanders at their burrow entrances, where feeding likely takes place. The habitat probably supports a rich invertebrate population. Ten study sites in optimal habitat supported an average of five salamander burrows per hundred square meters.

The presence and distribution of Red Hills salamanders at a site depends on how high the slope is, where the site is positioned on the slope (upper, middle, or lower section), and habitat alteration. Salamander habitat on higher slopes is less likely to be logged or to be impacted by timber cutting that may occur above or below the slope. Where salamanders are common, burrows are positioned on the upper two-thirds of the slope; however, where salamanders are not common, most burrows were found in the more stable middle section of the slope. Regardless of salamander abundance, most burrows at clear cut and selective cut sites are concentrated in the uncut, protected (middle) section. The middle section of the slope is likely to be less affected by disturbances than sections above or below it, and it may be less prone to desiccation than these disturbed areas.

Clear cutting negatively affects salamander populations by increasing soil surface disturbance and desiccation. In turn, invertebrate prey populations probably decrease, at least initially. Some areas clear cut within the past 2 years retain burrows in protected seeps, under stumps, or along ledges that provide some degree of protection. At other clear cut sites, however, no burrows remain.

Can populations affected by selective timber cutting recover? The data from sites where trees have been cut since 1976 but where habitat conditions nevertheless are improving suggest that this is possible, although the recovery process

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is probably very slow. Some populations likely never recover, depending on their viability prior to cutting. If sufficient time is allowed to rebuild population size, if catastrophic events do not affect the remaining animals, and if the habitat recovers quickly, then populations probably will slowly recover. The type of forest replanted and the level of selective cutting also probably influence recovery potential.

Despite 12 years of Federal protection, forestry practices detrimental to the Red Hills salamander continue. This was most dramatically in evidence at clear cuts in Monroe, Butler, and Conecuh Counties. Other areas were observed where clear cuts or very heavy selective cutting encroached on Red Hills salamander habitat. Most logging companies state that they "mark out" salamander habitat to ensure the conservation of the species, but incorporating better oversight of existing and planned cutting into company programs would help to ensure that prime habitats are not destroyed in the future.

The following suggestions could reduce impacts on salamander habitat from timber harvesting activities:

(1) Clear cutting should be avoided on slopes containing Red Hills salamander burrows, especially on the steeper slopes.
(2) Mechanical site preparation should be avoided. This practice destroys burrows and exposes the soil to desiccation.
(3) Woody litter should be maintained to provide shade and maintain the moisture content of the soil. In addition, woody litter is important for the preservation of the microarthropod prey community and for nutrient conservation.
(4) Selective cutting *may* not adversely impact salamander populations if carried out in such a manner to minimize surface disturbance to the upper and middle sections of the slopes where most salamander burrows are found. In any case, a tree canopy providing over a two-thirds shade cover is recommended.
(5) When cutting areas above or below a slope that contains Red Hills salamander burrows, a buffer area should be left. If this buffer is excluded, the sun will dry out the soil surface despite the presence of vegetation on the slope. The necessary size of the buffer will vary depending on sun angle and slope orientation, but it should provide sufficient shade at all times of day.
(6) Chemical sprays having adverse effects on amphibians, their eggs, or the salamander's invertebrate prey should be avoided.

With care in the planning of forestry operations, acquisition of major habitats (I recommended 25 areas totalling 1,764 acres or 741 hectares), conservation agreements and easements to maintain the viability of remaining populations, and continued research on biological and management related questions, the long-term survival and recovery of Alabama's only endemic vertebrate can be ensured.

photo by C. Kenneth Dodd, Jr.

Intensive logging damages Red Hills salamander habitat by soil disturbance and dessication.

Beach Mice

(continued from page 9)

The recovery effort for the Perdido Key beach mouse is a cooperative project involving the Florida Game and Fresh Water Fish Commission, National Park Service, Fish and Wildlife Service, Alabama Department of Conservation, and Alabama Cooperative Fish and Wildlife Research Unit.

Recovery efforts also are under way for another Endangered subspecies, the Choctawhatchee beach mouse (*P. p. allophrys*). This mouse has suffered considerable habitat loss as a result of beachfront development. Found only in Florida, its original range extended along the dune system from the entrance to Choctawhatchee Bay to the entrance of St. Andrew's Bay. Before reintroduction efforts for this beach mouse began in January 1987, occupied habitat was restricted to a 3.5-mile (5.6-km) stretch of dunes in the Topsail Hill (Walton County) area and a 5.8-mile (9.4-km) stretch of dunes on Shell Island (Bay County).

In January 1987, eight pairs of Choctawhatchee beach mice were translocated from Shell Island to Grayton Beach State Recreation Area (Walton County). Six additional pairs were released at a second location on Grayton Beach in December 1987. Release methods were similar to those used in the Perdido Key beach mouse reintroductions except that only small enclosures were used. Trapping surveys conducted in October 1987 were not promising; no mice were captured and only a few tracks were observed. One unmarked mouse was captured and mouse tracks were observed at both sites in December 1988. Further trapping attempts will be made.

Reestablishment of the Choctawhatchee beach mouse is a cooperative effort involving the Florida Game and Fresh Water Fish Commission, Florida Department of Natural Resources, U.S. Fish and Wildlife Service, and Alabama Cooperative Fish and Wildlife Research Unit.

Recovery efforts for these Endangered subspecies of beach mice include maintenance of a breeding colony at Auburn University, Alabama. Perdido Key beach mice have not yet reproduced in captivity, but attempts to breed captive Choctawhatchee beach mice have been successful.

Tar River Spiny Mussel Recovery Efforts Under Way

Dick Biggins
Asheville, North Carolina, Field Office

The Tar River spiny mussel (*Elliptio (Canthyria) steinstansana*) is one of only three known spiny freshwater mussel species, and it is among the rarest of all federally listed mussels. This species, which was listed on July 29, 1985, as Endangered (see BULLETIN Vol. X, No. 7), was first discovered in 1966 in the Tar River near Old Sparta, Edgecomb County, North Carolina. Subsequent collections indicate that the species once inhabited North Carolina's Tar River from Pitt County upstream through Edgecomb County into Nash County. By the time it was listed, however, the mussel was known from only a short reach (12 miles) of the Tar River in Edgecomb County.

Surveys of the Tar River in 1986 and early 1987 failed to locate any live specimens and the Tar River spiny mussel was thought to be extinct. However, with funds provided by the U.S. Fish and Wildlife Service under Section 6 of the Endangered Species Act, biologists from the North Carolina Wildlife Resources Commission found four live specimens in the Tar River (Edgecomb County) during the summer of 1987. In 1988, Commission biologists widened the search area, and although no additional specimens were found in the Tar River, three live spiny mussels were discovered in a Tar River tributary. The tributary has good to excellent water and substrate quality, and the stream's relatively small size may make protection efforts easier.

In addition to surveying for live specimens, biologists are conducting life history studies. The Tar River spiny mussel is too rare to bring into the laboratory for studies, but a related and somewhat less rare species—the James spiny mussel (*Fusconia collina*)—is being used as a surrogate. This species, which itself was listed July 22, 1988, as Endangered, is known from parts of the James River system in southwestern Virginia and adjacent West Virginia. Biologists with the Virginia Cooperative Fishery Research Unit have received funds from the same Section 6 grant to conduct this project. They have determined that eight minnow (family Cyprinidae) species serve as hosts for the mussel during its larval, parasitic stage. This winter, age and growth data will be analyzed, and plans are under way to develop techniques to propagate the mussel.

photo by Dick R. Biggins

Tar River spiny mussel

The survey data will delineate the habitat that needs protection within the Tar River system. This information, coupled with life history data from the surrogate species research, may allow for management of the Tar River spiny mussel's habitat. If propagation studies are successful, reintroductions may be possible. The future of the Tar River spiny mussel is far from secure, but work toward that goal is making progress.

Two Utah Plants Proposed for Delisting

Two plants native to the State of Utah were proposed recently by the Fish and Wildlife Service for removal from Endangered Species Act protection. The **purple-spined hedgehog cactus (*Echinocereus engelmannii* var. *purpureus*)** now is believed not to be a distinct taxon, and enough new populations of the **Rydberg milk-vetch (*Astragalus perianus*)** have been discovered to indicate that this species is not in danger.

New studies found that the purple-spined hedgehog cactus is merely a sporadically occurring vegetative phase of *Echinocereus engelmannii* var. *chrysocentrus*, a common plant in the Mojave Desert of California, Arizona, Nevada, and Utah. The 1969 description of *E. e. purpureus* as a distinct variety in southwestern Utah was based largely on its darker and shorter spines. A 1988 review, however, demonstrated that there are many morphological variations within the range of *E. e. chrysocentrus* and that none of them, including *E. e. purpureus*, exhibit any independent population integrity. If *E. e. purpureus*, which is currently listed as Endangered, cannot be defended as a distinct species, subspecies, or taxonomic variety, it is not eligible for Endangered Species Act protection. Therefore, the Service proposed it for delisting (F.R. 1/19/89).

The Rydberg milk-vetch, a low-growing herbaceous plant in the pea family (Fabaceae), was listed as a Threatened species in 1978, when only two populations were known. Surveys of potential habitat since that time have located 10 additional populations. Most *A. perianus* habitat is on federally managed lands (Dixie and Fishlake National Forests), and all 12 of the currently known populations are healthy. Because activities such as mining and road construction still could threaten portions of the species' habitat but would not result in its extinction, the Service believes that Endangered Species Act protection for *A. perianus* is not needed. Consequently, this species was proposed for delisting (F.R. 10/11/88).

New Publications

The Utah Museum of Natural History, in cooperation with the Ecology Center of Utah State University, has published *The Atlas of the Vascular Plants of Utah*, by Beverly J. Albee, Leila M. Shultz, and Sherel Goodrich. The 685-page Atlas includes 2,438 maps of plants growing in Utah in more than one location without benefit of cultivation. The data for the dot maps were obtained by critical examination of some 400,000 specimens located in various herbaria in Utah. Under each of the maps is a brief description of the plant, including flowering time, customary habitat, and altitudinal range. The book is available for $26 plus $4 shipping and handling from the Utah Museum of Natural History, University of Utah, Salt Lake City, Utah 84112. (Utah residents should add $1.65 sales tax per copy.)

* * *

The Texas Parks and Wildlife Department has published *Endangered, Threatened, or Protected Native Plants of Texas*. The publication is in a 3-ring binder format to provide for future additions, deletions, and revisions. (Purchasers will be notified as supplements become available.) All State and federally-listed Endangered and Threatened plants are included in the reference. The publication includes physical descriptions of the plants, line drawings showing key characters, county distribution maps, and habitat descriptions. It is available for $8.50 (including postage and tax) from the Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744.

* * *

The Fish and Wildlife Service has recently published the following publications on Endangered species, candidates, or their habitats:

- Biology and conservation of the interior least tern: a literature review. Paul L. Whitman. Biological Report 88(3).
- Annotated historical records of bald eagles from the northern United States. James P. Mattsson. Biological Report 88(10).
- Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). C. Kenneth Dodd, Jr. Biological Report 88(14).
- Status of the marbled murrelet in North America: with special emphasis on populations in California, Oregon, and Washington. David B. Marshall. Biological Report 88(30).
- Tamaulipan brushland of the lower Rio Grande Valley of south Texas: description, human impacts, and management options. S.E. Jahrsdoerfer and D.M. Leslie, Jr. Biological Report 88(36).

Requests for these Service publications should be sent to the Publications Unit, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

The fourth edition (1988) of the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California*, edited by James P. Smith, Jr., and Ken Berg, is a 168-page reference containing information on more than 1,500 of California's rarest plants. All State and federally-listed plants and listing candidates are covered. Each entry in the Inventory provides a summary of information on the distribution and habitat of the species, identifies the species' rarity and degree of threat, and notes the plant's official State and Federal status. Topographic quad data are included for more than 1,000 plants. This new edition has added more than 100 plant entries to the Inventory, revised and updated status and distribution information in the entries, and added new appendices that list plants by county and family. It also is organized alphabetically within families by scientific name. The Inventory is available for $19.95, plus $1.75 for shipping, from the California Native Plant Society, 909 12th Street, Suite 116, Sacramento, California 95814. (California residents must pay appropriate local sales tax.)

* * *

The National Museum of Natural Sciences in Ottawa, Canada, has published the fourth and final part of the *Atlas of the Rare Vascular Plants of Ontario*, edited by K.M. Pryer and G.W. Argus (1987). This volume concludes a project to map and describe 542 rare plant species; Part 1 of the Atlas was published in 1982. Each rare species account includes scientific and common names, Ontario dot maps based on verified herbarium specimens, North American range maps based on published sources, information on habitat and rare status elsewhere, and pertinent notes and references. The Atlas is available from the Rare and Endangered Plants Project, Botany Division, National Museum of Natural Sciences, P.O. Box 3443, Station D, Ottawa, Ontario K1P 6P4, Canada. To cover postage and handling, include a check or money order payable to the Receiver General for Canada for $6 U.S. ($5 in Canada). A limited number of the earlier parts are still available and will be included for new recipients of the Atlas.

* * *

The 1988 Plant Conservation Resource Book, published by the Center for Plant Conservation, is the first comprehensive list of over 500 professionals and offices involved in conserving rare plants native to the United States. The book includes botanists and other contacts in the Federal and State governments, State heritage programs, native plant societies, The Nature Conservancy, and other national private organizations that are working on plant conservation programs. The book also includes information on rare plant laws and rare and endangered plants by State. The 96-page publication is available from the Center for Plant Conservation, 125 Arborway, Jamaica Plain, Massachusetts 02130, for $9.00 (including postage).

* * *

Regional News

(continued from page 2)

privately owned island south of Aransas National Wildlife Refuge. It was foggy as three birds the hunters thought were snow geese (*Chen hyperborea*) flew over the blind. One of the birds was shot and later identified by leg markers as a 4-year-old female whooping crane. She and her mate had returned to Aransas in the fall with their first chick. The hunters turned themselves in to a Texas Parks and Wildlife Department officer, and charges are pending in Federal court.

* * *

A fall census of Mt. Graham red squirrels (*Tamiasciurus hudsonicus grahamensis*) was accomplished by personnel from the U. S. Forest Service, Arizona Game and Fish Department, University of Arizona, and the Fish and Wildlife Service. Post-breeding populations were estimated to be between 228 and 178, depending on whether or not questionable activity areas are included in the estimate. Spring pre-breeding populations were estimated at about 207. Failure of Engelmann spruce (*Picea engelmannii*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*) cone crops, the red squirrel's primary food, is the leading cause of recruitment failure. With reduced winter food stocks, spring populations may be critically low. Winter checks on current activity areas are planned.

* * *

The Bureau of Land Management is planning to construct a fence this year to protect a population of the Arizona cliffrose (*Cowania subintegra*). This Endangered species occurs on limestone soils in central Arizona, where it faces threats from mining, off-road vehicle use, land development, and grazing by cattle, burros, and mule deer. The fence is intended to alleviate these threats.

* * *

Region 4 — The Service is considering whether or not to propose listing all free-living mountain lions (*Felis concolor*) occurring in the eastern United States as Threatened under the Similarity of Appearance provisions of the Endangered

(continued on page 14)

Regional News

(continued from page 13)

Species Act. In recent years, mountain lions, also known as cougars, pumas, or panthers, have been sighted in many eastern States. Some of these animals have been hunted and killed as unwanted predators. Most of the hunted animals probably were individuals of non-listed subspecies (western mountain lions) that either escaped from captivity or were deliberately released, but others may have been members of Endangered subspecies: the Florida panther (*F. c. coryi*) and the eastern cougar (*F. c. couguar*).

Because it is almost impossible to distinguish among the listed and unlisted subspecies, it has been almost impossible to prosecute cases of illegal take. Therefore, the Service believes that the only way to provide the necessary protection for the Endangered Florida panther and eastern cougar may be to protect all free-living mountain lions in the eastern United States under the Similarity of Appearance provision. If this approach is pursued, the Service will publish a proposed rule in the *Federal Register* and all interested parties will have 60 days to comment.

* * *

A formal Section 7 consultation has been reinitiated for the Tennessee Valley Authority's (TVA) Columbia Dam project on the Duck River in south-central Tennessee. An initial biological opinion was issued on this project in 1979. That biological opinion found that the project, as designed, would likely jeopardize the survival of two listed freshwater mussels, the birdwing pearly mussel (*Conradilla caelata*) and Cumberland monkeyface pearly mussel (*Quadrula intermedia*) by permanently flooding their free-flowing stream habitat. However, the Service determined that a mussel conservation program proposed by TVA would be an acceptable alternative if it were successfully completed prior to inundation of the mussel habitat. The TVA pursued the mussel conservation program, but so far has been unsuccessful in completing it. Recently, local project proponents, who still want the Columbia Dam completed, asked for a reinitiation of Section 7. The Service is now reviewing project alternatives involving lower pool levels and other options. A biological opinion on these new alternatives is scheduled to be issued soon.

* * *

The Service's Caribbean Field Office has completed status surveys for two listing candidates, the least tern (*Sterna albifrons*) and the southeastern snowy plover (*Charadrius alexandrinus*). The least tern nests in only three coastal wetlands in Puerto Rico and in St. Croix, U.S. Virgin Islands. All of the Puerto Rican sites are threatened by development projects. Nesting success for the tern is greatest at the Sandy Point National Wildlife Refuge in St. Croix. The southeastern snowy plover is known from only three sites in the Caribbean from Puerto Rico to St. Ritts. In Puerto Rico, it nests only on the Cabo Rojo salt flats in the southwestern portion of the island. The salt flats, an essential nesting and foraging area for several migratory and resident shorebirds, is under intense pressure for development.

* * *

An Army Corps of Engineers dredging operation is depositing spoil on an area in North Carolina that supports the second largest known population of seabeach amaranth (*Amaranthus pumilus*). This is just one of the threats facing this plant, a listing candidate, which once occurred on barrier islands and beaches from Massachusetts to South Carolina. Based on status surveys funded by Regions 4 and 5, the species has been extirpated from all areas except some sites in North and South Carolina. The surviving populations in these States are threatened by coastal development along the eastern seaboard, off-road vehicles, dune restoration projects, construction of groins and breakwaters, recreational impacts, and natural causes (such as hurricanes).

This plant has no close relatives, so its survival contributes to botanical diversity. It also serves as a beach stabilizer. In addition, the nutritional value of *Amaranthus* is high because the seeds contain a high percentage of lysine, an essential amino acid generally found in low amounts in other grains and in the other species within this genus.

* * *

Status surveys have been conducted for three plants that are candidates for listing proposals: Cantino's false dragonhead (*Physostegia longisepala*), the Louisiana blue star (*Amsonia ludoviciana*), and the plumleaf azalea (*Rhododendron prunifolium*). Before these surveys were conducted, these plants were known from only a dozen or fewer populations, but now each plant is known to have at least 40 populations.

The Louisiana Heritage Program found 48 populations of *Physostegia* and 40 populations of *Amsonia*. Both plant species are herbaceous. *Physostegia* occurs near the edges of mixed hardwood-pine flatwoods in the coastal prairie areas of Louisiana and Texas. *Amsonia* occupies diverse habitats in Louisiana and Georgia. In Louisiana, the species is found in pine flatwoods, small-stream riparian forests, and higher-position, bottomland forests. In Georgia, *Amonsia* grows near granite outcrops. One historical *Amsonia* location from Mississippi is reported as an open savanna. Both *Amsonia* and *Physostegia* frequently occur in altered habitats, such as roadside and powerline rights-of-way and artificial drainageways.

The Georgia Natural Heritage program discovered 41 populations of the third plant, *Rhododendron prunifolium*. The shrub is known from southeast Alabama and southwest Georgia, where it occurs in rich, wooded ravines along the Chattahooche River and its tributary valleys.

* * *

A status review was conducted recently on the Blue Ridge population of the green salamander (*Aneides aeneus*) by the Service's Asheville, North Carolina, Field Office and a representative of the South Carolina Wildlife and Marine Resources Department. This disjunct population has disappeared from 78 percent of its known range in South Carolina, North Carolina, and Georgia over the past 10 to 15 years. Successful reproduction has been documented at only three of the active sites in recent years. Since there apparently have been no significant disturbances in the habitat, it is possible that the species is threatened by acid rain and/or the successive years of severe drought in the region.

* * *

Region 5 — Peregrine Fund personnel report that the number of reestablished peregrine falcon (*Falco peregrinus*) pairs in eastern States continued to increase through the 1988 field season. Last year also proved to be a good one for releasing captive-produced young, with a total of 96 birds hacked in 8 States (Maine, New York, Massachusetts, West Virginia, Virginia, North Carolina, South Carolina, and Georgia).

During 1988, we had 67 confirmed pairs on territories from Maine to North Carolina. Fifty-one of these pairs nested, and 39 pairs produced 90 fledglings. The number of nesting pairs increased by 21 percent over the previous year's figure, compared to a 40 percent increase in 1987, 20 percent in 1986, 36 percent in 1985, 78 percent in 1984, 80 percent in 1983, 25 percent in 1982, 100 percent in 1981, and 100 percent in 1980.

A Regional look at nesting results in the 1988 breeding season again indicates that severe spring weather plays an important role in the reproductive failure of some pairs. Maine and New Hampshire had a total of 11 pairs on territories but only 6 pairs nested. Two of these pairs apparently renested after the loss of their first clutches, but even then only three of the six nesting pairs succeeded in producing a total of four young for the region. Severe storms that blew through the region during the incubation season may account for the nesting failure of other pairs. In contrast, 10 pairs nesting in areas where the storm did not hit so hard (in Vermont and the Adirondack Mountains of New York) reared at least 19 young.

The reproductive rate for peregrines in the mid-Atlantic region, all of them nesting on towers, bridges, and buildings, was the highest in the East. Thirty of 35 territorial pairs laid eggs and produced 63 young. If we add to that number the 12 young hatched from the eggs we removed from bridges, total production was 75 young or

(continued on page 15)

2.5 per laying pair. Few if any wild populations are known to do better.

* * *

Region 6 — The red shiner (*Notropis lutrensis*), a fish from the southern and southwestern Great Plains, recently invaded the upper Virgin River in Utah. Competition from this exotic fish is believed to be responsible for a 72-percent decline in numbers of the native Endangered woundfin minnow (*Plagopterus argentissimus*) in the recently invaded reach over the past few years. Further invasion was impeded by a diversion dam, but the possibility remained that the red shiner would get past this barrier to penetrate the last uncontaminated habitat and cause the extinction of the woundfin.

The Service, in cooperation with the Utah Division of Wildlife Resources and the Washington County Water Conservancy District, conducted a red shiner eradication project in late 1988. It was intended to protect the woundfin by reclaiming from the red shiner 21 miles of riverine habitat downstream of the diversion dam. Thousands of woundfin and a rare Virgin River chub were salvaged from the treatment area. A small diversion dam 6 miles downstream of the main diversion dam was modified to make it a better fish barrier. The buffer zone between the two diversion dams would, after chemical treatment to remove red shiners, protect the upstream woundfin population in case the other rehabilitation efforts downstream failed. A larger barrier dam then was constructed 14 miles downstream of the small barrier/diversion dam to create additional woundfin habitat after treatment. Several rotenone treatments were applied to eradicate the red shiners in this reach. Semiannual monitoring will determine whether or not these treatments were successful.

The downstream barrier construction and chemical treatments may have occurred just in time. On New Years Day, 1989, the main upstream diversion dam, which had been the only barrier to the invasion of the last uncontaminated woundfin habitat,suddenly broke. The flood waters breached the smaller diversion dam 6 miles downstream, but the larger barrier dam another 14 miles downstream held. Thus, red shiners below this barrier were prevented from passing by the breached dams upstream into the woundfin habitat.

* * *

Region 7 — *Thlaspi arcticum*, a small white-flowering member of the mustard family, has been considered a category two candidate for a listing proposal. Although it is known from numerous scattered locations in northeastern Alaska and the adjacent Yukon Territory of Canada, most colonies were known to number only a few individuals. Concern for the welfare of this candidate species increased when it appeared that the locations of the largest populations were on the North Slope of Alaska, where oil and gas development could pose a threat.

photo by Nancy Felix

A status review for* Thlaspi arcticum*, a small plant native to regions of the Arctic, revealed that this species has a much wider distribution than previously thought.

In June 1988, Nancy Felix, Janet Christiansen, Kristen DuBois, and other personnel from the Arctic National Wildlife Refuge conducted surveys in areas of the refuge not recently examined for *Thlaspi*. The results of these efforts were most encouraging. Surveys in the Arctic Refuge resulted in the discovery of several previously unknown locations for the species. Although most populations were scattered and small in number, one of them exceeded 1,000 plants. All of the populations are within the designated wilderness portion of the refuge, and thus are not likely to be affected by human activities.

Since there were taxonomic questions regarding the affinity of this species to its nearest congeners in North America and the Soviet Union, Dr. David Murray of the University of Alaska Herbarium was contracted to reevaluate its status. Dr. Murray concluded that *T. arcticum* is a valid taxon. In addition, he found that plants from the Soviet Arctic previously known as *T. cochleariforme* are the same as *T. arcticum* in Alaska and Canada. Therefore, *T. arcticum* has a much wider distribution than previously thought. As a result of the taxonomic review and the 1988 surveys, this species likely will be withdrawn from the candidate species list.

* * *

Region 8 (Research) — Studies on the Threatened greenback cutthroat trout (*Salmo clarki stomias*) by the Jackson, Wyoming, Field Research Station of the National Fisheries Contaminant Research Center-Columbia have demonstrated that this species is not as sensitive to acid rain as are Snake River and Yellowstone cutthroat trout. Four life stages were exposed to 12 combinations of acidity and dissolved aluminum in 7-day pulsed tests.

* * *

Laboratory results received in late November indicate that a radioed gray wolf (*Canis lupus*) that died in the Superior National Forest, Minnesota, during early November had symptoms of Lyme disease — a tick-borne malady.

* * *

One radioed adult female gray wolf was shot illegally in early November within Superior National Forest. This incident is being investigated by Service law enforcement agents.

* * *

Four Endangered Hispaniolan parrots (*Amazona ventralis*) were seized by Service law enforcement agents in Region 4 during November. After health testing at the Miami Metrozoo, the birds will be sent to the Luquillo aviary in Puerto Rico where they will be used as surrogate research animals for the Puerto Rican parrot (*Amazona vittata*) project.

New Endangered Species List Available

The Fish and Wildlife Service has published an updated and revised List of Endangered and Threatened Wildlife and Plants. This new list covers all listing actions completed through January 1, 1989, and supersedes all versions published previously. Copies of the list are available from the Publications Unit, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	151	6	1	40	6	2	206	84
TOTAL	357	49	467	107	21	39	1040	284 **

Total U.S. Endangered 406
Total U.S. Threatened 128
Total U.S. Listed 534

Recovery Plans approved: 242

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
March 1, 1989 36 plants

January/February 1989 Vol. XIV Nos. 1–2

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

April 1989 Vol. XIV No. 4

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

The Return of Thick-billed Parrots to Arizona

Terry B. Johnson, Noel F.R. Snyder, and Helen A. Snyder
Arizona Game and Fish Department

(Editor's note: Restoring a rare species is seldom an easy or straightforward task, especially if it involves reintroduction. The factors that led to the original decline must be addressed, and locating suitable, protected habitat can be difficult. Research into new captive propagation and reintroduction techniques also may be necessary. The following article shows, however, that hard work and patience can be rewarded. With private and Federal assistance, the State of Arizona is achieving success in its program to reclaim a unique part of its wildlife heritage.)

The thick-billed parrot (*Rhynchopsitta pachyrhyncha*) is one of two species of psittacines native to the continental United States, and the only one that survives. By no stretch of the imagination is the thick-bill a tropical bird; it occurs in temperate conifer and mixed deciduous-conifer forests. Thick-bills feed primarily on conifer cones and, to a lesser extent, on acorns and juniper berries. In winter, they inhabit areas with overnight temperatures usually dropping far below freezing. It is an odd but accurate image: a parrot that can be seen in the snow zone.

There are no historical breeding records for thick-billed parrots north of Mexico, but there are virtually none for Mexico either during the period when these birds still occurred in the United States. Thus, it seems logical that the absence of breeding records is merely an observational artifact and does not prove anything about the species' previous breeding range. None of the early naturalists visiting Arizona or New Mexico is known to have tried to locate their nests. Most information on thick-bills in the wild came from incidental observations by ranchers, loggers, and casual naturalists.

Historically, thick-bills occasionally made irruptive movements (i.e., unpredictable movements in large numbers) into Arizona and New Mexico from Mexico, most notably during the extreme drought of 1917-1918. Our interviews of elderly Arizonans who had seen thick-billed parrots in the earlier part of this century indicate that in the Chiricahua Mountains of southeastern Arizona the birds were also once regular seasonal residents, not just occasional visitors. The fact that this parrot still breeds within about 90 miles (150 kilometers) of the Arizona border (Lanning and Shiflett 1983) indicates a reasonable possibility it was once a breeding species in the United States.

Disappearance of the Thick-bills

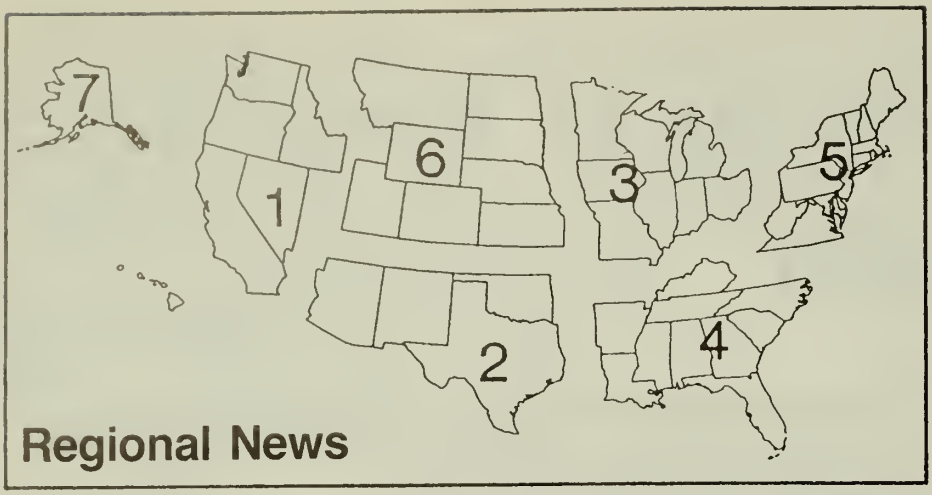
Thick-billed parrots effectively disappeared from the United States early in the 1900's. The species does survive, although in dwindling numbers, in the Sierra Madre of western Mexico, and it is listed there as Endangered. The cause of its disappearance from the United States is not well known. Our conversations with long-time Arizona residents indicate subsistence hunting by miners and woodsmen may have been a primary cause of the parrot's disappearance. Habitat loss, due to extensive cutting of the mountain forests to support the mining industry (roof props for mine tunnels and ties for railroad tracks), also may have been a factor in the extirpation of the species in this country. Further, some people have speculated that the disappearance of the imperial woodpecker (*Campephilus imperialis*) from these same montane forests may have reduced the number of available nesting cavities for the parrots. Naturally occurring cavities also are probably not as abundant as in pre-cutting days because there are fewer old trees.

With a reduction in the human activities that may have eliminated thick-bills from

(continued on page 4)

photo by Terry B. Johnson

Adult thick-billed parrots typically are about 16 inches (40 centimeters) in total length and have a wingspan of 8 to 10 inches (20 to 25 cm). They are mostly green except for red patches on the foreparts of the head and wings. In flight, they show a yellow stripe on the underwings.



Regional News

Regional endangered species biologists have reported the following news:

Region 2 — In January and February, volunteers from the Arizona Native Plant Society transplanted about 350 Endangered Tumamoc globe-berry (*Tumamoca macdougalii*) plants onto a preserve near Tucson. The transplants were started from seed 3 years ago and grown in containers at the Arizona-Sonora Desert Museum. The Service hopes these plants will survive and thus supplement the population that was partially lost due to construction of a Central Arizona Project canal.

* * *

Volunteers from the Arizona Native Plant Society also transplanted 105 Endangered Kearney's blue-star (*Amsonia kearneyana*) container-grown plants into a canyon on the east side of the Baboquivari Mountains. These plants will supplement the 38 survivors of an April 1988 transplant project at the same canyon. The survival of the species in the wild may depend on this transplanted population; only eight plants remain in the single natural population.

* * *

The Southwestern Bald Eagle Nest Watch Program began another year with 16 nest watchers. These people observe the eagles (*Haliaeetus leucocephalus*) from dawn to dusk while collecting data on nest activities and interactions with other wildlife species and humans. They also enforce the breeding area closures and can rescue nestlings that have accidentally fallen from their nests.

* * *

The Service, in cooperation with the Bureau of Land Management, Army Corps of Engineers, Arizona Game and Fish Department, and Arizona State Parks, plans to open a public viewing station at the Alamo Lake bald eagle breeding area this spring. For the first time in Arizona, visitors will have a place to watch eagles from a distance that will avoid disturbances to the birds.

* * *

The Sierra Club Legal Defense Fund, acting on behalf of the Natural Audubon Society and Coastal Bend Audubon Society, has notified the Army Corps of Engineers of its intent to file suit unless the Corps initiates formal Endangered Species Act/Section 7 consultation with the Service over planned maintenance dredging of the Gulf Intracoastal Waterway.

Of particular concern is dredging within critical habitat of the whooping crane (*Grus americana*). The problems that need to be addressed are: 1) finding environmentally acceptable locations for dredge spoil disposal; 2) preventing contaminants in bottom sediments from entering aquatic food chains; and 3) stopping the erosion of whooping crane hab-

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Susan Recce Lamson, *Acting Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief*,
Kenneth B. Stansell, *Deputy Chief*,
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief*,
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief*,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Regional 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Marvin Plenert, *Acting Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jay Watson, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide. **Region 9:** Washington, D.C., Office.

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Correction

The caption for the Mariana flying fox (*Pteropus mariannus mariannus*) photo in BULLETIN Vol. XIV, Nos.1-2, should have read that the Service considers this bat a category 1 listing candidate in the southern Mariana Islands and a category 2 candidate to the north.

Regional News

(continued from previous page)

itat along the waterway. The Corps has acknowledged that marshland adjacent to the waterway is eroding at rates up to 3 feet (1 meter) annually, but the Corps says it lacks funding authority to provide erosion protection.

* * *

Region 4 — The Fish and Wildlife Service, Arkansas Natural Heritage Commission, and U.S. Forest Service will conduct a status survey and habitat investigation for the Rich Mountain slitmouth (*Stenotrema pilsbryi*), a category 1 candidate snail, on Rich Mountain and Black Fork Mountain in Arkansas and on other mountains in Oklahoma. A survey has been conducted by Dr. Ron Caldwell on the Oklahoma side of Rich and Black Fork

(continued on page 5)

National Pesticide Consultation is Extended

On September 30, 1988, the Environmental Protection Agency (EPA) requested formal consultation, in accordance with Section 7 of the Endangered Species Act, on the potential impacts of 108 pesticide registrations on over 160 Endangered and Threatened species. An interim National Pesticide Consultation Team, with Fish and Wildlife Service representatives from Regions 1-6, was appointed to conduct the consultation. (See story in BULLETIN Vol. XIV, Nos. 1-2.) The team produced a draft Biological Opinion, which is currently under review by EPA and the U.S. Department of Agriculture (USDA). In order to allow for the consideration of additional data supplied by EPA on December 12, 1988, the due date for the Biological Opinion was extended to April 26, 1989. A second extension, until June 9, 1989, has been provided to allow for a detailed review of the reasonable and prudent alternatives identified in the draft Biological Opinion.

On another Section 7 matter, the Service is conducting an informal consultation on USDA's Animal Damage Control Program in anticipation of a request for a formal programmatic consultation. The Service anticipates that the methodology being developed will be suitable for programmatic consultations on other USDA activities.

Agreement Reached on New Manual for Identifying and Delineating Wetlands

In a major step toward improving the conservation of our Nation's wetlands, four Federal agencies with responsibilities in this area recently agreed on the technical basis for identifying and defining wetlands. This agreement is set forth and detailed in the new *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*, produced jointly by the Fish and Wildlife Service, Army Corps of Engineers, Environmental Protection Agency, and Soil and Water Conservation Service. The manual should help Federal agencies assist the administration in implementing its policy that calls for "no net loss" of wetlands.

Of the 215 million acres of wetlands in the conterminous United States when the Pilgrims landed, only 99 million acres—about 46 percent—remained by the 1970's. Surveys by the Fish and Wildlife Service's National Wetlands Inventory indicate that nearly half a million acres of wetlands in the U.S. continue to be lost each year. Once thought of as only swampy wastelands to be drained and filled, wetlands are now increasingly being recognized as a precious natural resource. They filter and clean polluted water, absorb flood waters, provide a variety of recreational opportunities, and are vital habitat for many species of wildlife. The Service estimates, for example, that about half of our nation's endangered animals and almost a third of our endangered plants depend on wetlands for their survival.

The absence of a consistent Federal approach to identifying wetlands and determining their boundaries had long been of concern to developers seeking regulatory decisions on permit applications and to conservationists interested in protecting wetland resources. Confusion over what constitutes a wetland arose because there are many different kinds of wetlands and because the various regulatory agencies have different authorities and responsibilities. The new agreement and manual reconcile longstanding differences in the wetland guidelines used by the four agencies.

Incorporated into the new manual is the Corps of Engineers "3-parameter approach," which uses 1) vegetative composition, 2) soil type, and 3) hydrology to identify an area as a wetland. Under the recent agreement, the hydrology requirement is assumed to be satisfied if an area has typical wetland vegetation growing on hydric soil with no evidence of significant man-made drainage. The practical benefit of this new approach is an improvement in the way that seasonal wetlands (e.g., bottomland hardwood forests, prairie potholes, vernal pools, pocosins) are identified for protection. Even though these areas do not always contain water, seasonal wetlands are very important for maintaining waterfowl and other wildlife, including many endangered species. Habitat protection and/or restoration is vital to the success of endangered species recovery efforts, and the improved wetland definition could give those species that depend on wetlands—particularly seasonal wetlands—a better chance for long-term survival.

The manual is strictly a technical document and has been distributed to involved agencies, which will be meeting regularly to discuss its implementation. After the manual has been used for a year, agency representatives will discuss the need for any modifications.

photo by Robert Ornduff

Baker's sticky seed* (Blennosperma bakeri), *an annual plant, is endemic to vernal pools of the Cotati Valley, Sonoma County, California. The seasonal wetland habitat of this and other listing candidates could benefit from the new agreement for identifying and delineating wetlands

Parrots

(continued from page 1)

Arizona, and with apparently suitable habitat available, it has long seemed desirable to us to attempt to reestablish this native species in the United States. To the south, continued habitat destruction and a recent increase in the capture of thick-bills for the illicit pet trade makes the long-term survival of the species in Mexico questionable. Thus, reestablishing new populations in the United States could enhance overall conservation of the species.

Developing a Release Plan

In 1985 and 1986, an enormous increase in the flow of smuggled thick-bills into the United States was observed by Fish and Wildlife Service law enforcement agents. Nearly all of the birds confiscated by the agents appeared to have been captured as adults, judging from their dark bill color and their familiarity with pine cones. It occurred to Agent Sam Jojola that the confiscated birds might be suitable for an experimental release effort. Being wild-caught adults, they had a relatively high probability for survival in the wild, although some people wondered if they might fly home to Mexico if released in the United States.

The idea of a release effort was very favorably received. After two public hearings were held and an environmental assessment was prepared, the Arizona Game and Fish Department, Fish and Wildlife Service, and Forest Service signed a cooperative agreement to experimentally release thick-billed parrots in Arizona.

The Chiricahua Mountains of southeastern Arizona were chosen as the site for the initial releases. These mountains are largely within the Coronado National Forest, under the jurisdiction of the U.S. Forest Service. The forest is principally managed for recreation, wildlife, and watershed values. Very little timbering has occurred there in recent decades. Most of the early records of thick-bills in the United States came from this area (Lusk 1900; Phillips et al. 1964; Smith 1907; Wetmore 1935). The Chiricahuas have a substantial acreage of suitable habitat at elevations of about 6,600 to 9,800 feet (2,000 to 3,000 meters), the principal elevational range at which thick-bills occur in Mexico (Lanning and Shiflett 1983). The higher slopes are cloaked with mature pine-fir-spruce-aspen vegetation, and lower elevations are dominated by various species of oaks mixed with conifers. With a dozen species of conifers and more than half a dozen oaks, the diversity of food available to thick-bills in the Chiricahuas compares favorably with the diversity south of the border.

The first birds available for release, like most birds received subsequently, were in relatively poor physical condition when they arrived in Arizona. People capturing thick-bills in Mexico invariably cut or pull out their primary and secondary feathers, presumably to reduce the chance of escape. Birds whose primaries have been forcibly pulled, with follicle damage resulting, invariably are unsuitable for release. Birds with cut feathers, however, usually can be rehabilitated for release.

It is often necessary to hold the birds for months in large cages until their wings have recovered. Cages provide only limited opportunities for exercising the birds. Wild thick-bills are very strong flyers, attaining speeds approaching 50 miles per hour (80 kilometers per hour) and engaging in routine foraging flights of 6 to 12 miles (10 to 20 kilometers). Although the caged birds generally fly well after release, they sometimes are not able to keep up with wild birds immediately. It generally takes them about a week in the wild to develop the flight abilities necessary to keep from lagging behind the flock. During that period, they suffer elevated risks of predation from hawks, especially the locally common Apache northern goshawk (*Accipiter gentilis apache*).

Clearly, at least one pair of thick-billed parrots bred successfully in the wild in Arizona in 1988.

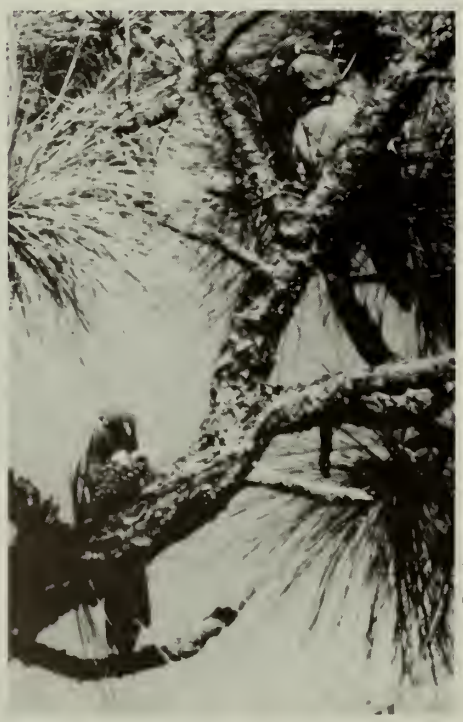

photo by Dave Daughtry

Released thick-billed parrot in the Chiricahua Mountains of southeastern Arizona, feeding on Apache pine (Pinus engelmannii) seeds

Establishing an Arizona Population

In September and October of 1986, 29 birds, some wearing radio collars, were released in the Chiricahuas (BULLETIN Vol. XI, No. 10-11). Seven of the birds were quickly lost, probably to hawks. Another eight were last observed heading toward the Mexican border. The other 14 generally stayed in the release area, except for the month of December when they were about 70 miles (110 km) to the northwest in the Graham Mountains.

In mid-June 1987, the flock, by then numbering 17 birds because of additional releases during the spring, flew at least 250 miles (400 km) northwest to summer along the Mogollon Rim of central Arizona. The flock covered considerable ground during the summer in this region, due to limited food supplies, but it apparently spent most of its time within the Tonto Basin in the central part of the State.

In late September 1987, almost exactly a year from the date of the first release, nine thick-bills returned to the original release area. A few others may have stayed in central and northern Arizona. We then released another radio-tagged bird into the flock. The group stayed together in the Chiricahuas until mid-June 1988, suffering the loss of only a single bird. During the second winter, the flock remained near the release area.

With the release of 3 more parrots in the spring of 1988, we built the Chiricahuas flock back up to 11 birds. Again in mid-June, the flock headed northwest to the Mogollon Rim. Its date of departure was only 4 days different from that of 1987. Three of the parrots, however, did not leave with the group. These birds, along with two more released in June, remained in the Chiricahuas throughout most of the summer.

The flock that flew north initially went to same area of the Tonto Basin in which it summered in 1987. Ponderosa and piñon cones were much more abundant through mid-July 1988 than they were in 1987. The flock thrived with this large food supply, and we frequently saw the birds mating. In late July and August, however, we lost track of the flock.

We received no confirmed reports of thick-bills anywhere other than the Chiricahuas until September. Then a group turned up in the same Tonto Basin area where the flock was seen in July. The group varied from 8 to 10 birds for a few weeks, then increased to 12 birds. The increase was due in part to two radio-tagged birds that had summered in the Chiricahuas and then flown more than 190 miles (about 300 km) to join this flock. The other two birds proved to be quite a different and even more exciting story.

Local residents began reporting that one, perhaps two, of the birds had pale bills—an indicator of young birds. We

(continued on next page)

searched through October to confirm the presence of the young birds, but the flock could not be located in central Arizona's rugged pine forests and steep canyons. Then, in November, 10 birds were seen back in the Chiricahuas. Soon they were roosting and foraging at the now familiar sites. Two of the parrots had distinctly pale bills that showed very well as they begged food from their parents. Clearly, at least one pair of thick-billed parrots bred successfully in the wild in Arizona in 1988.

In the winter of 1988-1989, the young birds and the rest of the flock again wintered on the snow-covered crest of the Chiricahuas, where the conifer cone crop was very good. There are still two radio-tagged birds somewhere in central Arizona. In early February of this year, we released another radio-tagged bird, which integrated into the flock very well. Several weeks later, one of the thick-bills that had hatched in the wild disappeared from the flock, possibly taken by a predator. However, a short time later, two to four more birds returned to the Chiricahuas from parts unknown and integrated into the flock. Although it is difficult to count birds in this rugged country, we believe there are currently 11 to 13 thick-bills in the flock. All things considered, the release program for wild-caught birds is going very well.

A separate release effort, with captive-bred birds from the Jersey Wildlife Preservation Trust and the Gladys Porter Zoo, was not as successful. In late 1987, we released five of these hand-reared birds in the Chiricahuas. For 6 months the birds had been conditioned to feed on pine cones. They had ample opportunity to socialize with one another and with captive wild-caught birds throughout that period. Upon release, however, they showed no tendency to flock, and made no attempts to feed on the pines they had learned to feed upon while still in captivity. After little more than a day, it was obvious they would not form a flock or even begin feeding. We recaptured all of the birds and distributed them to various captive-breeding projects.

We also released a parent-reared bird from the Sacramento Zoo with the Jersey birds. This bird had socialized with wild-caught parrots rather than with hand-reared birds in the same cages. It soon became indistinguishable from wild-caught birds in feeding abilities and other behavior. Upon release, this parrot immediately joined the wild flock. Unfortunately, it was taken by a raptor before it could achieve full flight strength and integration with the wild flock. This suggests, though, that releases of captive-bred birds should be limited to parent-reared individuals.

Future of the Release Project

Overall, after 2 years of releasing wild-caught thick-bills, the results are encouraging. Once the birds have passed through a high-vulnerability phase immediately after release, they apparently have reasonably high survival rates. At least some of the parrots have found Arizona to be a congenial place and have established what appears to be a migratory pattern between the southeastern and central parts of the State. There have been no signs that the birds have had difficulty finding food, despite 1987 having been a relatively poor cone year for a number of dominant conifers in the region. While breeding has not yet been seen at the nests, the frequency of copulations observed in 1988 and the subsequent appearance of two young birds in the flock show that reproduction has occurred in the wild. These points all reinforce our intent to continue the release effort.

One of the questions we hope to answer with future releases is whether we can produce a less migratory flock. There is a greater diversity of conifers and oaks in southeastern Arizona than in the central part of the State. This suggests that parrots staying in the Chiricahuas might be better buffered against cone crop failures during drought cycles. If migratory patterns are largely learned behavior in thick-bills, perhaps releases of captive-reared birds in isolation from wild-caught birds could produce more sedentary populations.

The primary difficulty we have encountered since beginning this project has been obtaining adequate numbers of birds for release. While the overall smuggling of thick-bills into this country is still substantial, it is now clear that confiscations are at best an erratic source of birds and that many of the birds are in very poor condition. Very few birds came to us through Fish and Wildlife Service confiscations during 1987 and 1988. In the summer of 1988, U.S. Customs agents confiscated 37 thick-bills in Texas. Unfortunately, nine of the Texas birds died during quarantine. Further investigations revealed "parrot wasting disease" in the group. Thus, it is unlikely that we will be able to release any of these birds, if indeed any survive this currently incurable, little known disease.

The shortage of birds has been alleviated to a limited extent by donations from zoos and private breeders. Many organizations have supplied both financial support and birds for release. Most notable among these are the Jersey Wildlife Preservation Trust and (its granting arm) Wildlife Preservation Trust International, San Diego Zoo, Los Angeles Zoo, Sacramento Zoo, Gladys Porter Zoo, Arizona-Sonora Desert Museum, Bronx Zoo, and Salt Lake City Zoo. More than 300 individuals also have contributed time, money and birds. We would particularly like to acknowledge Bud Brunner, Steve Hoffman, Bill Konstant, Jim Koschmann, Dirk Lanning, Allison Leete, Chuck Rau, Mike Wallace, Jim Wiley, and Jerry and Teddy Wolcott, who have given especially generously of their time and expertise in launching the effort. The considerable support of Fish and Wildlife Service Regional Director Michael J. Spear also has been crucial to the project.

We are encouraging more organizations to participate in the breeding effort in the future. To the extent that captive-breeding projects can supply high quality, parent-reared birds, we hope to move toward larger and more regular releases in the years ahead.

Arizona citizens are contributing to the thick-bill release efforts through the State nongame tax check-off, but the support of interested people everywhere is welcome. Anyone wishing to contribute directly can send a check, made out to the Thick-billed Parrot Project, to the Arizona Game and Fish Department, Nongame Branch (Attn: Terry Johnson), 2222 West Greenway Road, Phoenix, Arizona 85023. The contributions, which are tax deductible, go into a dedicated fund used only for direct project expenses. Donors will receive periodic updates on the thick-billed parrot project.

Literature Cited

Lanning, D.V., and J.T. Shiflett. 1983. Nesting ecology of thick-billed parrots. Condor 85:66-73.

Lusk, R.D. 1900. Parrots in the United States. Condor 2:129.

Phillips, A., J. Marshall and G. Monson. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, AZ.

Smith, A.P. 1907. The thick-billed parrot in Arizona. Condor 9:104.

Wetmore, A. 1935. The thick-billed parrot in southern Arizona. Condor 37:18-21.

Regional News

(continued from page 3)

Mountains. Dr. Caldwell, who is with Lincoln Memorial University, will help identify survey sites and do the field work. The Forest Service and State of Oklahoma will pay his expenses.

* * *

The Hitchiti Experimental Forest, Oconee National Forest, and Piedmont National Wildlife Refuge in Georgia have signed the first Memorandum of Understanding for cooperative management of red-cockaded woodpeckers (*Picoides borealis*). The objective of this agreement is to increase woodpecker habitat and establish a viable population in the area. The red-cockaded woodpecker recovery plan specifies that one of the 15 viable populations needed for recovery and delisting should be located in the piedmont of North Carolina, South Carolina, or Georgia. This cooperative agreement sets population goals and establishes the pine and pine-hardwood forest acreages to be managed for the species on each property. The agencies agreed to cooperate in monitoring the population, implementing appropriate habitat management prac-

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Protection is Proposed for Butterfly and Mussel

Two rare invertebrates, an insect and a mollusk, were proposed recently by the Fish and Wildlife Service for listing as Endangered species. If these proposals become final, Endangered Species Act protection will be available to the following:

Queen Alexandra's Birdwing Butterfly (*Troides alexandrae*)

The Queen Alexandra's birdwing holds several distinctions. With a wingspan of up to 10 inches (250 millimeters), it is the world's largest butterfly. According to the International Union for the Conservation of Nature and Natural Resources (IUCN), it also is one of the world's 12 most endangered animals. On March 1, 1989, the Service proposed to list this insect formally as Endangered.

Troides alexandrae occurs only in tracts of lowland tropical rain forest within a small area of northern Papua New Guinea. This already restricted range is shrinking as native forest habitat required by the butterfly is cleared for agriculture. The region's expanding oil palm industry is the main threat to the species, although the development of cocoa and rubber plantations have contributed to the problem. Negotiations to exploit reserves of timber in the region also are under way.

Overcollecting is another danger. Birdwing butterflies in general have long been held in high esteem by insect collectors and are in great demand worldwide. Species such as *T. alexandrae*, which are not only impressive in appearance but rare and difficult to obtain, realize extremely high prices. Collecting the Queen Alexandra's butterfly is prohibited under local law and the species is on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); however, some illegal trade may still occur.

drawing by Sarah Anne Hughes, reprinted from IUCN Invertebrate Red Data Book with permission

Golf Stick Pearly Mussel (*Obovaria retusa*)

The latest member of North America's rich but dwindling mussel fauna to be proposed for listing as Endangered is the golf stick pearly mussel (F.R. 3/7/89). (Thirty-two mussel species in the United States already are listed.) Like other freshwater mussels, the golf stick pearly mussel (also known as the ring pink mussel) feeds by filtering particles from moving water. It has a complex reproductive cycle during which the mussel's larvae parasitize a host fish. The life span, preferred host species, and other life history aspects of the golf stick pearly mussel are unknown.

The mussel's historical range is better documented. It was distributed widely throughout the Ohio River and its large tributaries in Pennsylvania, West Virginia, Ohio, Tennessee, Indiana, Illinois, Kentucky, and Alabama. Currently, however, it is known to survive only in four relic populations. Two of these are in reaches of the Tennessee River (one in the State of Kentucky and one is in the State of Tennessee), the third is in a reach of the Green River in Kentucky, and the fourth is in a reach of the Cumberland River in Tennessee.

Most of the historically known populations were lost when their free-flowing river habitat was dammed to create a series of large impoundments. This not only reduced the availability of riverine gravel/sand shoal habitat preferred by the mussel but also probably affected the distribution and availability of the mussel's host fish. Other activities imperil the remaining *O. retusa* populations. The Green River population is threatened by water pollution resulting from oil and gas production and by altered stream flows from an upstream reservoir. The other three are potentially jeopardized by river channel maintenance, navigation projects, and sand and gravel dredging.

None of the four populations is known to be reproducing. Therefore, unless viable populations are discovered or methods can be developed to promote reproduction in existing populations, the species will become extinct in the foreseeable future. Further clouding the species' future is the belief that three of the mussel populations (those in the Tennessee and Cumberland Rivers) may contain only old individuals that have already passed their reproductive age.

Condor Update

The second California condor (*Gymnogyps californianus*) chick conceived in captivity emerged from its egg, assisted by staff of the San Diego Wild Animal Park, on April 19, 1989. As of April 20, the chick (whose gender will be determined later) was feeding normally and doing well. It is a sibling to Molloko, the first captive-conceived California condor, which hatched at the San Diego facility last year.

More good news is expected this summer. Three other fertile California condor eggs are being incubated, and their projected hatching dates are in mid-to-late May. Two of the eggs were laid at the San Diego Wild Animal Park. The other is from the Los Angeles Zoo, and is the first fertile egg produced by that facility's captive breeding flock. All of this year's fertile eggs are being attended by the experienced staff at San Diego Wild Animal Park; however, aviculturists and veterinarians from the Los Angeles Zoo will perform the upcoming "break-out" of the chick conceived at their facility.

This year's reproduction is important progress toward the ultimate goal of the California condor recovery program, which is to reestablish self-sustaining populations of this magnificent bird in the wild.

Protection Approved for the Alabama Canebrake Pitcher Plant

The Alabama canebrake pitcher plant (*Sarracenia rubra* ssp. *alabamensis*), a member of the family Sarraceniaceae, is an insectivorous perennial herb with red, nodding flowers and narrow, tubular leaves. This species is endemic to three counties in central Alabama, where it occurs in sandhill seeps, swamps, and bogs. It was reported historically from 28 sites, 16 of which no longer support the species. Only 4 of the remaining 12 populations are of significant size.

Most of the species' wetland habitat has been destroyed or adversely modified through clearing and drainage for agricultural use. Fire suppression also has modified the open habitat by allowing vegetational succession. As a result, as many as five pitcher plant populations have been lost through shading and overcrowding. Herbicide applications, overcollecting, and gravel mining pose additional threats.

The Fish and Wildlife Service proposed listing the Alabama canebrake pitcher plant as an Endangered species in the April 21, 1988, *Federal Register* (see BULLETIN Vol. XIII, No. 5), and the final rule was published March 10.

Regional News

(continued from page 5)

tices, and implementing plans to improve effective gene flow and increase genetic diversity.

* * *

The Fish and Wildlife Service, National Park Service, U.S. Forest Service, and several private conservation groups sponsored a cave management training seminar recently at Gatlinburg, Tennessee. Thirty-seven people directly involved in cave management or responsible for monitoring caves and cave life attended. Topics covered at the seminar included cave geology, hydrology, and mineralogy; cave-dependent bats and other cave life; recreational use of caves; use of volunteers to assist in cave protection and management; the Federal Cave Resources Protection Act; archaeological resources in caves; cave-related liability and risk management; cave gates; and cave inventory, monitoring, and management planning. This seminar was the eighth in a series that began in 1985 at Salt Lake City, Utah. The next training seminar is tentatively scheduled for October 1989 in Bend, Oregon, and will be sponsored by the U.S. Forest Service. For further information, contact Mr. Jim Nieland, U.S. Forest Service, Amboy, Washington (206/247-5473), or Mr. Robert Currie, U.S. Fish and Wildlife Service, Asheville, North Carolina (704/259-0321 or FTS 672-0321).

* * *

The Service's Jackson, Mississippi, Field Office and the Tensas National Wildlife Refuge recently completed arrangements with Dr. Bob Hamilton of Louisiana State University, School of Forestry, Wildlife and Fisheries Management, to survey part of the refuge's forest for the Bachman's warbler (*Vermivora bachmanii*). Dr. Hamilton previously reported the warbler from this area and hopes to confirm its presence this spring.

* * *

Region 5 — The Monongahela National Forest staff in West Virginia is doing its part to promote the recovery of the Endangered Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*). All of the red spruce (*Picea rubens*) in the Forest has been mapped, and 20 sets of nest boxes have been set up to determine the general distribution of this squirrel. Boxes are being checked by wildlife students from West Virginia University. Nest boxes are also being put up and monitored in association with proposed timber sales in potential northern flying squirrel habitat. The draft recovery plan for this squirrel and another Endangered subspecies, the Carolina northern flying squirrel (*G. s. coloratus*), is under review.

* * *

Students from West Virginia University also have been assisting with survey work for the Threatened flat-spired three-toothed snail (*Triodopsis platysayoides*). They reconfirmed this snail's presence at 3 known locations and discovered 4 new ones, all within 1 mile (1.6 kilometers) of the type locality at Cooper's Rock.

* * *

The Maryland Natural Heritage Program has submitted a report detailing the results of its first season of field work on the harperella (*Ptilimnium nodosum*), partially supported with Endangered Species Act/Section 6 funds. The distribution, abundance, and survival of harperella populations were assessed in the report.

In September of 1988, experimental transplants of vegetative buds were made into eight sites, two of which contained natural *P. nodosum* stands. Preliminary survivorship data indicate that the apparent suitability of transplant sites varied. Some appeared to be nearly as suitable as sites in which harperella occurs naturally.

* * *

In Virginia, The Nature Conservancy has acquired a beach site containing a large population of a rare tiger beetle (*Cicindela dorsalis dorsalis*), a category 1 listing candidate.

* * *

The 1988 field season brought good news for the Peters Mountain mallow (*Iliamna corei*), one of our rarest species. This plant's total population in the wild consists of three genetic individuals (clones) on Peters Mountain in Giles County, Virginia. Reproductive success of these plants has been plagued by problems of flower and fruit abortion prior to seed set. This has occurred in all three individuals as well as in offspring grown from the few seeds they did produce. However, searches through the leaf litter at the Peters Mountain site by researchers from Virginia Polytechnic Institute and State University (VPI) revealed additional seeds. When grown in an experimental garden at VPI, these seeds produced plants that flowered and set fruit vigorously, producing many thousands of seeds. This work, supported largely with Section 6 funds, has contributed greatly to the species' recovery potential. A recovery plan for the Peters Mountain mallow is being prepared.

* * *

The Service's Annapolis, Maryland, Field Office recently received a contract report from Dr. A. E. Schuyler of the Pennsylvania Academy of Sciences on the taxonomic status of two candidate plants in the genus *Bacopa*. Schuyler's study, which included herbarium and field investigations and some preliminary *ex situ* growth studies, concludes that neither *Bacopa* species merits recognition as a distinct taxon. It states that morphological distinctiveness could best be ascribed to environmental influences on these freshwater intertidal plants. These *Bacopa* species thus will be transferred to Category 3B.

* * *

Maryland's single population of Canby's dropwort (*Oxypolis canbyi*) did not fare well in 1988. Perhaps due in part to last summer's drought, the current dropwort population consists of only seven plants. These individuals represent the only remaining population north of the Carolinas. If conditions do not improve this year, plans have been made to initiate a cultivated population. A study of the dropwort site's hydrologic regime also has been initiated.

* * *

Region 8 (Research) — The Puerto Rico Research Group continues to monitor and manage the production of both wild and captive Puerto Rican parrot (*Amazona vittata*) flocks. In the wild, four nests had clutches and chicks during February and March. Eggs are being removed from some nests to stimulate the laying of second clutches, and chicks are being cared for temporarily at the Luquillo aviary. The captive flock produced three young Puerto Rican parrots in January, but no production has occurred there since then.

* * *

At the Patuxent Wildlife Research Center in Laurel, Maryland, the captive whooping crane flock produced its first two 1989 eggs in mid-March.

* * *

Region 9 (Washington, D.C., Office) — This edition of the BULLETIN begins our coverage of news from the "Washington Office," or Region 9, Division of Endangered Species and Habitat Conservation (EHC).

Most of the Service's Region 9 offices, including EHC, recently moved from various places in the Washington metropolitan area to a new location in nearby northern Virginia, and are together in one building for the first time in years. The new EHC mailing address is: U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation, Room 400 — ARLSQ, Washington, D.C. 20240. *Only* special deliveries, such as overnight mail, can be accepted at the new street address (Room 400, 4401 North Fairfax Drive, Arlington, Virginia 22201).

The new telephone number for the EHC Division Chief, William Knapp, and Deputy Chief, Kenneth Stansell, is 703/358-2161. The Branch of Listing and Recovery (Janet Hohn, Branch Chief), or BLR, can be reached at 703/358-2171. Among BLR's responsibilities are: developing policy and guidelines for listing actions, recovery plans, and economic analyses of Critical Habitat designations; tracking listing actions, petitions, and recovery plans during their review in Washington; and compiling Regional selections of listing candidates. The Branch of Federal Activities (Frank DeLuise, Branch Chief), or BFA, is at 703/358-2183. BFA is responsible for,

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among other things, developing policy and regulations to implement the Endangered Species Act (particularly Section 7 interagency consultations), Fish and Wildlife Coordination Act, National Environmental Policy Act, and other laws that give the Service specific review authority. The Branch of Special Projects (E. LaVerne Smith, Branch Chief), or BSP, can be reached at 703/358-2201. BSP coordinates Service implementation of the Food Security Act (Farm Bill) and the Emergency Wetlands Act; conducts the National Wetlands Inventory; and oversees development of the Endangered Species Information System. The Controlled Correspondence Section (Denise Henne, Section Chief), at 703/358-2166, primarily is responsible for processing controlled (priority) correspondence and producing the *Endangered Species Technical Bulletin*.

To dial these numbers through FTS, omit the area code and substitute 921 for the 358 prefix.

* * *

Beginning with next month's BULLETIN, reports on EHC activities of general interest will be a regular feature of this column. We also plan to highlight news from other Region 9 offices, such as the Office of Management Authority, Division of Federal Aid, and Division of Law Enforcement, on their activities that contribute to endangered species conservation.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	152	6	1	40	6	2	207	84
TOTAL	358	49	467	107	21	39	1041	284 **

Total U.S. Endangered **407**
Total U.S. Threatened **128**
Total U.S. Listed **535**

Recovery Plans approved: 242

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
April 30, 1989 36 plants

April 1989 Vol. XIV No. 4

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Agriculture, Wetlands, and Endangered Species: The Food Security Act of 1985

Jana Nelson
Food Security Act Coordinator
Region 1

Federal, State, and local agencies, working in cooperation with landowners and non-profit organizations, are reaping increasingly significant benefits for agriculture, wetlands, and wildlife, including endangered species. Valuable opportunities for building closer coordination between agricultural and wildlife interests were made possible through the conservation provisions of the Food Security Act of 1985 (also known as "the Farm Bill").

The fate of wetlands and endangered species is closely linked to agriculture. Cropland and pastureland comprise about 60 percent of the Nation's land base, and nearly 45 percent of federally listed Endangered and Threatened species are associated with some form of agriculture. Within Region 1 (see map on BULLETIN page 2) of the Fish and Wildlife Service (Service), almost 30 percent of listed species have been affected by agricultural practices, and about 15 percent have been adversely affected by the filling of wetlands.

Wetlands—including coastal marshes, mangrove swamps, ponds, springs, seeps, and such intermittently wet areas as vernal pools, prairie potholes, playa lakes, and bottomland hardwood forests—are highly productive ecosystems. They provide necessary food, water, and shelter for many species of animals and plants. It is estimated that approximately one-half of the animals and almost one-third of the plants currently listed in the United States as Endangered or Threatened species depend on wetlands for their survival. Wetlands typically are marginal for crop production due to tillage problems and inconsistent yields; however, when conserved, wetlands can benefit landowners by filtering pollutants, increasing groundwater recharge, improving water quantity and quality, reducing downstream flooding, and decreasing soil erosion.

When the Pilgrims landed, there were approximately 215 million acres (87 million hectares) of wetlands in what is now the conterminous United States. By the mid-1970's, however, only 99 million acres (40 million ha) remained. Losses in some areas have been even more severe, with California having lost over 90 percent of its historical natural wetlands. The Service estimates that about 450,000 additional acres (182,000 ha) are still disappearing each year nationwide. Over 87 percent of wetland losses in recent years can be attributed to agricultural practices.

Over 20 percent of listed species in the United States, including the least Bell's vireo (*Vireo bellii pusillus*), bald eagle (*Haliaeetus leucocephalus*), and Yuma clapper rail (*Rallus longirostris yumanensis*), stand to benefit if wetlands are conserved. The status of Endangered plants, such as salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*) and bunched arrowhead (*Sagittaria fasciculata*), also could improve.

Because of the increasing recognition given to wetlands and the impacts of agriculture on the environment, Congress included a number of important conservation measures in the Food Security Act. The five main provisions that address wildlife habitat on agricultural lands are known as Swampbuster, Sodbuster, Conservation Reserve Program, Section 1314 conservation easements, and Section 1318 debt restructure easements. (See BULLETIN Vol. XIII, No. 2, for details.) Related programs, such as the Agricultural Credit Act of 1987, Executive Orders 11988 and 11990 for the protection of floodplains and wetlands, and a May 1987 Memorandum of Understanding between the Service and the Farmers Home Administration (Farmers Home), enhance the Service's opportunities for habitat protection.

The Fish and Wildlife Service's primary role in these programs is to serve as a technical consultant to Farmers Home, the Soil Conservation Service, and the Agricultural Stabilization and Conserva-

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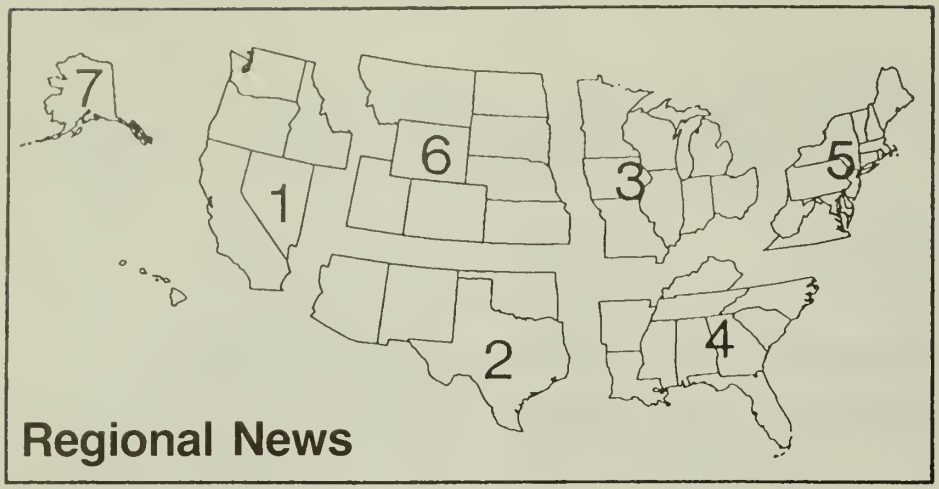
photo by Charlie Craig

This valuable wetland habitat on Farmers Home Administration inventory property in Oregon may be protected under a planned conservation agreement.



Regional News

Regional endangered species staffers recently reported the following news:

Region 1 - Representatives of the San Francisco Bay National Wildlife Refuge, Sacramento Endangered Species Office, and California Department of Fish and Game met to discuss remedies for the recent population crash of the California clapper rail (*Rallus longirostris obsoletus*), an Endangered bird. Red fox (*Vulpes vulpes*) predation is most likely to blame for the rail's 30 percent population decline in the past 3 years. Winter counts at all major marshes throughout the San Francisco Bay area since 1981 indicate that the current population of this subspecies is approximately only 450 birds. Responses to the problem may include intensive rail-predator studies during the breeding season; a public education effort by the California Fish and Game, other interested agencies, and key environmental groups; and a statewide California Fish and Game study of red fox problems.

* * *

The Animal Damage Control section of the U. S. Department of Agriculture has begun a concentrated effort to trap and remove red foxes preying on Endangered light-footed clapper rails (*Rallus longirostris levipes*) at Seal Beach National Wildlife Refuge, California. Predation by foxes has contributed to an alarming decline in the population of this highly vulnerable bird. The California Department of Fish and Game has agreed to allocate a portion of its Section 6 (Endangered Species Act) grant-in-aid funds to this effort.

* * *

The U. S. Geological Survey has begun long-term studies of water quality and nutrient levels in Upper Klamath Lake, Oregon. Rapidly deteriorating water quality in the lake is responsible for die-offs of two Endangered fishes, the Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*). Massive blue-green algae blooms have driven dissolved oxygen levels below those acceptable for maintaining the species during certain summer months. In addition to the Geological Survey, agencies contributing funds to the study include the Klamath Indian Tribe, U. S. Bureau of Reclamation, Klamath County, City of Klamath Falls, Pacific Power & Light, and Klamath County Farm Bureau. The study will examine changes in land uses around the lake and regulation of water levels.

* * *

A meeting was held with personnel of the Burns, Oregon, District of the Bureau of Land Management (BLM) to negotiate implementation of Malheur wire-lettuce (*Stephanomeria malheurensis*) recovery activities for 1989. The BLM will fund this season's work on census studies, seed over-wintering, competition with non-native cheat grass, and experimental out-plantings of *S. malheurensis* nursery stock. Cooperation from Boise State College and Portland's Berry Botanic Garden will again be crucial to the success of these efforts.

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The Fish and Wildlife Service, California Department of Fish and Game, National Park Service, and U. S. Forest Service have agreed upon 1989 recovery activities for the Little Kern golden trout (*Salmo aquabonita whitei*). The recovery

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

Steve Robinson, *Acting Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief,*
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide. **Region 9:** Washington, D.C., Office.

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Protection Recommended for Rare Mussel and Plant

During April 1989, the Fish and Wildlife Service proposed giving Endangered Species Act protection to two rare and vulnerable taxa:

Dwarf Wedge Mussel (*Alasmidonta heterodon*)

A small freshwater mollusk, the dwarf wedge mussel rarely exceeds 1.5 inches (3.8 centimeters) in shell length. It lives in clean, free-flowing streams of various sizes on a muddy sand, sand, or gravel substrate. The host fish, to which the mussel attaches in its larval stage, is not known for this species.

The dwarf wedge mussel once was widely distributed in river systems along North America's Atlantic coast from New Brunswick, Canada, south to the Neuse River in North Carolina. It has been recorded historically from 70 locations within 15 drainages. Today, however, it is known to survive at only 10 small sites within 5 river drainages, and as few as 4 populations may be viable. Each of these 4 populations, which occupy very limited areas in the Ashuelot River, Connecticut River, Tar River, and Tuckahoe Creek drainages, faces an uncertain future. Evidence of the species' decline was provided by The Nature Conservancy's status report and other studies.

The disappearance of the dwarf wedge mussel from most of its historical sites can best be explained by water pollution from agricultural, urban, and industrial sources. Even where water quality has improved, as in the lower Connecticut River, chemicals and other substances trapped in the sediments inhabited by mussels can inhibit the recovery of sensitive species. Acid precipitation may be adding to the water quality problem by leaching toxic metals into streams and by lowering stream pH levels. Increased acidity appears to have contributed to the decline of the dwarf wedge mussel in the Fort River of Massachusetts.

One of the largest remaining populations occurs where the Ashuelot River meanders through a golf course. The continuing decline of the dwarf wedge mussel at this site, particularly downstream of the golf course, may be attributable to run-off of chemicals and fertilizers applied to the golf course and to adjacent agricultural lands. If this is true, and if current plans to expand the golf course are carried out, more of the population's habitat could be subject to run-off impacts.

Damming and channelization of rivers throughout the species' range have also altered much of the species' former habitat. For example, waters upstream of dams have lower dissolved oxygen levels and increased silt deposition; downstream, daily fluctuations in reservoir discharges lead to rapid changes in water levels and temperatures. Dams may also have an indirect but more serious impact on the dwarf wedge mussel. A population of this species vanished from one site, which still supports other mussel species, after the construction of a downstream causeway created a barrier to anadromous fish. This suggests that the host fish for dwarf wedge mussel larvae (glochidia) may need access to the ocean to complete its life cycle. If this is the case, then one of the 10 remaining populations of the mussel is threatened by the proposed construction of a dam at Sumner Falls in New Hampshire.

The Service has proposed to list the dwarf wedge mussel as an Endangered species (F.R. 4/17/89).

Cassia mirabilis

This plant, a shrub that grows to about 30 inches (1 meter) in height, is endemic to an area of silica sands on the north coast of Puerto Rico. It has small leaves arranged alternately on the stems and produces solitary yellow flowers approximately 0.75 inches (2 cm) wide.

Data from early herbarium collections indicate that *C. mirabilis* once was common throughout the island's northern silica sands. However, extensive destruction of native habitat apparently has reduced its distribution to three sites on privately owned land. Only 150-200 plants are known to remain, and all are vulnerable to continued habitat loss. Accordingly, the Service has proposed to list *C. mirabilis* as Endangered (F.R. 4/14/89).

The largest *C. mirabilis* concentration, located on the southern shore of Tortuguero Lagoon, is threatened by sand mining, occupation of the area by squatters, and trash dumping. One of two sites in the Dorado area is being used for livestock grazing, which does not appear to harm *C. mirabilis*, but it has been proposed as the location for a large office building complex. The other Dorado population is destined to be eliminated by road construction unless the plants can be relocated successfully.

* * *

Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement of the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are not legally binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

New Publications

The North Carolina Biological Survey and North Carolina State Museum of Natural Sciences have published *Endangered, Threatened, and Rare Fauna of North Carolina, Part II: A Re-evaluation of the Marine and Estuarine Fishes*, by Steve W. Ross, Fred C. Rohde, and David G. Lindquist. This 20-page report updates the evaluations in the 1977 report, *Endangered and Threatened Plants and Animals of North Carolina*. A brief description of physical characteristics, life history and ecology, special significance, Federal status, current protection, and management recommendations for North Carolina's endangered fishes are provided. The report is available for $3, postpaid, from the North Carolina State Museum of Natural Sciences, P.O. Box 27647, Raleigh, North Carolina 27611. Checks should be made payable to the NCDA Museum Extension Fund. Part I of this report, *A Re-evaluation of the Mammals*, was published in 1987 and is still available for $5, postpaid.

A Forum for the Exchange of Information & Ideas on Endangered Species Issues

Published by the School of Natural Resources at The University of Michigan, the Endangered Species Update is a bulletin providing current news and information on endangered species protection. The Update includes a reprint of the latest Endangered Species Technical Bulletin, a U.S. Fish and Wildlife Service publication which is publicly available only through the Update. Additionally, the School of Natural Resources supplements each reprint with articles and information covering a variety of issues relating to species conservation.

The Update was first developed in 1983 to reprint the U.S. Fish and Wildlife Service bulletin after budget cuts forced the Office of Endangered Species to limit its distribution. Since 1981, however, distribution has been limited to federal and state agencies and official contacts of the federal Endangered Species Program. The Update keeps this unique source of information available to the public.

In the years since its inception, the Update (formerly known as the Endangered Species Technical Bulletin Reprint) has established itself as an important forum for the exchange of ideas and information on endangered species conservation issues. Along with the recent name change, the amount of information supplementing the Fish and Wildlife Service bulletin has been increased. The newly designed Update includes:

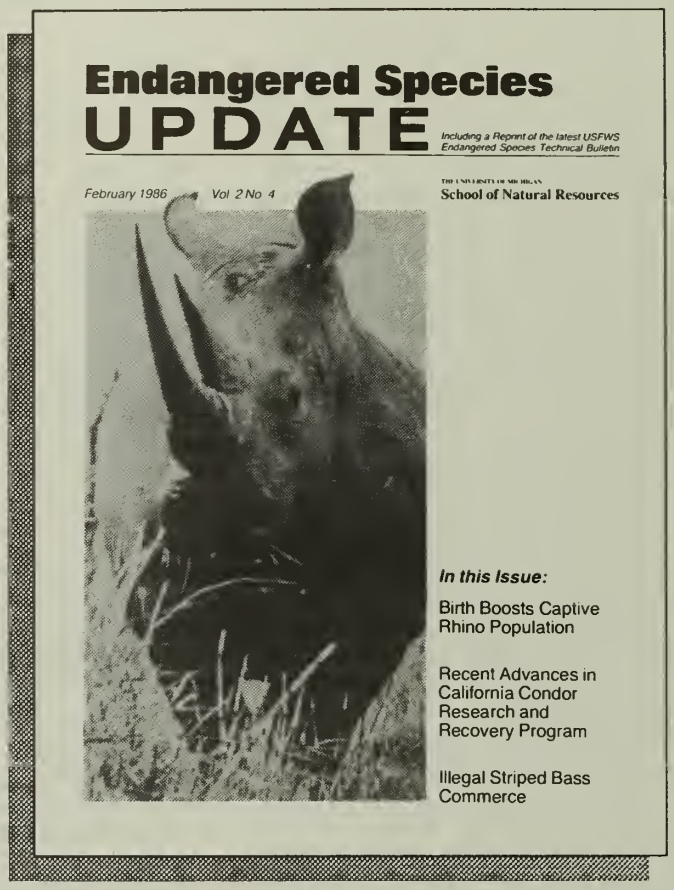
A Reprint of the Latest U.S. Fish & Wildlife Service Endangered Species Technical Bulletin
This reprint provides the most current information on the federal endangered species program.

A Feature Article
Article topics have included wetland protection, maintaining biotic diversity in national forests, and wolf recovery in the Yellowstone Ecosystem.

A Book Review
This section covers publications in the field of conservation.

Opinion
This guest column provides a forum for the quick exchange of ideas concerning endangered species.

Bulletin Board
This portion lists upcoming meetings, new publications, and current announcements.



To receive the Endangered Species Update for one year (10 issues), send $15 by check or money order (payable to The University of Michigan) to:

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Coal Mining and the Decline of Freshwater Mussels

Dick Biggins
Asheville, North Carolina, Field Office

Fourteen of the 18 mussel species of the Cumberland and Tennessee Rivers now on the Federal list of Endangered wildlife declined at least in part because of past habitat deterioration associated with coal mining. Environmental impacts related to coal mining are suspected in the continuing decline of more than a dozen other mussel species that are candidates for possible Endangered Species Act protection.

Coal mining particularly affected many rivers and streams in the southern Appalachian Mountains, where certain mining activities continue to have serious impacts on some stream reaches. If left untreated, water runoff from coal mines and processing sites can contain high levels of silt and coal fines (small particles of coal mixed with silt) that settle from the water and blanket riverbeds. These deposits can destroy delicate stream ecosystems and smother many aquatic animals and plants that have evolved to exist in clean, relatively silt-free environments. Chemical pollutants associated with coal mining also can cause significant problems. Acidic drainage from mines has affected the aquatic habitat in many streams in the southern Appalachians and organisms may be killed directly by the drop in pH. Other toxic chemicals also can be present in coal waste.

The Fish and Wildlife Service is funding three studies to address coal-related pollution and its impacts on mussel communities. One of these studies addresses the Powell River, which has a diverse mussel fauna containing 35 species (including 5 that are listed federally as Endangered). In Virginia, and to a lesser extent in Tennessee, the Powell River watershed has been seriously degraded by coal-related pollution. Coal waste, primarily fine particles of coal, is now a significant component of the river bottom. In a study being conducted by the Service's Virginia Cooperative Fish and Wildlife Research Unit, biologists are attempting to assess 1) the amount of coal waste that has been incorporated into the substrate, 2) the magnitude of the decline in mussel diversity and abundance, and 3) how and to what extent the coal waste affects the mussels.

A study by the Service's Tennessee Cooperative Fisheries Research Unit, funded in part by the Tennessee Wildlife Resources Agency and the Kentucky Department of Fish and Wildlife, is focusing on the upper Cumberland River basin in Kentucky and Tennessee. The Tennessee Co-op Unit is concentrating its efforts on the Little South Fork of the Cumberland River. As recently as 1981, the Little South Fork had one of the most diverse and abundant mussel faunas (22 species, 2 of which are listed as Endangered) in the Cumberland River system. Surveys of the area in 1987 and 1988, however, showed that the river's mussel population has crashed. Mussel density has declined significantly, and only 14 species recently have been found there alive. The little-wing pearly mussel (*Pegias fabula*) was the second most common mussel found in the 1981 study of the Little South Fork, but surveys of the same area in 1987 located no live specimens and the species is now listed as Endangered. Another federally listed species, the Cumberland bean pearly mussel (*Villosa trabalis*), also has been extirpated from this study area, along with mussels that elsewhere are relatively common. Although Endangered and non-listed species survive in low numbers upstream, they have disappeared from the river downstream of strip-mined areas. The Tennessee Co-op Unit study may provide some answers on what happened in the Little South Fork.

The Service's Tennessee and Virginia Co-op Units also are working together on a study of mussel tissue and river substrate samples collected from streams affected by coal mining. Analysis of these samples should provide data on potentially toxic chemicals that may be associated with coal waste.

Once these studies are complete, the Service, other Federal and State agencies, and the coal industry will be better able to protect Endangered mussels during and after coal production and mine reclamation activities.

photo by Dick Biggins

Biologists are surveying the Powell River to determine the abundance and diversity of the remaining mussel fauna.

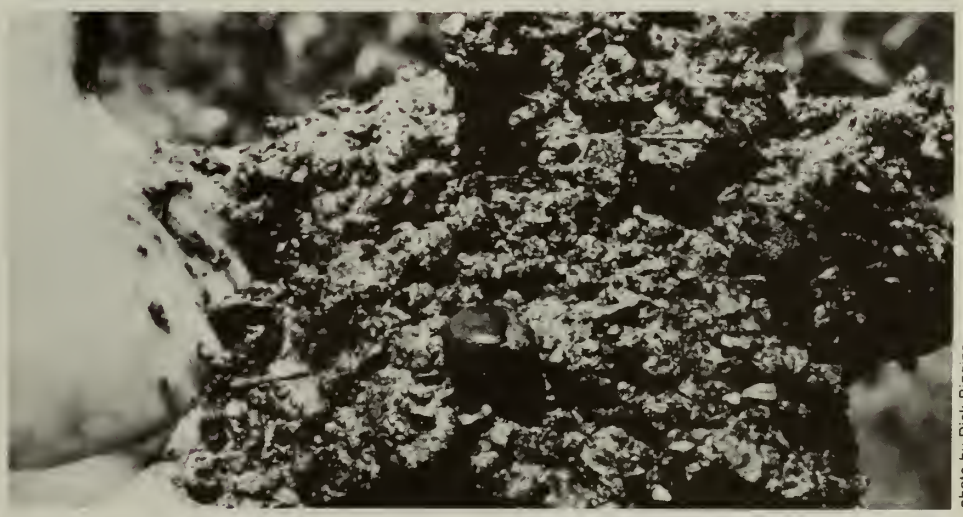

photo by Dick Biggins

Coal-related pollution has seriously degraded much of the Powell River in southwestern Virginia, where coal waste is now a significant component of the river bottom.

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tion Service to ensure that wildlife issues are considered when agency activities are planned. It also serves as a liaison between these agencies and State, local, and private resource agencies and organizations. The Service's contributions have been in three major areas: 1) conservation planning; 2) habitat protection and preservation; and 3) habitat restoration.

1) Conservation Planning

Effective land use planning is critical for meeting the conservation goals of the Food Security Act. One Federal agency, the Soil Conservation Service, is involved in preparing conservation plans for highly erodible farmlands. These plans feature management practices designed to lower erosion rates to an acceptable level and often include practices that benefit other resources, such as ground water or wildlife. Landowners also can request help from the Soil Conservation Service in developing conservation plans even for lands that are not highly erodible.

Success in effectively protecting wetlands, endangered species habitat, and other sensitive resources depends on landowner support. Over 90 percent of our Nation's existing wetlands, and most of its restorable wetlands, are on privately owned lands. In many instances, the Service can suggest conservation recommendations that promote both wildlife and economic uses of the land. The situation facing the San Joaquin kit fox (*Vulpes macrotis mutica*) habitat in south-central California provides an example. Several Farmers Home inventory properties occur on or adjacent to areas used by this Endangered animal. The conversion of many properties from rangeland to cropland made them marginal habitat for the fox because cultivation reduced the number of small mammals upon which the fox feeds. However, changing management of the property to a controlled grazing regime would promote the recovery of the fox's prey base while allowing agricultural use of the land. By looking at species-specific needs, it may be possible to develop similar agreements to benefit a wide variety of listed species.

Farmers Home has agreed also to consider the Service's conservation planning recommendations for projects that could have an impact on listing candidates when these recommendations would not significantly diminish the economic value of the property. For example, an agreement have been reached in southern California for the desert tortoise (*Gopherus agassizii*), a State-listed threatened species and candidate for Federal listing. A private developer had already negotiated with Farmers Home for the purchase of inventory property to be included as part of a racetrack site. The track was to be located next to the Bureau of Land Management's desert tortoise natural area. Although tortoises were not likely to occur on the property to be developed, they were known to occur in the adjacent area. There was concern that high noise levels from the racetrack would disturb tortoise behavioral patterns. To protect this sensitive species, Farmers Home agreed as a condition of sale to require the installation of noise barriers around the racetrack perimeter.

photo by Jay Sheppard

Typical habitat along the southwestern edge of the San Joaquin Valley of California for the blunt-nosed leopard lizard and San Joaquin kit fox.

Another form of conservation planning can occur during loan review. Farmers Home receives thousands of loan requests for rural housing, rural water supply, farming equipment and operations, and other purposes each year. Through the Memorandum of Understanding, the Service can participate in the loan review process by providing technical information on fish and wildlife resource impacts that could result from the loan activity and making recommendations to protect these resources. The result can be the establishment of a conservation easement, such as the 50-acre (20-ha) easement established in Oregon for a bald eagle roost site, or recommendations to avoid project impacts, such as the realignment of a water pipeline to avoid disturbing Houston toad (*Bufo houstonensis*) habitat in Texas.

2) Habitat Protection and Preservation

Three provisions of the Food Security Act allow the establishment of conservation easements to protect environmentally sensitive resources. Another law, the Agricultural Credit Act, also promotes habitat protection by allowing fee title transfer of property for conservation purposes. The habitat protected under these provisions provides long-term protection for waterfowl, endangered and threatened plants and animals, and other wildlife. When easements are established, an easement manager is designated to see that the land is managed for the intended conservation purpose. The easement manager can be a Federal, State, or local resource agency or a private conservation group. The landowner typically maintains most rights to the property, including control of public access and other uses of the property as long as the uses are compatible with the purpose of the easement.

Inventory Property Easements

Reviewing Farmers Home inventory properties for wildlife resource values has been a significant commitment for the Service in the past year. Under Executive Orders 11988 and 11990, and Section 1314 of the Food Security Act, Farmers Home can establish easements for the protection of wetlands, floodplains, and other environmentally sensitive habitats. Lands come into Farmers Home inventory either through voluntary conveyance or foreclosure. Prior to resale, Farmers Home evaluates each property for the presence of important resources (as defined in the May 1987 Memorandum of Understanding). The Service provides technical assistance in determining impacts to these resources, which include wetlands; floodplains; riparian zones;

photo by Leon Snyder

*San Joaquin kit fox (*Vulpes macrotis mutica*)*

coastal barriers; threatened and endangered species (including candidate species, critical habitat, known occurrence areas, and potential habitat for release, restoration, and/or reintroduction); aquifer recharge areas; areas of high water quality or scenic value; and habitats of national, State, regional, or local importance. Farmers Home also assesses impacts to important cultural resources, such as archaeological sites.

Over 4,100 inventory properties have been reviewed nationwide and conservation easement recommendations have been made on about 25 percent of them. If Farmers Home agrees to these easements, they will give protection to over 100,000 acres (40,000 ha) of sensitive habitat. Protective conservation easements have been recommended for numerous wetland habitats as well as for a wide variety of listed species, including the Indiana bat (*Myotis sodalis*), eastern indigo snake (*Drymarchon corais couperi*), and gray wolf (*Canis lupus*). For Farmers Home to accept easements for listed species, the Service must document that the species is known to occur on or adjacent to the property. At times, this can be difficult due to such factors as seasonal use. In such cases, the Service uses the best available information on habitat availability, known distribution, and other factors to document the importance of the particular property to the listed species.

Standard conservation easement language has been developed to address wetland and floodplain protection. In many instances, this standard language also serves to protect listed species. For endangered species issues or other wildlife values, the standard language may occasionally be modified to provide special consideration of such factors as precautions on the uses of pesticides in endangered species habitat. Establishment of conservation easements for listed species does not supersede the need for Federal agencies to comply with Section 7 requirements of the Endangered Species Act, but in many cases acceptance of these recommendations can mean avoiding impacts on listed species.

Types of Easements Available Under the Food Security Act and Associated Programs

Provision	Length of Easement	Types of Habitat Protected
Conservation Reserve Program	10 years	highly erodible soils, vegetative filter strips, cropped wetlands
Debt-restructure Program (Section 1318)	50 years or more	highly erodible soil, upland, or wildlife habitat
Section 1314	in perpetuity	any sensitive environmental habitat
Executive Orders 11988 and 11990	in perpetuity	wetlands and floodplains
other lands	term varies based on agreement	any sensitive environmental habitat

Conservation Reserve Program Easements

The Conservation Reserve Program is a voluntary program designed to conserve and improve soil and water resources by taking highly erodible cropland, cropped wetlands, and vegetative filter strips out of production for a 10-year period. In return, the landowner receives an annual rental payment and agrees to establish permanent wildlife cover on the set-aside acres, for which the Agricultural Stabilization and Conservation Service will share up to 50 percent of the actual cost. Creation or restoration of shallow water wetlands is an acceptable wildlife cover practice that

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results in significant benefits to waterfowl and other wildlife.

Over 28 million acres (11 million ha) have already been set aside under this program, and the national goal is to have over 45 million acres (18 million ha) enrolled by 1990. To participate in this program, landowners place bids with the Agricultural Stabilization and Conservation Service during twice annual sign-ups.

Debt-restructure Easements

Section 1318 easements, commonly referred to as "debt-restructure" easements, are one of about 10 loan servicing options that can be considered by landowners who meet certain conditions of delinquency on Farmers Home loans. In return for a 50-year or longer conservation easement, landowners can have their debt written down by the value of the easement area. These easements are considered only when requested by the landowner, and they must be able to make it feasible for the landowner to pay off any remaining debt. They can be established for conservation and wildlife purposes on land that is wetland, upland, or highly erodible. In late November 1988, Farmers Home sent out approximately 81,000 notices of delinquency and default requesting landowner input regarding loan servicing options. However, fewer than 350 landowners requested consideration of a conservation easement. For landowners who did, however, this program may provide a valuable way for them to reduce their debt to a point where they can maintain a viable farming operation while also benefiting wildlife.

Fee Title Transfers

Section 616 of the Agricultural Credit Act allows the transfer of Farmers Home inventory property, or interest therein, to any State or Federal agency for conservation purposes without reimbursement. Priority consideration is given to land transfers that promote the North American Waterfowl Management Plan, recovery of endangered species, or habitat of national importance. Based on information from the Service and other sources, Farmers Home determines if the land is marginal for agriculture, has special management importance, or is environmentally sensitive. If the property meets any of these criteria, it can be considered for transfer to a Federal or State conservation agency. The prior owner/operator is allowed to exercise rights of buyback/leaseback before a transfer is considered.

The first fee title transfer under this provision occurred in Grays Harbor County, Washington, on an 85-acre (34-ha) tract along the Chehalis River. This former dairy farm will be managed by the Washington Department of Wildlife for waterfowl, fisheries, and wildlife production and for wetland and floodplain protection. It contains extensive wetlands that provide breeding and feeding areas for waterfowl and is within known bald eagle wintering range. The river border contains gravel bars used by salmon and steelhead for spawning areas.

Numerous fee title transfers are under consideration nationwide. Many will provide direct protection for listed species as well as a chance to promote the enhancement of existing habitat for these species. For example, a 640-acre (259-ha) property in California that contains habitat for the San Joaquin kit fox, palmate-bracted bird's-beak (*Cordylanthus palmatus*), blunt-nosed leopard lizard (*Gambelia silus*) and Tipton's kangaroo rat (*Dipodomys nitratoides nitratoides*) probably will be transferred to the State for management. Possible types of habitat enhancement for these species could include planting and protecting native plant species, managing grazing, and improving existing alkali sinks.

3) Habitat Restoration

The Service is undertaking a major wetland restoration effort on lands associated with the Food Security Act and related programs. Wetland restoration addresses many conservation issues, including soil erosion, ground water recharge, surface and groundwater quality, safe and adequate water supply, stabilization of flood and drought cycles, recreation, and provision of wildlife habitat.

In southern California, a 203-acre (82-ha) easement, which will be managed by the Service, has been established for wetland protection. Wetland restoration will improve habitat for the Endangered Yuma clapper rail, waterfowl, and other birds.

Over 15,000 (6,100 ha) acres of prairie potholes, bottomland hardwood forests, and other wetlands were restored last year on lands associated with the Food Security Act in the midwest and southeast. About half of the restoration was on Farmers Home inventory lands, with most of the remainder on Conservation Reserve properties. Thousands of additional acres throughout the Nation will be restored this year.

Wolf Longevity in the Wild

L. David Mech[1]

The maximum age any mammal reaches in the wild is difficult to measure unless aging techniques are available for that species. In the case of the gray wolf (*Canis lupus*), aging methods are still being developed and tested. Information from captive wolves indicates that 16 years is probably close to the maximum life span for the species in captivity. However, until recently, no one knew how long wolves live in the wild.

Until about 7 months of age, wolf pups can be distinguished from adults by the presence of milk teeth. Thus, if wolves are caught before gaining their permanent teeth and are then fitted with a radio transmitter, they can later yield some information about longevity. Even adult wolves that are followed long enough can provide minimal indications of longevity. Through the latter method, the Patuxent Wildlife Research Center's Minnesota Field Station has been able to learn how old at least some wolves live to be in the wild.

Three females lived at least 9 years to 12 years and 8 months, and three males lived at least 9 years and 6 months to at least 11 years and 7 months. None of these wolves died of old age. One was killed illegally by humans, one was killed by other wolves, one starved, and three were still alive when their radio collars failed. Thus, all of these ages are minimal estimates of potential lifespan in the wild.

It is noteworthy that one wolf produced pups even when she had reached 10 years of age. Another bore pups when at least 8 years old and ovulated when at least 9 years old. A third female was last known to have produced pups when at least 7 years old (and probably 8). From the time she was at least 8 years (and probably 9) through at least 12 years and 8 months (and probably 13 years and 8 months) old, this third female wolf did not produce any pups that survived into summer. However, she did travel with at least two different males during her non-productive years. With regard to male wolves, one sired pups when at least 10 years and 10 months old. From these data and those from captive wolves, it appears that prime age in wild wolves probably extends up to about 11 years and maximum lifespan to at least 13.

[1] U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, Minnesota 55108.

Final Listing Rules Approved for Two Species

During April 1989, final listing rules were published for two species, bringing Endangered Species Act protection to the following:

Dwarf-flowered Heartleaf (*Hexastylis naniflora*)

This low-growing herbaceous plant in the birthwort family (Aristolochiaceae), has dark green, heart-shaped leaves and small, inconspicuous jug-shaped flowers that are usually beige to dark brown in color. The plant grows in acidic soils along bluffs and hillsides in boggy areas next to streams, and along ravines in the upper piedmont of North and South Carolina. Much of the habitat that the dwarf-flowered heartleaf prefers has been altered by conversion to peach orchards and pastures, destroyed by housing construction, or flooded by impoundments. Only 24 populations are known to occur in an 8-county area, and only 4 of these sites receive some protection. The Fish and Wildlife Service proposed on April 21, 1988, to list the dwarf-flowered heartleaf as Threatened (see BULLETIN Vol. XIII, No. 5), and the final rule was published in the April 14, 1989, *Federal Register*.

Magazine Mountain Shagreen (*Mesodon magazinensis*)

The Magazine Mountain shagreen is a dusky brown or buff colored land snail approximately 0.5 inches (13 millimeters) wide and 0.3 inches (7 mm) high. Its entire range is within the Ozark National Forest. More specifically, the snail is known to occur in small numbers only on rock slides on the north slope of Magazine Mountain in Logan County, Arkansas. Because of its limited range, the snail is vulnerable to collecting and to any adverse habitat modification. Recreational developments or activities, military training exercises, and forestry activities are potential threats to the species if they occur on the north slope of the mountain. The Service proposed the Magazine Mountain shagreen for listing as a Threatened species on July 5, 1988 (see BULLETIN Vol. XIII, No. 8), and the final rule was published on April 17, 1989.

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effort for this Threatened fish is approximately 50 percent complete. Prospects for accelerated recovery have improved with recent successes in artificial propagation at the California Department of Fish and Game's Kernville hatchery and a commitment by the State for a recovery coordinator position. An ambitious stream restoration and reintroduction program is scheduled for the 1989 field season. Under the accelerated schedule, complete recovery of this Threatened fish may be only 3 to 4 years away.

* * *

Region 2—U.S. Fish and Wildlife Service bald eagle (*Haliaeetus leucocephalus*) nest watchers saved an 8-week-old chick from starvation. They observed that one chick in the nest was having difficulty eating and was regurgitating all consumed food. After several days of observation, the situation remained and the chick became weak from lack of food. The nest watchers contacted a biologist, who removed the starving chick and delivered it to a veterinarian. The veterinarian removed a large fish vertebra that had become lodged in the chick's throat. After a week of recuperation, the eagle chick was returned to the nest and was expected to fledge successfully.

* * *

Robert Mesta, Raptor Biologist with the Service's Phoenix, Arizona, Ecological Service Field Office, participated in a joint U.S./Mexico research project in Sonora, Mexico. A team of U.S. and Mexican biologists surveyed approximately 120 miles (190 kilometers) of the Rio Yaqui Drainage by canoe, searching for breeding bald eagles and checking the status of three known nests. One of the nest sites was occupied and had three nestlings, the second nest had failed, and the third was unoccupied. No new nests were discovered. Little is known about this small population, which was discovered in 1986, or about its possible relation to bald eagles breeding in Arizona. This is the third year the eagle survey has been conducted by the joint team.

* * *

Since 1975, 218 whooping crane (*Grus americana*) eggs have been transferred from the whooper's only nesting grounds, in Wood Buffalo National Park, Canada, to sandhill crane (*Grus canadensis*) nests at Gray's Lake National Wildlife Refuge in southeastern Idaho. The goal has been to establish a second whooping crane population in the wild. Out of these 218 whooping crane eggs, 210 have hatched and 85 young have survived to flight age (90 days). The population peaked at 34 individuals in 1984-85, but declined to 14 (a figure that includes some translocated birds as well as eggs) by 1989. The causes of death have been identified for 24 of the birds, and include collisions with powerlines (41.6 percent), collisions with fences (20.8 percent), disease (16.7 percent), and avian predators (8.3 percent). The population decline since 1985 is a consequence of 3 years of drought at Gray's Lake (which limited chick survival) and continuing natural attrition of subadults and adults. An additional bird, a 5-year-old female, died in March after hitting a powerline in the San Luis Valley of Colorado.

The project, now in its 15th year, will be reviewed by the Service this summer. Although the experiment has successfully established a migratory population that uses the same areas as their foster parents, no whoopers have produced eggs. Female whooping cranes reach sexual maturity and produce fertile eggs at an average age of 5.4 years, although fertile eggs can be produced at age 3. During the project, females 4 to 8 years of age have passed through a breeding season on 20 occasions without producing young.

* * *

Region 4 - The second year of status surveys for the seabeach amaranthus (*Amaranthus pumilus*) has been completed. It shows fluctuations in some populations, but verifies the species' overall rarity and vulnerability to threats. This plant once grew on barrier islands and beaches from Massachusetts to South Carolina. Based on the results of status surveys funded by Regions 4 and 5, it is now extirpated from all but the southernmost portion of its range (North and South Carolina).

The species' habitat is extremely dynamic and very vulnerable to natural changes, such as beach erosion. The accelerating pace of coastal development along the eastern seaboard, where undeveloped beachfront is becoming rare, increases the species' vulnerability to extinction. Even populations on public land have succumbed to habitat destruction caused by off-road vehicles, dune restoration projects, construction of groins and breakwaters, and heavy recreational use. A U.S. Army Corps of Engineers dredging operation is currently depositing soil on an area in North Carolina that supports the second largest known population of the species.

Because this species has no close relatives, its extinction would be a considerable loss to botanical diversity. *Amaranthus pumilus* also is a valuable beach stabilizer. Its nutritional value is especially high because the seeds are high in lysine, an essential amino acid generally found only in low amounts in other grains and other *Amaranthus* species.

* * *

The Florida Game and Fresh Water Fish Commission is initiating a study on the life history, management, and status of fox squirrels (*Sciurus niger*) in Florida. Two subspecies of fox squirrels are found in Florida, and both are category 2 candidates for Federal listing. The mangrove fox squirrel (*S. n. avicennia*) is restricted to the Big Cypress area of south Florida. Sherman's fox squirrel (*S. n. shermani*) is found in north and central Florida. Hunting

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is not permitted for the mangrove fox squirrel, but is still legal to take the Sherman's fox squirrel. The results of the project will help the Commission decide if current management for fox squirrels in Florida is appropriate. The results will also help the Service decide whether or not either subspecies needs Federal listing protection.

* * *

Remember the Cross-Florida Barge Canal, a watery route across Florida first proposed by Thomas Jefferson, finally begun by the Corps of Engineers in the late 1960's, and terminated (deauthorized) by Congress in the 1970's as an environmental mistake? The project remains deauthorized, but what to do with the previously authorized portion, including several lakes, dams, locks, canals, and a thin corridor of mostly uplands stretching across peninsular Florida, was never decided. Should the resources now held and, to an extent, managed by the Corps as the Cross Florida National Conservation Area be returned to their original owners? If the Corps retains ownership, how should these resources be managed in the future? These and other questions will be addressed over the next several years as the Corps and other agencies and individuals discuss what to do with the project's remains. The Jacksonville, Florida, Field Office is actively working with the Corps to see what benefits for wildlife can be salvaged.

* * *

Region 5 - Peregrine falcons (*Falco peregrinus*) returned to several sites in the Green Mountains of Vermont and White Mountains of New Hampshire during late February. Up to 16 pairs of peregrines may nest in the two States this spring. In 1988, two out of three young produced in New Hampshire were at Holts Ledge. The U. S. Forest Service, U.S. Fish and Wildlife Service, and State agencies are coordinating on protection of nesting areas. Also, local helicopter users whose flights over these sensitive sites in past years have raised concern about disturbance of nesting falcons, have been contacted.

* * *

Results of the 1988 Mid-Winter Bald Eagle Survey in New Jersey have shown an unprecedented number of wintering bald eagles in the State. Thirty-eight bald eagles and two non-endangered golden eagles (*Aquila chrysaetus*) were found during the 2-day survey in January. New Jersey has only one active bald eagle nest; however, a recent surge in eagle activity at several potential nesting areas in the State offers hope for others in the future.

* * *

Region 5 has prepared and distributed the draft Sandplain Gerardia (*Agalinis acuta*) Recovery Plan. This plant was listed in September 1988 as Endangered (see BULLETIN Vol. XIII, Nos. 9-10). It is known to occur at 10 sites in Massachusetts, New York, Rhode Island, and Maryland. Recovery actions include developing management and protection plans for each population and locating or establishing new sites.

* * *

Region 6 - In April 1988, the Service received a petition to list a Montana plant, the Sapphire Mountain rockcress (*Arabis fecunda*), as an Endangered species. At the time, only 30-35 small populations were known, and they were threatened by livestock grazing and knapweed (*Centaurea* sp.) encroachment. Last summer, however, botanists working for the Montana Natural Heritage Program, aided by Section 6 funding, discovered 70 new populations in the Pioneer Mountain Range. As a result, the Montana Heritage Program requested that the petition be withdrawn.

* * *

A wildlife celebration, "Wings Over the Platte," held March 17-19, 1989, on the Platte River in Nebraska was an overwhelming success. It attracted more than 2,000 people from all across the country, as well as from Nigeria and France. This year, due to low water conditions in the nearby Rainwater Basin, the river was teaming with more waterfowl than usual. An estimated 5-7 million ducks and geese and 300,000 sandhill cranes were present on the river over the 3-day period. The event included workshops on waterfowl and river ecology and guided tours along the river. Unfortunately, no whooping cranes were present for the celebration, but one did arrive March 25 after the festivities were over. The bird, a female whooper, was given the name "Oklahoma" by the local community of Grand Island, Nebraska, because she overwintered her first year in Oklahoma. For the past 3 years, she has returned to the Platte to spend a month feeding in local fields. The rest and feeding stop gives her energy to make the long flight to Wood Buffalo National Park in northern Alberta, Canada. "Oklahoma" should reach sexual maturity this year, and it is hoped that she will pair and mate.

* * *

The Colorado River Fishes Recovery Team met in Phoenix, Arizona, on February 23-24 and completed its review of revised recovery plans for the Endangered humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and Colorado squawfish (*Ptychocheilus lucius*). The revised plans for the humpback and bonytail chubs will undergo public review soon, and the revised Colorado squawfish plan will be sent out for agency review. Fragmentation of squawfish habitat was identified by the team as a serious threat to its recovery and survival. Also, plans proposed by the State of Utah to introduce non-native fish to provide forage for striped bass (*Roccus saxatilis*) in Lake Powell are being reviewed by the team as to the potential effects on the three Endangered fish.

* * *

The Interagency Grizzly Bear Committee met January 31 and February 1, 1989, in Billings, Montana, to discuss the status of the grizzly bear (*Ursus arctos*) in the Northern Continental Divide Ecosystem of northwestern Montana. It appears that this population may be nearing recovery. In addition, the Committee directed that a Conservation Strategy Document be developed to outline the population monitoring methods and habitat/population management that would be needed after a future delisting to ensure the population's survival. This Conservation Strategy Document would be signed by all State and Federal management authorities prior to a delisting, and the document is scheduled to be completed in December 1989.

During a March 16-17 meeting in Washington, D. C., the Committee briefed Congressional committee staffs, agency heads, conservation organizations, and private groups on Committee activities and the overall status of the grizzly bear in the lower 48 States. Particular interest was expressed in three areas: 1) the recovery and delisting prospects for the grizzly population in the Northern Continental Divide Ecosystem; 2) progress on the proposed augmentation effort in the Cabinet/Yaak Ecosystem; and 3) the need to ensure adequate funding for grizzly bear recovery.

Continued illegal killing of grizzlies in the Selkirk and Cabinet/Yaak Ecosystems prompted a meeting of 50 law enforcement and management personnel from the U. S. Fish and Wildlife Service, U. S. Forest Service, the States of Montana, Idaho, and Washington, and the Canadian Province of British Columbia on March 21-22, 1989, in Post Falls, Idaho. Of the 11 grizzly bears radio collared in the Selkirk Mountains in Idaho since 1984, 5 have been killed illegally. The meeting was held to develop a coordinated law enforcement and public education program in the area to limit further illegal kills.

Planning continues for the placement of two subadult female grizzly bears in the Cabinet Mountains of northwest Montana in July or August of 1989. The Cabinet Mountains population is estimated to comprise fewer than 15 bears. A local citizens' group has been formed to work with the involved agencies and ensure that local input is part of the program. The citizens' group and the agencies are preparing a question-and-answer brochure on the grizzly and the placement of bears in the Cabinets. The brochure will be distributed throughout northwest Montana. In addition, the citizens' group is preparing a

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slide program for showing to local organizations and schools. It also will present two public forums on grizzly bear augmentation to give citizens the chance to ask questions and express concerns.

* * *

During the fall of 1988, 8,000 Threatened greenback cutthroat trout (*Oncorhynchus clarki stomias*) were moved from the Bozeman Fish Technology Center in Bozeman, Montana, to the State's Bluewater Springs Trout Hatchery in Bridger. The move was prompted by concern about the spread of "whirling disease" in western trout streams. As a precaution, the plan now calls for keeping the greenbacks at Montana's Bluewater facility, which is certified disease-free, during the fall, winter and spring. The fish are scheduled to be released this summer into restored lake and stream habitats in Rocky Mountain National Park, Colorado.

* * *

The Federal Highway Administration and the Service have reached agreement on measures to protect the Mead's milkweed (*Asclepias meadii*), a Threatened plant, from potential impacts of the proposed Lawrence Trafficway on this species' habitat. The project would entail construction of a 14-mile (22-kilometer) highway around the city of Lawrence in eastern Kansas. The original highway alignment would have crossed an area of native prairie known locally as Elkins Prairie. The 70-acre (28-hectare) Elkins Prairie is an excellent example of virgin tall grass prairie and contains the largest known Mead's milkweed populations. The tract also contains habitat for the western prairie fringed orchid (*Platanthera praeclara*), a species proposed for Federal listing in October 1988 (see BULLETIN Vol. XIII, Nos. 11-12).

Consultations among the two Federal agencies and local sponsors resulted in an agreement for highway alignment changes to avoid direct impacts on Mead's milkweed. Concerns about possible secondary impacts due to increased development incentives along the new highway were alleviated through zoning guidelines. This is a fine example of interagency cooperation for protecting listed species while accommodating project goals.

* * *

For many years, Kansas has maintained a significant wintering population of bald eagles but no nesting has ever been documented in the State. The surrounding States of Colorado, Missouri, Nebraska, and Oklahoma have, currently or in the past, reported the nesting of bald eagles. This year, Kansas may be added to the list.

Late this past winter, a pair of bald eagles was observed near a creek arm opening into Clinton Reservoir, a Corps of Engineers flood control facility south of Lawrence. The eagles constructed a nest in a large dead cottonwood tree, and in late March they were observed sitting on the nest in an incubation posture. As of May 2, it was not known if there were eggs in the nest. It is suspected that the birds are first-year nesters and are developing fidelity to the area.

A meeting was held April 11, 1989, with representatives of the Service, Kansas Department of Wildlife and Parks, and Corps of Engineers to discuss how to protect the birds from human disturbance during the critical nesting period. They decided to establish a restricted area 200 yards (183 meters) in radius from the nest. The Corps agreed to place buoys in the reservoir marking the waterward limit of the boundary. For its part, the Service agreed to post signs at boat ramps and other access areas to make the public aware of the presence of the bald eagles, their need to be left undisturbed, and the facts concerning their protection under the Endangered Species Act.

* * *

Scientists from several agencies and educational institutions are teaming up to investigate various aspects of desert tortoise (*Gopherus agassizii*) nutrition in the northeastern Mojave Desert. Cooperating agencies and institutions include the Bureau of Land Management in Arizona and Utah, Arizona Game and Fish Department, Utah Division of Wildlife Resources, U. S. Fish and Wildlife Service, U. S. Forest Service, Colorado State University, and Brigham Young University.

The Beaver Dam Slope population of the desert tortoise in Washington County, Utah, falls within the northeastern Mojave. It was listed in 1980 as Threatened, but it has continued to decrease. Competition with livestock for food plants is one of several factors implicated in the decline. Some biologists estimate that the number of tortoises in this population has fallen over 50 percent since 1980. This continuing decline is believed to be related to long-term changes in range condition and the composition of plant species. The new studies are designed to answer questions relating to the tortoise's nutritional requirements on different habitat sites and under different grazing management regimes. The physiological condition of desert tortoises will be determined through examinations of blood and bone samples, and the nutritional value of several plants they are believed to forage upon will be measured at different growth stages. Livestock-tortoise overlaps in the selection of foraging plants will be examined in the future.

* * *

Region 9 (Washington, D.C., Office)—The Branch of Listing and Recovery, Division of Endangered Species and Habitat Conservation (EHC), is preparing a policy statement on the regulatory definition of "vertebrate population." Under the Endangered Species Act, vulnerable species of plants and animals may be listed as Endangered or Threatened. The Act defined "species" to include subspecies, plant varieties, and distinct populations of vertebrate animals. Precisely defining "vertebrate populations" is necessary because, once listed, populations receive full legal protection under the Act. Over the years, the Service has been petitioned to take action on questionably distinct groups (e.g., "the squirrels in the park") and other entities that some interests want listed, reclassified, or delisted.

More precisely defining vertebrate populations would permit the Service to concentrate its resources on those that clearly need protection. A draft of the policy will be circulated to the Regions soon.

In a related matter, representatives of Regions 1, 2, and 6 are scheduled to meet June 15 in Denver to discuss the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and several other listing candidates. They have requested Jay Sheppard of EHC/Listing and Recovery and Richard Banks of Region 8 to participate in the discussion, which will be used in part to review the draft "vertebrate population" policy. More news about this issue will included in future editions of the BULLETIN.

* * *

EHC/Listing and Recovery is working with the International Association of Fish and Wildlife Agencies to establish procedures for the reporting of "reasonably identifiable" State expenditures (in addition to Section 6 Federal grants) for endangered species conservation. An annual report to Congress on such spending is required under the 1988 amendments to the Endangered Species Act (see BULLETIN Vol. XIII, Nos. 11-12).

* * *

The Service's Interim National Pesticide Consultation Team met at the Region 9 EHC office May 22-26 to work toward completion of the Endangered Species Act/Section 7 consultation on 108 pesticide registrations. The final biological opinion regarding the potential impacts of these chemicals on endangered species is due to the Environmental Protection Agency June 9, 1989. (See feature article in BULLETIN Vol. XIV, Nos. 1-2.) On May 26, regional Section 7 coordinators met at EHC to discuss upcoming consultations on other pesticide registrations.

* * *

The Service has released a videotape presentation entitled "Wetlands in Crisis," which was produced at the direction of Secretary of the Interior Manuel Lujan. The video illustrates the importance of wetland habitats to many animals and plants, including Threatened and Endangered species, and summarizes various activities of the Service, such as the National Wetlands Inventory, wetland restoration programs, and Section 404 permit reviews. "Wetlands in Crisis" will be available soon in each of the Service's regional offices.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	3	1	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	6	0	0	10	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	153	6	1	40	6	2	208	85
TOTAL	360	49	468	108	22	39	1046*	285 **

Total U.S. Endangered 409
Total U.S. Threatened 130
Total U.S. Listed 539

Recovery Plans approved: 245

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
May 31, 1989 36 plants

May 1989 Vol. XIV No. 5

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

June 1989 Vol. XIV No. 6

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

U.S. Bans Ivory Imports for Protection of the African Elephant

photo by Mimi Westervelt

Dr. Iain Douglas-Hamilton, widely regarded as one of the world's leading authorities on the African elephant, has called the decline of this species "...one of the greatest mammalian tragedies of this century."

Following a decision announced by President Bush in his World Environment Day message on June 5, an immediate moratorium on the importation of African elephant (*Loxodonta africana*) ivory into the United States was implemented by the U.S. Fish and Wildlife Service through an announcement in the June 9, 1989, *Federal Register*. The ban applies to imports of raw and worked ivory from all countries, and is aimed at individual souvenirs purchased abroad by tourists as well as large commercial imports. It will remain in effect at least until adequate sustainable harvest levels are determined and enforceable international ivory trade controls are established.

This action was taken in an effort to slow the dramatic decline of the African elephant, which is already listed by the United States as a Threatened species. Estimates of African elephant numbers today range from 550,000 to 700,000, down from 1.5 million just a decade ago. Well-armed poachers are believed to kill 200 to 300 elephants *every day* for their tusks.

A quota system for legal, regulated trade in ivory was authorized a number of years ago under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a treaty to regulate international wildlife trade that has been signed by 102 countries. Unfortunately, however, 80 percent or more of the world's ivory trade is believed to occur illegally, outside of the CITES quota system. With elephant poaching and the ivory trade essentially out of control, there is growing concern about whether or not wild populations of this magnificent species — the largest land animal in the world — will survive into the next century.

On May 12, 1989, the U.S. submitted a formal proposal to move the African elephant from Appendix II of CITES to the more restrictive Appendix I at the next general CITES meeting in October 1989. This would effectively end legal commercial ivory trade among all CITES nations. Because of developing concern that poaching and illegal trade would increase in the time before stronger CITES controls are imposed, the Service decided that an immediate moratorium on imports of ivory into the U.S. was appropriate. The ban was imposed under provisions of the African Elephant Conservation Act of 1988.

By authority of the Act, the Service had already banned importation of ivory from all countries that are not parties to CITES and from Somalia, which is believed to be

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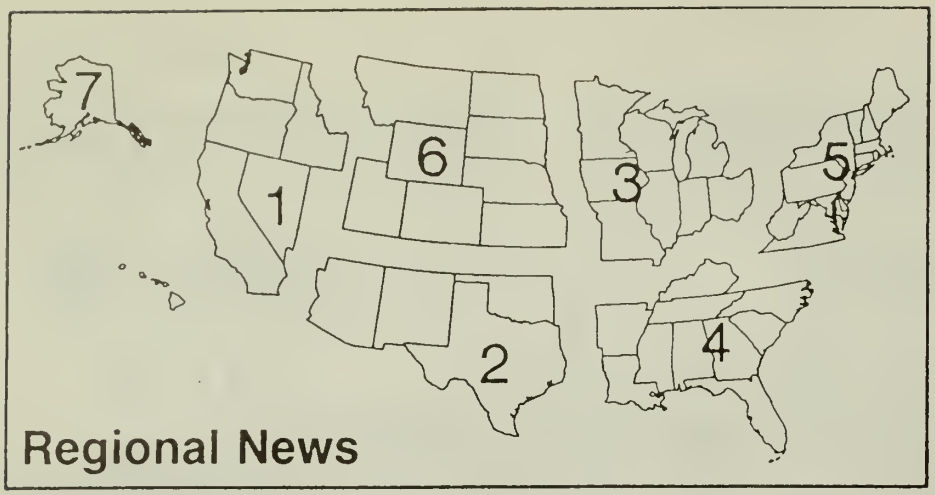

Regional News

Regional endangered species staffers have reported the following news:

Region 2 — A 6-year-old female whooping crane (*Grus americana*) was shipped May 5 from the Patuxent Wildlife Research Center in Laurel, Maryland, to Grays Lake National Wildlife Refuge in Idaho. This bird had been hand-reared, was full-winged, and was of breeding age (but had not paired previously). She was placed in an enclosure within the territory of a wild, foster-reared male whooping crane. The male had previously shown strong parental tendencies by helping a single sandhill crane (*Grus canadensis*) foster parent feed a whooping crane chick through the summer of 1988. The male exhibited interest in the penned female whooping crane. After one week, the female was allowed to leave the enclosure. Dr. Rod Drewien reports that since that time the two whooping cranes have copulated and built a nest. The male enlarged his defended territory and the female assists him in territorial defense.

This is the first evidence of mating in the 15 years of the Grays Lake cross-fostering experiment. One of the theories explaining the absence of breeding until recently is that the cross-species foster-rearing may create improper sexual imprinting. The cross-fostered whooping crane males appear to behave similarly to wild whooping crane males in the Canadian population. The female cross-fostered whooping cranes, however, do not seem to exhibit appropriate behavior. A similar phenomenon has been observed with some raptor species, in which 50 percent of the individuals that are cross-fostered become improperly sexually imprinted on the foster parent species.

* * *

Biologists from the Fish and Wildlife Service's Albuquerque, New Mexico, Field Office, Alchesay National Fish Hatchery, and Mescalero National Fish Hatchery, along with biologists from the U.S. Forest Service, collected 100 Gila trout (*Oncorhynchus gilae*) from South Diamond Creek in the Gila Wilderness of New Mexico. The fish were packed out of the wilderness by mule and then taken to the Mescalero hatchery by truck. The ripe females were hand-spawned at the hatchery and approximately 5,000 eggs were taken. The offspring of these native Endangered fish will be reintroduced in the wilderness streams that have been cleared of non-native trout.

* * *

The Gila Trout/Chihuahua Chub Recovery Team conducted habitat evaluation surveys of several streams and stock tanks (ponds) in the Mimbres River drainage of southern New Mexico. The surveys were conducted in an attempt to locate suitable reintroduction sites for the Chihuahua chub (*Gila nigrescens*). Streams surveyed for this Threatened fish included Gallinas Creek in Noonday and Allie Canyons. Two chubs were taken upstream of San Lorenzo along a reach of river owned by the New Mexico Department of Game and Fish. The Mimbres River downstream of San Lorenzo also was intensively sampled, but no Chihuahua chubs were found.

* * *

A new population of the Endangered Todsen's pennyroyal (*Hedeoma todsenii*) has been discovered by Bureau of Land Management biologists in the Sacramento Mountains of New Mexico. This Endan-

(continued on page 8)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

Steve Robinson, *Acting Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief,*
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, 1002 N.E. Holladay St., Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

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Endangered Species and Florida's Pesticide Program

Linda Walker
Jacksonville, Florida, Field Office

In a far-reaching attempt to protect endangered plant and animal species, the U.S. Fish and Wildlife Service (Service) is working with the Environmental Protection Agency (EPA) to propose needed changes in the regulation of pesticide use. These changes would result in the better management of pesticide use in areas or at times where they may harm endangered species. The regions most likely to see these changes are those with high numbers of aquatic endangered species and large areas of agricultural production, such as the Tennessee-Cumberland Valley and other parts of the southeast, particularly Florida.

As discussed in BULLETIN Vol. XIV, Nos. 1-2, the EPA has developed a national Endangered Species Protection Program to evaluate and, where necessary, control the impact of pesticides on endangered species. Better managing the use of pesticides found harmful to endangered species would be accomplished by distributing map bulletins as part of a pesticide label. These bulletins provide information on the distribution and habitat of the affected endangered species, and require the user to follow the instructions on how, where, and when to apply the chemicals.

Agricultural pesticides are widely considered an economic necessity in Florida, one of the largest producers of winter fruit and vegetables in the United States. Most American consumers have come to demand fruit and vegetables that are uniformly blemish-free and vibrant in color. In order to produce these conditions in large quantities, farmers apply chemicals from planting to harvest. Until consumers begin to accept fruit and vegetables in a more natural condition, the American farmer will feel pressured to use pesticides to compete effectively in the marketplace.

Florida's rapidly expanding population causes agriculture and wildlife to compete for a shrinking amount of available land. Much wildlife habitat is being destroyed, and what remains is often degraded by pesticide and nutrient-laden runoff. Endangered and threatened species are particularly vulnerable to such pollution. Acute impacts of pesticides on wildlife include die-offs and poisonings. Chronic impacts are not immediately noticeable but the consequences are often as significant, such as past episodes of DDT poisoning and eggshell thinning in raptors. In addition to direct impacts, pesticides can affect wildlife in other ways; secondary poisoning resulting from ingesting contaminated food, reductions in food sources, or elimination of habitat (such as aquatic herbicides destroying the nesting substrate of the endangered Everglade snail kite, *Rostrhamus sociabilis plumbeus*, in Florida).

Since most endangered plants and animals do not exist in direct association with agriculture, the potential for conflict usually occurs when pesticides contaminate a downstream water supply or the species inadvertently comes into contact with a poisoned animal. The species affected most by chemicals often are those whose ranges potentially overlap agricultural areas, such as the Everglade snail kite, the San Joaquin kit fox (*Vulpes macrotis mutica*) in California, and the northern aplomado falcon (*Falco femoralis septentrionalis*) in the southwest. In these cases, effects on endangered species from pesticide use need to be addressed only in the area of overlap.

Everglade snail kite feeding her chick at a nest on Loxahatchee National Wildlife Refuge. The first of Florida's "species plans" under its endangered species/pesticide program was written to protect this rare bird.

In 1987, the EPA granted several States permission to develop their own endangered species/pesticide programs. With such individual programs, States can better tailor pesticide regulations to reflect their own unique needs. A State program offering equal or greater protection will supersede the Federal program when approved by both the Service and the EPA.

Florida is one of the States taking a lead in this regard. In 1987, Governor Martinez requested the Florida Department of Agriculture and Consumer Services to set up a task force for developing and implementing its own endangered species/pesticide program. The task force is comprised of more than 60 members and reflects all interested parties, including Federal, State, and local governments, agricultural commodities representatives, and environmental organizations. Florida's State plan resembles the national program in that it intends to use map bulletins to identify restricted use areas; however, it is including several unique features.

For species with highly restricted ranges, such as some endemic plants, the State proposes a landowner contact program. This involves negotiating agreements with landowners who have endangered species on or adjacent to their property. These agreements give protection to the species by better managing certain types of pesticide use and by establishing monitoring programs. In such cases, developing agreements with individual landowners instead of establishing rangewide restrictions keeps the disclosure of endangered species sites to a minimum, thereby preventing potential vandalism and/or illegal collecting.

Another unique aspect of Florida's plan is the development of prototype "species plans." In these plans, basic information about the species' biology is used to develop a program of education, monitoring, and pesticide use. Florida intends to deal with each species separately. The first prototype plan developed was for the snail kite.

Snail kites have a water-dependent breeding cycle. In non-drought years, this bird nests in water conservation areas in the southern part of the State. In drought years, however, these conservation areas become too dry and the birds are forced

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PROPOSED LISTINGS— MAY 1989

Four species—a fish and three plants—were proposed by the Fish and Wildlife Service during May 1989 for addition to the U.S. List of Endangered and Threatened Wildlife and Plants. If these listings are approved, Endangered Species Act protection will become available to the following:

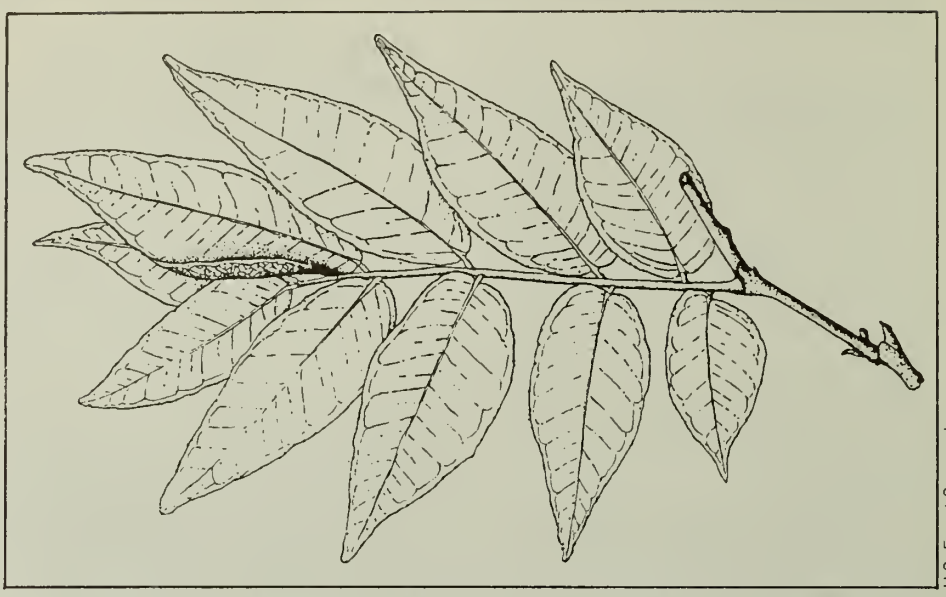
Neosho Madtom *(Noturus placidus)*

Known only from the Neosho (Grand) River drainage, this small midwestern fish currently exists in three populations. One is found in the Cottonwood and Neosho Rivers above the John Redmond Reservoir in Kansas; another occurs in the Neosho River below the reservoir in Kansas; and the third occurs in the Spring River in Missouri and Kansas. The Neosho madtom seems to require riffle areas within clean, relatively shallow rivers with a substratum of loosely packed gravel pebbles less than 1 inch (2.5 centimeters) in diameter.

When the lower Neosho River in Oklahoma was converted to a series of reservoirs, up to a third of the madtom's habitat was eliminated. The Soil Conservation Service (U.S. Department of Agriculture) has proposed to construct as many as 11 small dams within the South Fork watershed of the Cottonwood River. Further, the U.S. Army Corps of Engineers is investigating the possibility of constructing up to 112 small dams within the Cottonwood and upper Neosho River watersheds and reallocating storage in existing Federal reservoirs in the Neosho River basin. All of these proposed projects have the potential to alter and/or reduce flows within the madtom's habitat.

Water quality is another concern. In the past, some parts of the Neosho madtom's habitat were degraded by sewage, industrial effluents, and run-off from livestock feed lots. The Spring River flows through areas that have been mined extensively for lead, zinc, and coal, and the Neosho River flows through numerous oil fields. There is believed to be some potential for future water pollution from any of these sources unless adequate controls can be developed.

The Neosho madtom already is listed by Kansas, Oklahoma, and Missouri under State laws as endangered or threatened. This existing protection would be supplemented and reinforced by the Endangered Species Act if the Service's May 19, 1989, proposal to list the Neosho madtom as Threatened is approved.



U.S. Forest Service drawing

***Stahlia monosperma** is an evergreen tree with alternate, pinnately compound leaves composed of 6 to 12 opposite leaflets.*

Cóbana Negra *(Stahlia monosperma)*

Stahlia monosperma, an evergreen tree that can reach up to 50 feet (15 meters) in height, is endemic to a few sites in Puerto Rico, the nearby island of Vieques, and the Dominican Republic. This member of the pea family (Fabaceae) is the sole species in its genus. It grows only in brackish, seasonally flooded coastal wetlands in association with mangrove communities.

The most significant threat facing *S. monosperma* is habitat destruction. A 1987 survey found that the largest known natural population, located near Boquerón on the southeastern coast of Puerto Rico, numbered only 23 mature trees and 35 seedlings. Construction of residential and tourist development complexes, which would encourage the dredging and filling of coastal wetlands, has been proposed for this region.

Another threat is woodcutting; *S. monosperma* is highly valued for fenceposts and is suited for use in furniture. Seed-

(continued next page)

photo by Joseph T. Collins

The Neosho madtom resembles a small catfish. It reaches a total length of less than 3 inches (7.5 centimeters) and can be distinguished from related species by its mottled markings.

Listing Proposals

(continued from previous page)

lings are vulnerable to trampling or browsing by cattle. Although the status of the Hispaniola (Dominican Republic) population is not as well known, it is presumed to be vulnerable to the same threats. The population on Vieques, consisting of 30 to 40 individuals of various ages, occurs on property of the U.S. Navy.

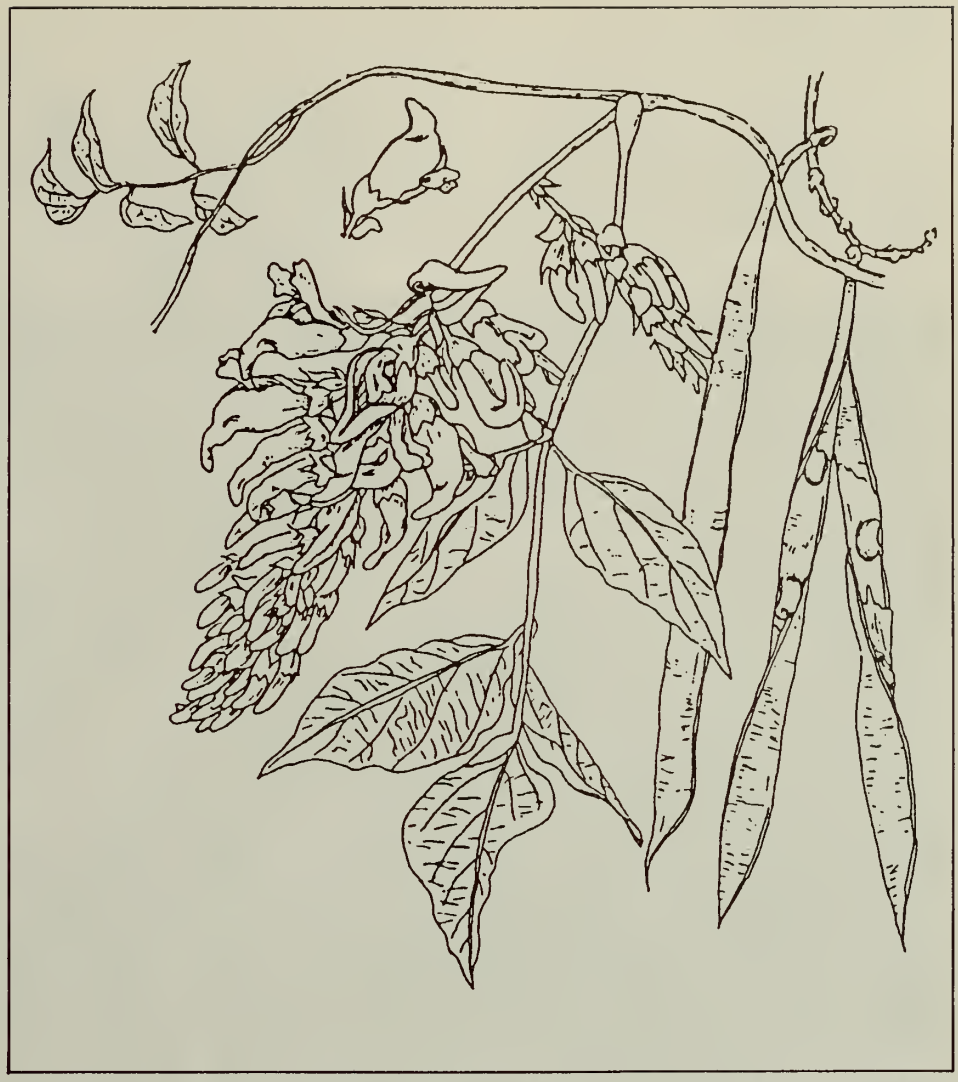
Because plantings of *S. monosperma* have been successful and the Puerto Rico Department of Natural Resources is making efforts to propagate the species, it was proposed as Threatened rather than Endangered (F.R. 5/12/89).

Price's Potato-bean *(Apios priceana)*

Another member of the pea family, Price's potato-bean is a twining perennial vine that grows to about 5.5 yards (5 m) in length. It has pinnately compound leaves and bears compact inflorescenses of greenish-white to purplish-pink flowers. This plant grows from large single tubers that are edible and historically may have been consumed by Indians or pioneers, as was the related *Apios americana* (which has small multiple tubers). *Apios priceana* thus has potential economic significance as a food crop. Moreover, its ability to grow in highly alkaline soils could provide genetic resources for developing *Apios* hybrids with large multiple tubers that can be cultivated in lands that are marginal for most other crops.

Price's potato-bean currently is known to occur in Alabama, Mississippi, Kentucky, and Tennessee. Of the 21 populations reported historically, 13 could be found in recent surveys. One of the apparently extirpated populations was on a national forest in southern Illinois. Only 5 of the 13 known surviving populations contain 50 or more plants. The Service has proposed to list this species as Threatened (F.R. 5/12/89).

Many of the remaining populations are declining because of habitat modification. Price's potato-bean is associated with forests but it does not grow well in deep shade. Instead, it occurs in clearings, open woods, and forest edges. Some populations extend onto adjacent roadside or powerline rights-of-way. Vegetation succession leading to excessive shading is one threat to the species. Price's potato-bean probably benefits from selective logging of its habitat, which opens the forest canopy, but heavy logging or clear cutting apparently has eliminated at least one population and threatens others. Two populations that occur within pastures have been damaged heavily through trampling and soil compaction by cattle. Additionally, habitat on rights-of-way could be degraded by road widening or herbicide applications unless the presence of the species is taken into account.



Price's potato-bean bears compact clusters of flowers that develop into legumes up to about 8 inches (20 cm) in length. Although the beans themselves are not edible to humans, the large tubers may have been a food source for Indians and pioneers.

One population in Tennessee grows on property owned by The Nature Conservancy. Part of the second population in the same State occurs within a conservation area on Tennessee Valley Authority land, but the portion that extends onto a roadside right-of-way is not protected. A third site is on Army Corps of Engineers' property in Alabama. If Price's potato-bean is listed, the Corps will be responsible for avoiding jeopardy to the species. All other populations are on private lands and State rights-of-way.

Bartram's Ixia *(Salpingostylis coelestina)*

A perennial herb in the iris family (Iridaceae), Bartram's ixia produces narrow, grassy leaves about 1 foot (30 cm) in height and bears one or two violet flowers that fade to violet-lavender before they wilt. This species occurs only in six counties of northeastern Florida. Within this region, Bartram's ixia is restricted to moist, relatively open pine flatwoods with a low-growing understory of grasses, herbs, and shrubs. It often grows with pitcher plants, sundews, orchids, and other plants of wet areas.

The low understory vegetation associated with Bartram's ixia is maintained by periodic fires, and this species, which grows from a well-buried bulb, apparently depends on burning to stimulate flower production. In the past 30 years, most of the natural pine flatwoods in northeastern Florida have been converted to pine plantations for pulpwood, and fire has been suppressed. When these densely planted stands mature, there is little understory vegetation.

The open pine flatwood habitat required by Bartram's ixia is vulnerable to several other threats. Some former sites have been converted to pastures, where the

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Ivory Ban

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violating the Act. Up until the recent import ban, the United States imported 10 to 12 percent of Africa's annual ivory exports for piano keys, jewelry, scrimshaw, and other trinkets. About 65 percent of U.S. imports came from Hong Kong, which is the major world ivory dealer and carver. Both the U.S. and Hong Kong are parties to CITES. Japan, another CITES member, is the world's leading consumer of ivory. If the African elephant is moved to CITES Appendix I, legal trade will come to a halt; however, if a CITES member files a reservation, it could then legally ignore the ban. The U.S. has a policy of avoiding such reservations, and it is encouraging all CITES signatories to comply with the will of the two-thirds majority of member nations that is required to make or change a CITES listing.

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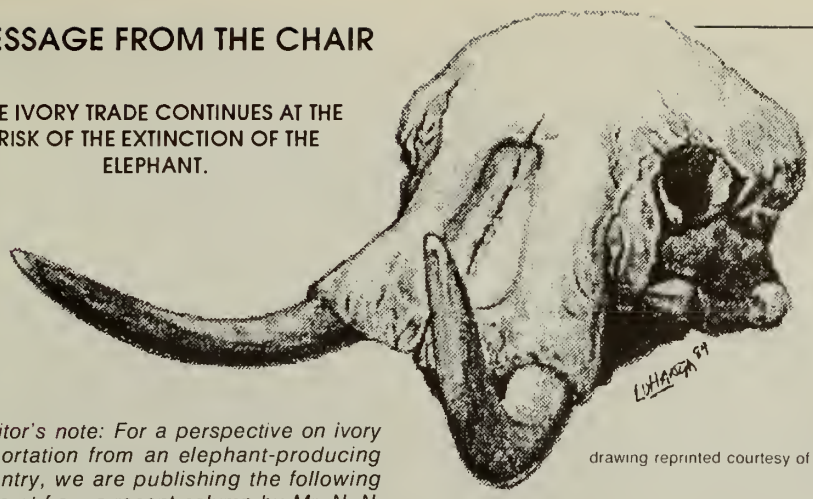
photo by Bill Stewart, courtesy of Animal Welfare Institute

These elephant products are among the illegally imported items that have been confiscated by the Fish and Wildlife Service. An estimated 200 to 300 African elephants are killed every day, most of them by poachers, to satisfy the world demand for ivory trinkets and other products.

MESSAGE FROM THE CHAIR

THE IVORY TRADE CONTINUES AT THE RISK OF THE EXTINCTION OF THE ELEPHANT.



drawing reprinted courtesy of MIOMBO

(Editor's note: For a perspective on ivory importation from an elephant-producing country, we are publishing the following excerpt from a recent column by Mr. N. N. Kitomari, Deputy Governor General of the National Bank of Tanzania. Mr. Kitomari writes as Chairman of the Steering Committee for the Wildlife Conservation Society of Tanzania. The full column was published in MIOMBO, the Society's quarterly newsletter.)

Recent studies have established that ivory poaching has reduced the elephant populations in East Africa by half in less than a decade. The same story is repeated for the rest of Africa except parts of southern Africa where rigorous management has actually made it possible for the elephant numbers to increase. Over much of the east and central Africa, elephants are so heavily poached, even in previously secure sanctuaries such as Selous, Tsavo, and the Luangwa Valley, that it will not be long before the elephant is extremely rare or even extinct. There is little doubt that short-term profit-motivated poaching is responsible for the enormous decimation of the large herds of elephants. Conservation organizations of the world are now demanding immediate enlightened action, strong political will, and a high degree of international cooperation to avert a disaster.

Africa alone cannot find a solution to this crisis. International cooperation is needed now to combat both the poaching and the international demand for ivory because the two go hand in hand. Without the demand for ivory, there would be no poaching! While we would praise the efforts of CITES, none of the methods proposed would come anywhere near stopping illegal trafficking in ivory when the market is so large and insatiable. The only way countries can help to protect elephants is to close down the enormous international market that creates such a huge demand for ivory.

African governments have been responsible enough to set aside sufficient protected areas to afford the African elephant a home even against competing land-use demands, they spend an inordinately large amount per capita on elephant protection, and many are party to CITES. They have participated in efforts to establish and implement such controls as the Ivory Export Quota, which was adopted in 1985 and has been in force since 1986. This is all well and good with regard to legitimate ivory; what of illicit trafficking?

Over the short space of 3 years that the ivory export quota has been in operation, 7,641 pieces of ivory weighing some 35 tons have been intercepted on the way to the illegal market from Tanzania alone! If we accept the premise that this represents no more than 20 percent of ivory smuggled out of the country each year, that means 38,206 pieces (176 tons) representing some 10,000 elephants. Is it any wonder therefore that the elephant is seriously threatened?

The elephant is more important on account of its role in shaping habitats and maintaining biological diversity. Elephants need a far larger range than many other species and they occur across most habitats in Africa from desert through savanna and wooded grassland to forest. We recognize too that the elephant appeals to the emotions and sympathy of people of all ages and has an enormous value and an economic role to play in the tourist industry.

Consider this for a moment: the United States, Western Europe, and Japan consume close to two-thirds of the world's "worked ivory" between them. If they were concerned enough as parties to CITES to agree to the appeal and prohibit importation of all ivory without exception, the present enormous demand for ivory would cease: in turn, poached ivory would not find a market, or at any rate not at current prices. Ivory poaching would become less lucrative. And CITES, the one instrument of international standing available, can do it. CITES parties should impose a worldwide ban on the ivory trade to stop the convention being used to channel hundreds of tons of illegal ivory into legal trade.

MIOMBO is distributed quarterly to members of the Wildlife Conservation Society of Tanzania. Persons interested in becoming members are invited to write the Society at P.O. Box 70919, Dar es Salaam, Tanzania. For overseas membership, enclose a check made out to the Society for $10 (U.S.).

Ivory Ban

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Due to the failure of international efforts to manage a legal trade in African elephant ivory through the CITES quota system, at least seven African nations also have called for a halt in all international ivory trade. Four of these nations — Tanzania, Kenya, Gambia, and Somalia — have submitted their own proposals to move the African elephant from CITES Appendix II to Appendix I.

On June 15, 1989, the government of Japan announced a ban on the importation of worked and "semi-worked" ivory and a ban on all raw ivory shipments that do not originate directly from an ivory-producing country under the auspices of the CITES ivory quota system. This is an interim measure that became effective June 19 and is intended to remain in effect at least until the October 1989 CITES conference.

The U.S. ivory moratorium does not prohibit sport hunters from importing trophies of African elephants legally taken in the country of origin, provided that the country has a CITES ivory export quota and has issued the appropriate export permits. Legal sport hunting has not been a significant factor in the elephant's decline. The license fees and other expenses associated with legal sport hunting are believed to contribute to wildlife management programs and give African countries an additional economic incentive to maintain huntable herds.

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A separate petition to reclassify the African elephant under the Endangered Species Act from its current classification as Threatened to the more critical category of Endangered was sent to the Service on behalf of 36 wildlife protection organizations on February 16, 1989. The petition contained supporting information that the status of the elephant has deteriorated substantially since it was listed as Threatened and that current ivory trade controls are not arresting the decline. After review of the petition, the Service published a finding that the reclassification may be warranted (F.R. 5/9/89). A full status

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Regional News

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gered plant formerly was known from only one small population on the White Sands Missile Range. Todsen's pennyroyal plants are being propagated at The Arboretum at Flagstaff and at the University of New Mexico for basic biological study and possible planting in native habitat. The discovery of a second natural population greatly enhances prospects for recovery of this species.

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The Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) population has continued to decline due to the failure of the squirrel's primary food crop (spruce and fir seeds) in 1988. The population in April was estimated to range from 148±59 to 99±53, down from the October 1988 estimates of 226±62 to 178±62. Surveys will be conducted to verify the April estimates and check other areas. The U.S. Forest Service, Arizona Game and Fish Department, and Fish and Wildlife Service will closely monitor the 1989 spruce and fir cone crops in the Pinaleno Mountains.

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The Service is cooperating with the U.S. Army to protect the Sanborn's long-nosed bat (*Leptonycteris sanborni*) and its habitat on Fort Huachuca, Arizona. Cursory surveys in April 1989 documented the recent presence of this Endangered bat on the base with the recovery of a mummified specimen from a mine cave used by recreationists. Portions of Fort Huachuca have dense stands of *Agave palmeri*, a prime food source for this bat. Management of controlled burns, tank training exercises, firing range activities, and recreational access to the caves and mines on the base will be needed to preserve the bat's habitat.

* * *

The Tulsa, Oklahoma, Ecological Services Field Office has begun the third year of a program to improve public awareness and appreciation of the interior least tern (*Sterna antillarum*), an Endangered bird. An estimated 700-800 least terns nest at scattered beach habitats throughout Oklahoma. Publicity has focused on tern colonies on the Arkansas River in the Tulsa metropolitan area, which account for almost one-third of the 200 breeding adults on the river in Oklahoma. "Area Closed" signs, interpretive signs, occasional tern tours, volunteer monitoring of colonies, and media coverage form the core of the program. Television, newspaper, and radio coverage has increased over the years, with positive public response. Increasing emphasis will be placed on reaching people in rural areas where the majority of terns nest.

A pamphlet on the tern has been developed jointly by the Service and the Oklahoma Department of Wildlife Conservation. Ten thousand copies will be mailed soon to Service offices and State conservation agencies throughout the tern's range for distribution to the public.

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Region 4 — North Carolina Wildlife Resources Commission biologists, with funding by an Endangered Species Act-Section 6 grant, recently found four juvenile Tar River spiny mussels (*Elliptio* (*Canthyria*) *steinstansana*) in a tributary of the Tar River in North Carolina. These specimens were collected at one shoal and they represent the greatest concentration of this Endangered species observed in recent years. The Service's Raleigh Field Office, in conjunction with the Commission, is working with the Farmers Home Administration to protect part of the riparian habitat along this tributary through provisions of the Food Security Act of 1985 ("Farm Bill"). This tributary is the only known current habitat of the species, and riparian zone protection is critical to its survival.

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The Service has acquired approximately 124 acres (50 hectares) at Logan Cave in Benton County, Arkansas, to protect the second largest gray bat (*Myotis grisescens*) maternity colony in Arkansas and the second largest population of Ozark cavefish (*Amblyopsis rosae*) anywhere. Many other rare but little known animals will benefit from this acquisition, including a recently described troglobitic crayfish (*Cambarus aculabrum*). This crayfish is known from Logan Cave and only one other site. The property will be managed as a satellite unit of Hollow Bend National Wildlife Refuge.

* * *

The Service's Jackson, Alabama, Field Office has been working with the U.S. Forest Service to conserve the pondberry (*Lindera melissifolia*), an Endangered plant found within the Delta National Forest in Mississippi. The Forest Service has taken an active role in the conservation of this species, which is particularly significant since the Forest is believed to support the species' largest known population. To date, the Forest Service has located 12 colonies. Disjunct populations of this species occur at two other sites in Mississippi and in Arkansas, Georgia, North Carolina, and South Carolina. The Forest Service is protecting all sites within Delta National Forest and is continuing with surveys for additional sites. Eventually, a monitoring program will be established for selected sites in the Forest to gain a better understanding of this species' biology and habitat requirements.

* * *

Region 5 — The piping plover (*Charadrius melodus*) is the target of increasing attention in Region 5. The Atlantic coast population of this beach-nesting bird is listed as Threatened. Among the recovery efforts under way are increased public education and protection during the nesting season. A 5-minute videotape on the plover's life history and the threats to its survival can be obtained from the Region 5 Public Affairs Office.

Packets of information about the piping plover have been sent to about 250 property owners on a barrier island off the Virginia coast that is experiencing increasing development. These packets include guidelines on measures that landowners can take to protect plovers on their property. State and Federal law enforcement agents will increase their efforts on this island during periods of high public use, such as Memorial Day and the Fourth of July, when plovers are subject to greater disturbance.

Region 5 is preparing a proposal to designate Critical Habitat for the Atlantic coast population of the piping plover. In other news relating to the plover and Section 7 of the Endangered Species Act, a consultation with the Army Corps of Engineers regarding an application for a construction permit has been completed. The applicant is seeking a permit to build a community pier facility on Cedar Island, Virginia. This barrier island is relatively undeveloped and is accessible only by boat. The community pier would facilitate access to the island, thereby promoting vehicular traffic, construction of more summer homes, and other human impacts. In its Biological Opinion, the Service found that the pier and associated human impacts would likely jeopardize the plover by adversely modifying nesting habitat and reducing plover survival. In cooperation with the applicant, the Service came up with "reasonable and prudent alternatives" that should avoid jeopardizing the plover. One such measure is for the developer to operate a private taxi service to reduce demand for unrestricted use of private vehicles on the island. Others include plover monitoring

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Ivory Ban

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review is under way. The public has 90 days to provide information or comments (address them to the Office of Scientific Authority, ARLSQ Room 725, U.S. Fish and Wildlife Service, Washington, D. C. 20240), after which the Service will decide whether or not to formally propose a reclassification. If the African elephant is ultimately moved to the category of Endangered, the ban on ivory imports would become permanent and would be extended to include trophies taken in legal sports hunts. Interstate trade without a permit also would be prohibited.

Although a moratorium on imports by the U.S. alone will not stop the world ivory trade, the Service hopes that its leadership will influence other countries to take similar protective actions.

Regional News

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and nest posting surveys throughout the nesting season and plover protection measures by the landowners who use the pier facility.

* * *

Region 6 — The gray wolf (*Canis lupus*) recovery effort in the northern Rocky Mountains is under way with the addition of three Service biologists to the Fish and Wildlife Enhancement Office in Helena, Montana. Dr. Steve Fritts is the Wolf Management Coordinator for the Montana, Greater Yellowstone Ecosystem, and Central Idaho Recovery Areas. Dr. Fritts transferred from the Patuxent Wildlife Research Center in Maryland, from where he supervised the Minnesota wolf recovery effort and other endangered species programs. Mr. Ed Bangs, the project leader directing wolf recovery in Montana, transferred from Kenai National Wildlife Refuge in Alaska, where he worked as a wildlife biologist managing ungulates and predators. Mr. Joe Fontaine, a wildlife biologist who recently transferred from the Bureau of Reclamation in Bismarck, North Dakota, is also working on wolf management in Montana.

The initial strategy for wolf recovery in Montana will be to establish a three-phase wolf monitoring system. The initial phase will be the collection and confirmation of wolf sightings using an organized system of observers from State and Federal agencies and local Indian tribes. The second phase will be to survey an area from which a high number of sightings have been reported to determine if a pack does exist. If a pack is located, the third phase will be to trap and radio-collar several individuals of the pack to document pack establishment. Kits are being developed by the Fish and Wildlife Service, in cooperation with the National Park Service and U.S. Forest Service, to guide in obtaining competent sightings. The kits also will be used as an educational tool for schools and conservation organizations.

* * *

In March, a female gray wolf was killed illegally north of the town of Yaak in northwestern Montana. It is believed that the female wolf dispersed from the "Camas" pack near Glacier National Park. The Camas pack consisted of members of the original "Magic" pack, which in 1983 became the first pack known in recent years to be active in northwestern Montana. The female had been in the area north of Yaak since October 1988 and may have been waiting for a mate to establish a territory. The loss of this wolf has slowed recovery efforts by reducing reproductive potential and possible establishment of a new pack. State and Federal law enforcement officials are working together to solve the case.

In April, a male wolf was killed illegally by a sheep rancher about 30 miles (48 kilometers) west of Kalispell. Apparently, the rancher thought it was a coyote when he shot the animal. He subsequently turned himself in, and the case is now under investigation by the Service.

* * *

Region 8 (Research)— According to a January 1989 survey by biologists from the Patuxent Wildlife Research Center's Hawaii field station, approximately 3,500 palilas (*Loxioides bailleui*), an Endangered bird, survive on the upper slopes of Mauna Kea. This is a decrease of almost 20 percent from the 1988 estimate of 4,300. Five active palila nests had been found through mid-May.

* * *

The National Ecology Research Center has begun a study to determine the role of food availability in the population biology of piping plovers nesting along the Platte River in central Nebraska. The Service will use the results of the study to determine management options for the bird.

* * *

As of June 7, there were 34 adult Puerto Rican parrots (*Amazona vittata*) in the wild and 9 chicks (5 of which had fledged). The Luquillo aviary has a total of 52 parrots, including 46 adults and 6 chicks.

* * *

Region 9 (Washington, D.C. Office) —After reviewing comments from the Environmental Protection Agency (EPA) and the Department of Agriculture, the Service has issued a final Biological Opinion on the potential impacts to 165 listed species from the registration of 112 pesticides. (For background on this subject, see BULLETIN Vol. XIV, Nos. 1-2.) The Biological Opinion was prepared by a task force of Service field, Regional, and Washington Office specialists. It presents information on a chemical as well as species basis, and it includes improvements on the handling of incidental take, reasonable and prudent measures, amd consistency in the analysis of chemical data. Implementation of the Biological Opinion should afford listed species needed protection from a variety of pesticides that are already in use through restrictions on their application. The EPA is committed to implementation as soon as reasonably possible.

See next month's BULLETIN for more news on the Biological Opinion.

* * *

Division of Endangered Species and Habitat Conservation (EHC) staff conducted three workshops during the week of May 15 on Section 10/404 permits, Farm Bill (Food Security Act) conservation activities, and the Emergency Wetland Resources Act. Discussion topics included the importance of these activities to protecting and recovering threatened and endangered species. Numerous Washington, Regional, and field office staffers attended.

Participants in the Section 10/404 Permits Workshop discussed new developments related to wetlands and wetland regulation, the new *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*, and future priorities. Those attending the Farm Bill Workshop exchanged information on wetland restoration plans for 1989, identified common problems and solutions with "Swampbuster" and Farmers Home Administration activities, and considered the need for a second national Farm Bill workshop. Participants in the Emergency Wetlands Resources Act Workshop discussed implementation of the Act, initiated the development of Regional Wetland Concept Plans, and outlined methods for interacting with the States to develop State Wetland Conservation Plans under the Statewide Comprehensive Outdoor Recreation Plans program.

* * *

On May 18, two staff members of the Environment Administration of the Republic of Korea visited the EHC staff. Ms. Koo A-Mi and Ms. Lee Cheong-mi are part of

(continued on page 11)

Condor Population Continues to Grow

A total of four California condor *(Gymnogyps californianus)* eggs have hatched this year, the latest on June 6. All four chicks are healthy and doing well. No others are expected this breeding season. The total California condor population now stands at 32 birds, all of them in captive breeding flocks at the San Diego Wild Animal Park and the Los Angeles Zoo.

On May 24, an Andean condor (*Vultur gryphus*) egg hatched at the San Diego Wild Animal Park. This chick is being cared for by two California condors, AC4 and UN1, who are the parents of three of the captive-conceived chicks. This is the first Andean condor chick to be cared for by California condors. It is being done as an experiment to test the parental skills of the captive California condors. This Andean condor will be released in South America within the next year.

The Andean condors that were shipped to Colombia from captive breeding facilities in the United States earlier this year arrived at their new home safe and sound. As of early June, the birds were in their hack box outside of Bogota, adjusting to their new surroundings. Two Service biologists are observing and assisting the Colombian biologists.

Final Listing Rules Approved for Three Mammals

During May of 1989, Endangered Species Act protection was extended to two Florida subspecies of beach mice and to the Chinese river dolphin:

Two Florida Beach Mice

The Anastasia Island beach mouse historically ranged along the Atlantic coastal dunes from the mouth of the St. Johns River south to the end of Anastasia Island. A recent survey located the mouse only on Anastasia Island, where its remaining habitat is fragmented and its populations are small. Viable populations may remain only at the ends of the island, along the publicly owned dune grasslands of Anastasia State Recreation Area, and at Fort Matanzas National Monument. Much of the mouse's habitat has been developed for houses and condominiums. A proposed bridge replacement across the Matanzas Inlet could adversely affect the mouse's habitat in the monument area. Competition from house mice (*Mus musculus*) and predation from house cats (*Felis catus*) also pose a threat to the beach mice.

The southeastern beach mouse, a related subspecies, formerly occurred on the Atlantic beach dunes from Ponce (Mosquito) Inlet south to Hollywood Beach, Florida. Today, this mouse is common only at Cape Canaveral and is found in smaller numbers at Cape Canaveral National Seashore (where beach erosion may soon threaten its habitat). Only a few small, fragmented populations remain from Sebastian Inlet to Hutchinson Island. Beachfront development has destroyed or severely disrupted the mouse's habitat in the southern part of its range and the subspecies no longer occurs in this area. House cats also may pose a serious threat.

The Fish and Wildlife Service proposed listing the Anastasia Island beach mouse as Endangered and the southeastern beach mouse as Threatened in the July 5, 1988, *Federal Register* (see BULLETIN Vol. XIII, No.8), and the final rule was published May 12, 1989.

(continued bottom of next page)

Pesticide Program

(continued from page 3)

to move northward into central Florida to feed and nest. It is during drought years that the snail kite comes in closer contact with agriculture. We hope that, by monitoring the water levels within the conservation areas, we can anticipate when snail kites will move into drought areas. At such times, the plan's pesticide use program will go into effect in these areas. At other times, when the snail kites are back in the water conservation areas, applications of pesticides in central Florida should not affect this species. The Florida task force plans to develop the next prototype plan for another bird, the wood stork (*Mycteria americana*).

photo by Alexander Sprunt, IV

The wood stork will be the subject of Florida's next species plan.

Florida plans to develop its own education program to inform pesticide users about the potential impacts of their activities on endangered species. The task force believes that if users are aware of endangered species and their needs, they are more likely to comply with protective use programs. The Florida Department of Agriculture and Consumer Services also has received a substantial grant from the EPA to develop a computer mapping system for endangered species in Florida. This program allows pesticide users to spot potential problems before they arise. By overlapping agricultural use areas with endangered species distributions, regulators can foresee potential problems.

The Jacksonville, Florida, Field Office of the U.S. Fish and Wildlife Service is represented on the Governor's Task Force. So far, the Service has assisted in the preparation of endangered species distribution maps and the prototype snail kite plan. By providing assistance at this early planning stage, the Service can ensure that the programs established will provide as much protection as possible for endangered species while minimizing the effects on pesticide users.

(For more on the endangered species/pesticide consultation, see the Region 9 section of Regional News in this BULLETIN.)

Listing Proposals

(continued from page 5)

plants do not survive, or developed for a variety of purposes. Road construction and urbanization could eliminate populations of the plant in the rapidly growing Jacksonville area.

Florida already considers Bartram's ixia a threatened species under State law and it will be reclassified to endangered (effective October 1, 1989). If the Service's May 19, 1989, proposal to list the plant federally as an Endangered species is approved, the provisions of the Endangered Species Act will offer additional protection.

* * *

Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are not legally binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

photo by David Martin

Bartram's ixia produces one or two violet flowers about 2 inches (5 cm) across from April to late June.

Final Listings

(continued from previous page)

Chinese River Dolphin *(Lipotes vexillifer)*

The Chinese river dolphin is found primarily in the lower and middle sections of the Chang Jiang (Yangtze) River in the east-central region of mainland China. The dolphin was originally proposed for listing as an Endangered species by the National Marine Fisheries Service in the May 18, 1988, *Federal Register* (see BULLETIN Vol. XIII, Nos. 6-7). Over the last 35 years, increasing industrial activity, boat traffic, and exploitation of fish resources have combined to degrade the Chinese river dolphin's habitat. Reduction in prey availability due to loss of important nursery areas, overfishing, and pollution also may have played an important role in the dolphin's decline. Other factors adversely affecting the species include accidental entanglement in fishermen's bottom longlines, incidental entrapment in fish traps and gillnets, and explosions associated with construction projects and illegal fishing. The final rule listing the species as Endangered was published May 30, 1989.

Regional News

(continued from page 9)

the Korea national flora and fauna survey program at the National Ecosystem Research Center, which is modeled after a similar project in Japan. Korea is starting to establish a preserve system and an inventory of species (both common and rare). Korea is not a party to CITES.

The purpose of the biologists' visit was to obtain background information on how the U.S. Endangered Species Act and implementing programs work. General topics discussed included listing and recovery activities; protection of listed species from take and trade; habitat protection; Federal aid to the States; import and export permits; cooperative international activities; research; and the organizational structure that carries out these functions.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	3	1	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	6	0	0	10	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	153	6	1	40	6	2	208	85
TOTAL	360	49	468	108	22	39	1046*	285 **

Total U.S. Endangered **409**
Total U.S. Threatened **130**
Total U.S. Listed **539**

Recovery Plans approved: 245

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
June 30, 1989 36 plants

June 1989 Vol. XIV No. 6

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U S Fish and Wildlife Service, Washington, D C 20240

July 1989 Vol. XIV No. 7

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Protection Proposed for the Northern Spotted Owl

The northern spotted owl (*Strix occidentalis caurina*) was proposed recently by the Fish and Wildlife Service for listing as Threatened (F.R. 6/23/89), reversing an earlier finding that a listing proposal for this bird was not warranted.

The Service revised its position on listing the spotted owl after a long and careful analysis of all available scientific information. This was the first rangewide analysis ever conducted on the northern spotted owl and it resulted in a level of knowledge that was not available in 1987 when the previous decision was made. The Service believes that more information is available now on the spotted owl than on almost any other species ever considered for listing under the Endangered Species Act.

One of three subspecies of the spotted owl, *S. o. caurina* ranges from northwestern California to southwestern British Columbia, Canada. It is primarily an inhabitant of natural old growth and mature coniferous forests of the Pacific Northwest. The Service is concerned that, due to extensive habitat modification and other factors, this subspecies has declined to a vulnerable status. At least 1,500 breeding pairs and an undetermined number of unpaired birds are believed to remain within Washington, Oregon, and California, and another 50 owls may occur in British Columbia.

U.S. Forest Service photo

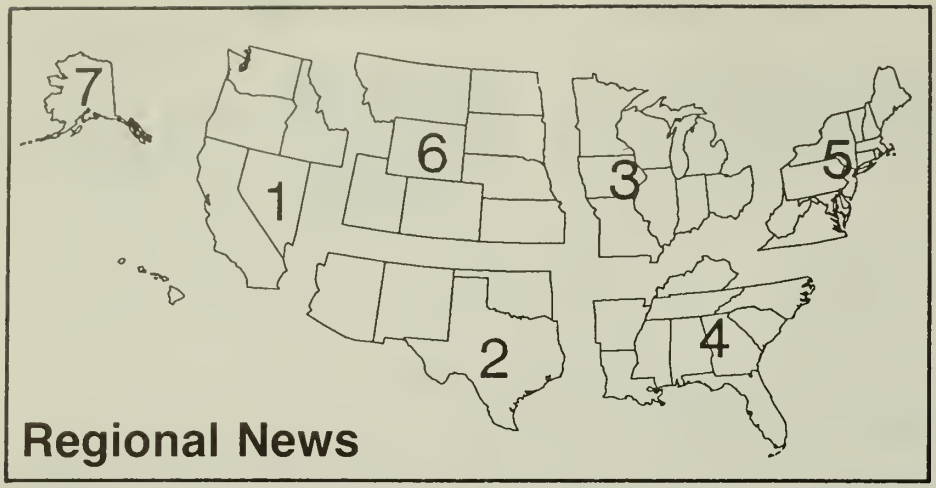
northern spotted owls as they appear before they attain their distinctive spotted plumage

Conserving the owl and its habitat is a very complicated issue because of competing values placed on old growth forests. Numerous lawsuits affecting the timber industry and Federal land management agencies are in progress. Although most public interest has focused on differences over how much of the remaining old growth forest to preserve and how much to log, the Service's decision will relate specifically to the status of the northern spotted owl. Under the Act, the Service is required to make its final decision on whether to list the owl or to withdraw the listing proposal solely on the basis of the best available scientific information. The decision must be made within 12 months unless there is substantial disagreeement among specialists regarding the accuracy or sufficiency of the supporting data; in such cases, a 6-month extension is allowed.

If the listing does become final, Federal agencies will be required under Section 7 of the Act to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of the spotted owl. Approximately 90 percent of the subspecies' remaining old growth habitat occurs on lands administered by the U.S. Forest Service, Bureau of Land Management (BLM), and National Park Service. Because of their extensive timber sale operations, the BLM and the Forest Service would probably need to enter into Section 7 consultations with the Fish and Wildlife Service to ensure that their activities will not jeopardize the spotted owl.

All interested individuals, agencies, and organizations are invited to provide written comments on the listing proposal or to provide additional status information. Comments are due to the Listing Coordinator, U.S. Fish and Wildlife Service, 1002 NE Holladay Street, Portland, Oregon 97232, by September 21, 1989. The Service held public hearings on the proposal in Portland, Oregon (August 14); Redding, California (August 17); Olympia, Washington (August 21); and Eugene, Oregon (August 28). The purpose of these hearings was to provide an opportunity for the public to present oral comments on the proposal.

Details on the proposal to list the northern spotted owl as Threatened are available in the June 23, 1989, *Federal Register*. An article examining the complex spotted owl/old growth issues is being prepared by the Service's Portland Regional Office, which is taking the lead in the listing proposal, and will appear in an upcoming edition of the BULLETIN.



Regional News

Regional endangered species staffers have reported the following news:

Region 2 - Dr. E. 0. Garton, a biometrician from the University of Idaho, recently completed an evaluation of the whooping crane (*Grus americana*) population at Grays Lake National Wildlife Refuge, Idaho. Entitled "Survival rates and population prospects of whooping cranes at Grays Lake NWR," the report includes projections of population growth under various assumptions. Survival of the Grays Lake birds in all age categories is significantly lower than survival of the Wood Buffalo National Park (Canada) population. Dr. Garton modeled the population growth by using the existing female survival rates, assuming females would eventually breed at the same rate as the Canadian population, and assuming that first year survival would be similar to that in Canada. Despite these unrealized assumptions, with the addition of 30 eggs per year the population would reach only 6 breeding pairs in 50 years.

* * *

Booming ground surveys indicate that the Attwater's greater prairie chicken (*Tympanuchus cupido attwateri*) population is now comprised of only 432 individuals, down 53 percent from the 1988 total of 926. The decline is believed to be a consequence of poor chick rearing conditions in 1988 (hard spring rains and summer drought) and overgrazing (which removed food and escape cover so that the chickens were vulnerable to avian predators during winter). The recovery team recommended acquiring a second refuge primarily for these prairie chickens and establishing a captive propagation program. The Texas Parks and Wildlife Department is beginning the propagation program using Endangered Species Act-Section 6 funding.

* * *

Eight to 13 thick-billed parrots (*Rhynchopsitta pachyrhyncha*) were observed in the Chiricahua Mountains of Arizona this spring. One of the wild fledglings of 1988 is still with the flock. Several other birds have been reported periodically from central and eastern Arizona and western New Mexico. During April and May, observations indicated that some pairs were apparently preparing cavities for nesting efforts.

* * *

During a multi-agency cooperative effort, about 1,800 humpback chub (*Gila cypha*) were captured in the Little Colorado River. About 450 of these Endangered fish received the new passive-integrated transponder (PIT) tab. Monitoring the tagged fish will help biologists understand the habitat requirements of this critical population.

* * *

The sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*), a dwarf *Astragalus*, occurs on Kaibab limestone pavement on the very edge of the South Rim of the Grand Canyon. The only known population of this Category 1 listing candidate contains fewer than 500 plants. The species' Latin name beautifully describes its location: *cremnophylax* means "watchman of the gorge." Because the plants are threatened by trampling from park visitors, the National Park Service plans to construct a fence around the population. Personnel of Grand Canyon National Park and the Fish and Wildlife Service will cooperatively

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

John Turner, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief,*
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, 1002 N.E. Holladay St., Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U S Virgin Islands **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming **Region 7:** Alaska **Region 8:** Research and Development nationwide **Region 9:** Washington, D C . Office

THE ENDANGERED SPECIES TECHNICAL BULLETIN is published monthly by the U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240.

Final Listing Rules Approved for Two Species

During April 1989, final listing rules were published for two species, bringing Endangered Species Act protection to the following:

Dwarf-flowered Heartleaf (*Hexastylis naniflora*)

This low-growing herbaceous plant in the birthwort family (Aristolochiaceae), has dark green, heart-shaped leaves and small, inconspicuous jug-shaped flowers that are usually beige to dark brown in color. The plant grows in acidic soils along bluffs and hillsides in boggy areas next to streams, and along ravines in the upper piedmont of North and South Carolina. Much of the habitat that the dwarf-flowered heartleaf prefers has been altered by conversion to peach orchards and pastures, destroyed by housing construction, or flooded by impoundments. Only 24 populations are known to occur in an 8-county area, and only 4 of these sites receive some protection. The Fish and Wildlife Service proposed on April 21, 1988, to list the dwarf-flowered heartleaf as Threatened (see BULLETIN Vol. XIII No. 5), and the final rule was published on April 14, 1989.

Magazine Mountain Shagreen (*Mesodon magazinensis*)

The Magazine Mountain shagreen is a dusky brown or buff colored land snail with a shell approximately 0.5 inches (13 millimeters) wide and 0.3 inches (7 mm) high. Its entire range is within the Ozark National Forest. More specifically, the snail is known to occur in small numbers only on rock slides on the north slope of Magazine Mountain in Logan County, Arkansas. Because of its limited range, the snail is vulnerable to collecting and to any adverse habitat modification. Recreational developments or activities, military training exercises, and forestry activities are potential threats to the species if they occur on the north slope of the mountain. The Service proposed the Magazine Mountain shagreen for listing as a Threatened species on July 5, 1988 (see BULLETIN Vol. XIII No. 8), and the final rule was published in the April 17, 1989, *Federal Register*.

Regional News

(continued from previous page)

develop a management strategy for this species.

* * *

Threats and recovery needs for the Mesa Verde cactus (*Sclerocactus mesaeverdae*) are being evaluated through intensive monitoring by the States of New Mexico and Colorado. The work, which is in its third year, is being supported with Section 6 funds. Plots measuring 330 x 660 feet (100 x 200 meters) have been established, and the locations of all cacti within the plots have been determined by triangulation from corner stakes. Size and reproductive status are measured annually for each plant.

photo by Kenneth D. Heil

Mesa Verde cactus

In one of the plots, numerous juveniles, whose locations were carefully mapped, occurred around several adult plants. Tracking survivorship of the juveniles will give investigators a better understanding of natural reproductive success in these cacti. The study is documenting the extremely slow growth of this Threatened cactus. Most plants have shown no increase in size in the past 3 years. Thus, any large Mesa Verde cacti are probably very old.

* * *

A group of biologists from the U.S. Forest Service, New Mexico Department of Game and Fish, and U.S. Fish and Wildlife Service checked Gila trout (*Salmo gilae*) populations in Iron Creek, part of the Gila Wilderness. Brown trout (*Salmo trutta*) encountered during the work were removed. No juvenile brown trout were discovered, and it is hoped that all adults of this non-native species have been removed from this creek.

* * *

A new population of lemon lily (*Lilium parryi*), a Category 2 listing candidate, was discovered in Arizona by an employee of the Fort Huachuca Military Reservation. Although it is more common in California, the lemon lily occurs in only five sites in Arizona, including the newly discovered site.

* * *

Region 3 - The southeastern bat (*Myotis austroriaparius*) is listed by the Service as a Category 2 listing candidate and by the State of Illinois as endangered. To learn more about the summer roosting and foraging ecology of this bat, the Illinois Natural History Survey and the Illinois Department of Conservation have embarked on a 2-year research project. With support from the Illinois Department of Transportation, the U.S. Forest Service, and the U.S. Fish and Wildlife Service, researchers are attaching miniature radio transmitters to southeastern bats and monitoring their movements. Thus far, three lactating females have been captured over the Cache River in extreme southern Illinois and equipped with transmitters. After 2 days and nights of diligent searching, the maternity roost was discovered within the hollow trunk of a living tupelo gum (*Nyssa aquatica*) in a cypress swamp more than 8 miles (5 kilometers) from the original capture site. Fortunately, this swamp, known as Heron Pond-Little Black Slough Nature Preserve, has been protected under Illinois Department of Conservation management since 1971.

Successfully avoiding numerous native cottonmouth snakes (*Agkistrodon piscivorus*), researchers conducting exit counts at dusk have determined that the bat colony contains just over 100 adults, all of which are presumed to be females. Each female could produce two young because southeastern bats, unlike other members of their genus in the U.S., commonly give birth to twins.

Fixed-station radio tracking at this maternity colony has been relatively unsuccessful because the females traveled considerably greater distances than expected from their roost tree to foraging areas. They often exceeded the 5-mile (3-km) average range of the transmitters by 6 to 8 miles (4 to 5 km). Other tracking techniques, however, have already revealed valuable data on the selection of foraging areas and on movements to and from the roost. Researchers anticipate that enough data will be gathered by the end of the study to permit them to comment on the status of this species within the Illinois portion of its range.

* * *

Region 4 - The Mississippi Department of Wildlife Conservation, in cooperation with the Service's Jackson Field Office, has begun the third year of a population assessment on the ringed sawback turtle (*Graptemys oculifera*). This assessment is designed to determine population levels of this Threatened species in selected stretches of the Pearl River system, its only known habitat, through mark and recapture. During the first year, all field work was conducted jointly by Service and Mississippi Department of Wildlife Conservation biologists. Subsequently, the State of Mississippi received Section 6 funding for this project from the Service,

(continued on page 7)

Establishment of an Experimental Population Proposed for the Guam Rail

The Guam rail (*Rallus owstoni*), a flightless bird endemic to the southernmost of the Mariana Islands, presumably became extinct in the wild in 1986 due to heavy predation by the non-native brown tree snake (*Boiga irregularis*). Since then, the rail has only been known to exist in captive breeding facilities. Recently, the U.S. Fish and Wildlife Service proposed to reintroduce the Guam rail in the wild by establishing an "experimental population" on the nearby island of Rota (F.R. 6/19/89).

The island of Guam is a U.S. territory in the western Pacific Ocean. It was free of major predators until shortly after World War II, when the brown tree snake (*Boiga irregularis*) was accidentally introduced. In the absence of natural controls, the snake population expanded to the point that snakes are now found throughout the island. Guam's unique avifauna proved all too vulnerable to the exotic predator, which forages on the ground as well as in trees. As a result, many of the island's native birds are now extirpated or extinct. (See accompanying story.) The rail was listed in 1984 as an Endangered species.

When it became evident that the rail faced imminent extinction, the Guam Division of Aquatic and Wildlife Resources (Guam DAWR), the Service, and a consortium of zoos under the auspices of the American Association of Zoological Parks and Aquariums agreed to embark on a captive propagation program. As many of the remaining rails as possible were captured. They were divided among the cooperating institutions, which entered into agreements for developing captive propagation techniques and maintaining maximum genetic diversity.

Fortunately, the Guam rail has proved to be a prolific breeder. At present, the captive flock consists of more than 112 rails at 13 locations: the Guam DAWR facilities; the National Zoological Park's Conservation and Research Center in Front Royal, Virginia; the Bronx Zoo in New York, New York; the Cincinnati Zoo in Cincinnati, Ohio; the Pittsburgh Aviary in Pittsburgh, Pennsylvania; the Sedgewick County Zoo and Botanical Garden in Wichita, Kansas; the Lowry Park Zoological Garden in Tampa, Florida; the Riverbanks Zoological Park in Columbia, South Carolina; Greater Baton Rouge Zoo in Baton Rouge, Louisiana; Trevor Teaching Zoo in Millbrook, New York; Philadelphia Zoological Gardens in Philadelphia, Pennsylvania; San Diego Zoo in San Diego, California; and Kansas City Zoological Garden in Kansas City, Missouri. The number of facilities propagating rails is expected to increase as more zoos in various parts of the country are enlisted as cooperators.

Although rails in captivity are capable of surviving and reproducing, they may, after several generations, lose their ability to survive in the wild. For this reason, establishing a population in the wild without undue delay is critical to the species' chances of eventual recovery. Usually, Service policy is to establish a wild population of an Endangered animal only within its historical range. But until brown

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photo by Jessie Cohen, National Zoological Park, Smithsonian Institution

If the proposal to establish an experimental population of the Guam rail is approved, birds like this one at the National Zoological Park's Conservation and Research Center will be introduced on the island of Rota.

Impacts of the Brown Tree Snake on the Native Birds of Guam

The Guam rail is not the only victim of the brown tree snake. This accidentally introduced predator has devastated almost the entire native avifauna of Guam. Until methods can be developed to control this species of snake where it has recently invaded or to prevent its spread, other island ecosystems in the Pacific are at serious risk.

In a recent report, "Demise of an Insular Avifauna: The Brown Tree Snake on Guam,"[1] John Engbring of the Service's Pacific Islands Office in Honolulu, Hawaii, and Thomas Fritts of Region 8 (Research) give an account of the snake's dramatic impact on the island's wildlife. Native forest birds have suffered the highest casualties. Of the 11 taxa present on Guam in 1945, all but 1 (the nightingale reed-warbler, *Acrocephalus luscinia*) were widespread throughout the island. Today, however, most of these birds are in low numbers or even extirpated. Now apparently missing from the island's forests are the Guam rail, nightingale reed-warbler, rufous fantail (*Rhipidura rufifrons*), cardinal honeyeater (*Myzomela cardinalis*), and bridled white-eye (*Zosterops conspicillatus*). Predation by the brown tree snake is believed to be the main factor in the decline of Guam's native avifauna. Even the species of native forest birds that remain on Guam are vulnerable. Unless efforts to control the snakes are successful, the Micronesian starling (*Aplonis opaca*), which has been able to colonize a few urban areas, may be the only native forest bird that has a chance for long-term survival on Guam.

Some of the last Guam rails and Micronesian kingfishers were collected for captive breeding and have reproduced readily in captivity. If some way to control the brown tree snake can be found, offspring of these birds could someday be released on Guam.

Three species of seabirds were present on Guam when the brown tree snake arrived, the white-tailed tropicbird (*Phaethon lepturus*), brown noddy (*Anous stolidus*), and white tern (*Gygis alba*). All three are now virtually extirpated from the main island of Guam, most likely due to predation on the eggs and young by the brown tree snake. Numbers of the Vanikoro or island swiftlet (*Aerodramus vanikorensis*), a cave-nesting bird, have fallen as well, although it is not known if the snake is to blame for the decline of this species. Most of the eight species of non-native birds that have become established on Guam also have been reduced in numbers but thus far have escaped extinction.

The brown tree snake has exhibited the ability to take a variety of animals other than birds, including small lizards and mammals. There is evidence, for example, that the endangered Mariana fruit bat (*Pteropus mariannus*), a tree-roosting species, is continuing to decline and may

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photo by G. H. Rodda

The brown tree snake is a rear-fanged, mildly venomous nocturnal species that can reach up to at least 9.6 feet (2.9 meters) in length. It is not usually considered dangerous to healthy human adults, but some young victims have become seriously ill after being bitten. Although it is an exceptional climber, the brown tree snake is highly adaptable and commonly forages on the ground as well as in trees. Snakes are not restricted to forests and brushy areas, and are frequently found in houses and commercial buildings.

In addition to its impacts on Guam's native wildlife, this snake has caused significant economic impacts. Snakes can climb guy wires leading to electrical transmission line poles as easily as they do trees. Frequent power failures occur when the snakes come into contact with powerlines and cause a short-circuits. Estimates of the costs from snake-caused power outages on Guam run into millions of dollars per year. Impacts on local agriculture include significant damage to poultry operations through predation on chickens and eggs.

Guam Rail

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tree snakes can be eliminated or effectively controlled, there is little or no prospect for a successful reintroduction of rails on Guam.

As an alternative, the island of Rota has been proposed as the site for establishment of an experimental population. The brown tree snake is not known to have colonized Rota, and the many weedy fields and second-growth forests should provide suitable habitat for the Guam rail. Rota, which lies about 31 miles (50 kilometers) north of Guam, is under the jurisdiction of the Commonwealth of the Northern Mariana Islands, and any introductions of the rail would be on Commonwealth lands or property of cooperating landowners. The rail population on Rota would be managed with the long-term objective of providing a source of wild rails for reestablishment on Guam when a way is found to eliminate or control the brown tree snake.

The Service proposed designating any rails introduced on Rota as a "non-essential experimental population" under Section 10(j) of the Endangered Species Act. Such a designation would give the rails protection while providing for a greater degree of management flexibility than otherwise allowed for Endangered animals. The Service estimates that mainland zoos alone could provide up to 100 birds for release each year without jeopardizing the captive flock.

The plan calls for releasing 50 to 100 rails on Rota annually for 5 years. All birds would be banded, and 25 to 30 per year would also carry radio transmitters to facilitate studies of dispersal patterns, mortality, and other factors. The project would be a cooperative venture of the Service, the Commonwealth Division of Fish and Wildlife, and the Guam DAWR (the designated lead agency). Follow-up evaluations of the releases would be conducted by Dr. Stuart Pimm and Mr. Gregory Witteman, a graduate student from the University of Tennessee, under an agreement with the Guam DAWR. The cooperating agencies would evaluate the project at the end of 5 years and determine its future.

Brown Tree Snake

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be prevented from recovering, even when protected from human poaching, due to predation by the snake.

Studies by biologists in Guam's Division of Aquatic and Wildlife Resources (Guam DAWR) and by U.S. Fish and Wildlife Service researchers have resulted in significant progress toward understanding the problem, identifying the research and management actions needed, and developing the rudiments of a control technology for snakes. For example, the Guam DAWR is attempting to "snakeproof" Mariana crow (*Corvus kubaryi*) nesting sites. This effort recently resulted in the first known successful fledging of a Mariana crow on Guam since 1985. (Unfortunately, the bird was later taken by a monitor lizard, *Varanus indicus*, demonstrating that the brown tree snake is not the only avian predator on Guam.) The Guam DAWR plans to expand its efforts to provide snake-free nesting trees over as wide an area of the species' remaining range on the island as funding allows.

The native range of the brown tree snake extends from eastern Indonesia through New Guinea, the Solomon Islands, and northern Australia. It most likely was accidentally introduced to Guam as a stowaway aboard military cargo soon after World War II. Until that time, Guam had been without any snakes except for a harmless blind snake, *Rhamphotyphlops braminus*. With no natural predators on Guam, snake populations in some areas have reached extraordinarily high densities. Estimates of population densities range up to 12,000 snakes per square mile in at least one area. This highly adaptable species has been found in virtually all habitats on the island, including urban areas and even human dwellings. The native forest birds, which had never needed to evolve defenses against snakes, were especially vulnerable to the ubiquitous arboreal predator.

Because of the brown tree snake's wide distribution on Guam and its propensity to seek refuge during the day in dark, secluded crannies, the snake is likely to infiltrate cargo originating in or passing through the island. Much of the cargo entering Micronesia and other parts of the Pacific is transshipped through Guam. If the snake eventually becomes established on other islands, ecological catastrophies similar to that which struck Guam are likely to occur. Brown tree snakes already have been found in Hawaii (Oahu) and on Wake Island, Kwajalein Atoll, and Diego Garcia Atoll, although so far no reproductive populations are known to have been established.

The goals of Territorial and Federal conservation agencies are to effectively control and/or eradicate the brown tree snake on Guam and to prevent its spread to other parts of the Pacific. Progress has been made but, unfortunately, the ability to accomplish these goals is still limited by an incomplete knowledge of the snake. For example, more information is needed about what ecological factors regulate populations of the brown tree snake in its native range. Research into habitat use, movements, feeding behavior, and population trends on Guam also is recommended. When biologists learn more about the brown tree snake, the prospects for devising effective methods to detect, monitor, capture, and kill or exclude snakes should improve. For example, research has shown that the snakes are attracted to bird odors, but a powerful attractant is needed to lure snakes to traps. The snake prefers the security of forests, but when hungry it will forage far into mowed clearings and urban habitats. Special attention during future research efforts will go toward the development of repellents, baits, traps, toxicants, and possible means of biological control.

Preventing the spread of brown tree snakes will involve efforts on Guam as well as the islands that are vulnerable to colonization by this animal. Although a few snakes probably will circumvent the most careful control measures, reducing the number of incidents and promptly reporting them will make the establishment of self-sustaining populations on other islands less likely. Training in how to detect the secretive brown tree snakes has been started for military and civilian personnel involved in the transportation, inspection, and distribution of cargo from infested islands to high-risk destinations.

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Advances in Captive Propagation of the Guam Micronesian Kingfisher

In addition to their success in propagating the Guam rail, zoos have had encouraging results with the Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*). To prevent the extinction of this endemic kingfisher, Guam DAWR biologists collected 29 birds in 1984 and 1985 for captive breeding. All but one were adults of unknown age. They were distributed among the Philadelphia Zoological Garden, National Zoological Park (Front Royal Conservation and Research Center), and Bronx Zoo. After these institutions proved successful in breeding the kingfisher, birds were sent to another four facilities: the Brookfield Zoo, Cincinnati Zoo and Botanical Garden, St. Louis Zoological Park, and San Antonio Zoological Gardens & Aquarium. Propagation of the kingfisher has been achieved at all seven zoos. Additionally, San Antonio zookeepers have the distinction of having produced a second generation in captivity.

As of July 1989, 30 to 35 kingfishers had been added to the collective zoo flock through captive propagation. Twenty of the birds originally collected on Guam survive, bringing the total Guam Micronesian kingfisher population up to 50 to 55 birds. Soon, there will be 14 zoos cooperating in the breeding program.

photo by Mike Greer Chicago Zoological Society

Chicago's Brookfield Zoo, where the above chick hatched, is one of the facilities having encouraging success in propagating Guam Micronesian kingfishers.

Brown Tree Snake

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Because people on many central and south Pacific islands are unfamiliar with snakes in general, personnel of the Fish and Wildlife Service personnel have conducted workshops on the problem on 14 islands under U.S. jurisdiction that are judged to be at risk of colonization by the brown tree snake. In addition, a slide/tape presentation is under review for ultimate distribution to vulnerable islands. Clearly, controlling this serious problem will involve a combination of education, training, research, and intensive management programs.

More complete information on the brown tree snake, its impacts on Guam's wildlife, and potential control strategies is included in Biological Report 88(31), "The Brown Tree Snake, *Boiga irregularis*, a Threat to Pacific Islands," by Thomas H. Fritts. Requests for this publication can be sent to the Publications Unit, ARLSQ, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

[1]*1988 Transactions of the Western Section of the Wildlife Society 24:31-37*

photo by Mike Greer Chicago Zoological Society

adult Guam Micronesian kingfisher

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and State biologists assumed responsibility for the field work.

The population assessment has been conducted on four stretches of the Pearl River and over 2,300 ringed sawback turtles have been permanently marked. Recapture rates this year have been as high as 30 percent. Limited growth data have been acquired from turtles marked during the past 2 years. A fifth area will be incorporated into the study this year, with this phase of the population assessment expected to continue for 2 more years.

* * *

The Service is conducting a similar population assessment on the yellow-blotched sawback turtle (*Graptemys flavimaculata*) to determine if this species should be proposed for listing. The yellow-blotched sawback, which is related to the ringed sawback, is endemic to the Pascagoula River system in Mississippi.

* * *

The Arkansas Mountain Lion Survey, an effort funded by the U.S. Fish and Wildlife Service, Arkansas Game and Fish Commission (using Section 6 funds), and U.S. Forest Service, is nearing completion. The surveys are complete on the Ouachita National Forest and in two major parts of the Ozark National Forest. Surveys in the Sylamore area of the Ozark National Forest are expected to be completed this summer. As yet, no supporting evidence of a mountain lion (*Felis concolor coryi*) population has been uncovered in Arkansas by a team of professional lion hunters from Alpine, Texas, who were contracted for the search.

* * *

A search for the Bachman's warbler (*Vermivora bachmanii*) on the Tensas River National Wildlife Refuge in northeastern Louisiana this spring uncovered no concrete evidence of this Endangered species. A decision will be made shortly on whether or not to continue the project.

* * *

This spring, staff from the Service's Asheville, North Carolina, Field Office assisted staff from the Daniel Boone National Forest in constructing gates at two caves used by the Indiana bat (*Myotis sodalis*). These eastern Kentucky caves currently support small winter populations of the Endangered bat. It is believed that the current low population numbers result from disturbance during the critical hibernation season. The installation of the gates should eliminate disturbance and help the Indiana bat populations recover.

* * *

In 1979, the Tennessee Valley Authority (TVA) entered into consultation with the Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act, on the proposed Columbia Dam and reservoir project on the Duck River in Tennessee. The Service issued a Section 7 Biological Opinion that the project, as proposed, would likely jeopardize the survival of two Endangered mollusks, the birdwing pearly mussel (*Conradilla caelata*) and the Cumberland monkeyface pearly mussel (*Quadrula intermedia*). A "reasonable and prudent alternative" identified by the Service was for TVA to complete a successful mussel conservation program. However, during the ensuing 9 years, TVA has been unable to make enough progress toward this goal.

At the request of the primary project advocate, the Upper Duck River Development Agency, TVA reinitiated formal Section 7 consultation with the Service on the Columbia Dam project on November 29, 1988. The intended purpose was to reassess the impacts of the original project design on the federally listed mussels and to explore potential impacts from other project alternatives. The Service had been prepared to issue a new Biological Opinion on February 27, 1989. At TVA's request, however, the Service postponed issuance of the opinion. Subsequently, TVA withdrew from formal Section 7 consultation. The project sponsor is now reassessing the biological data that TVA provided to the Service. Once this reassessment is completed, TVA has the option of again reinitiating formal Section 7 consultation.

* * *

The Jackson, Mississippi, Field Office is using the Service's Volunteer Program to gather status information on listing candidates. Under this program, the Service acquires valuable information and other services from experts on various species. Specific tasks a volunteer will perform are outlined and agreed upon by the volunteer and the Service beforehand, which

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Working to Recover Listed Fishes in Tennessee, North Carolina, and Virginia

State and Federal agencies are working together to reintroduce federally listed fish species into historical habitats within the Tennessee River system. Recovery efforts are focused on four species—the Endangered smoky madtom (*Noturus baileyi*) and the Threatened yellowfin madtom (*Noturus flavipinnis*), spotfin chub (*Hybopsis monacha*), and slender chub (*Hybopsis cahni*). The survival of these species is threatened primarily by impoundments, pollution, habitat modification, and other human-related impacts.

The smoky madtom, yellowfin madtom, and spotfin chub were extirpated from Abrams Creek in 1957 when this stream was treated with a fish toxicant to remove "unwanted" fish species from the watershed prior to closure of Chilhowee Dam. The removal of unwanted fishes was a common practice at the time, and it was believed that the eradication of native species would enhance the chances of establishing a recreational trout fishery in the new reservoir.

A recovery effort for the smoky and yellowfin madtoms has been underway for the past 3 years. This project, funded primarily by money appropriated under Section 6 of the Endangered Species Act, is administered by the Tennessee Wildlife Resources Agency. The work begins each spring with the collection of madtom eggs and larvae (three to five clutches of each species per year) from donor populations in Citico Creek on U.S. Forest Service lands in Monroe County, Tennessee. The eggs and larvae are then reared by University of Tennessee biologists and released in late summer into Abrams Creek. Last year (1988) was the most successful for survival of young madtoms during the rearing process. As a result, 155 yellowfin madtoms and 118 smoky madtoms were released into Abrams Creek. These laboratory-reared young were comparable in size to their wild counterparts. When released, they appeared healthy and dispersed quickly.

Researchers at the Virginia Cooperative Fish and Wildlife Research Unit at Virginia Polytechnic and State University are working to develop captive spawning and rearing techniques for the madtoms and chubs. Fish spawned and reared in captivity would provide an abundant source of fish for reestablishing native populations. Attempts are under way to adapt current aquaculture methods (primarily the use of hormone injections and temperature/photoperiod regulation) to the listed species. Efforts are being restricted to related, but non-threatened, surrogate species until procedures and techniques are perfected for use on rare species. Application of research results to the listed madtoms and chubs is planned in subsequent years. The work is supported by the public under Virginia's Nongame Tax Check-off Program and is being carried out through the Virginia Department of Game and Inland Fisheries.

A spotfin chub reintroduction project has been conducted by the North Carolina Wildlife Resources Commission, the Tennessee Wildlife Resources Agency, and the National Park Service, with the assistance of volunteers. Project coordination and technical assistance were provided by the Fish and Wildlife Service and Tennessee Valley Authority. In fall of 1988, 250 chubs were collected from the Little Tennessee River just upstream of Fontana Reservoir in Swain County, North Carolina. They were released into Abrams Creek the same day they were captured. No fish died during transport, and they appeared healthy when released.

Abrams Creek will be surveyed soon to determine if the transplant efforts have been successful. Later this year, all three species will be transplanted again. We hope that, through these efforts, the future of these fishes can become more secure.

photo by K. Taylor. North Carolina Wildlife Resources Commission

collecting chubs in a North Carolina stream

National Wetlands Plan is Available

Carlos H. Mendoza
Division of Endangered Species and Habitat Conservation
Washington, D.C.

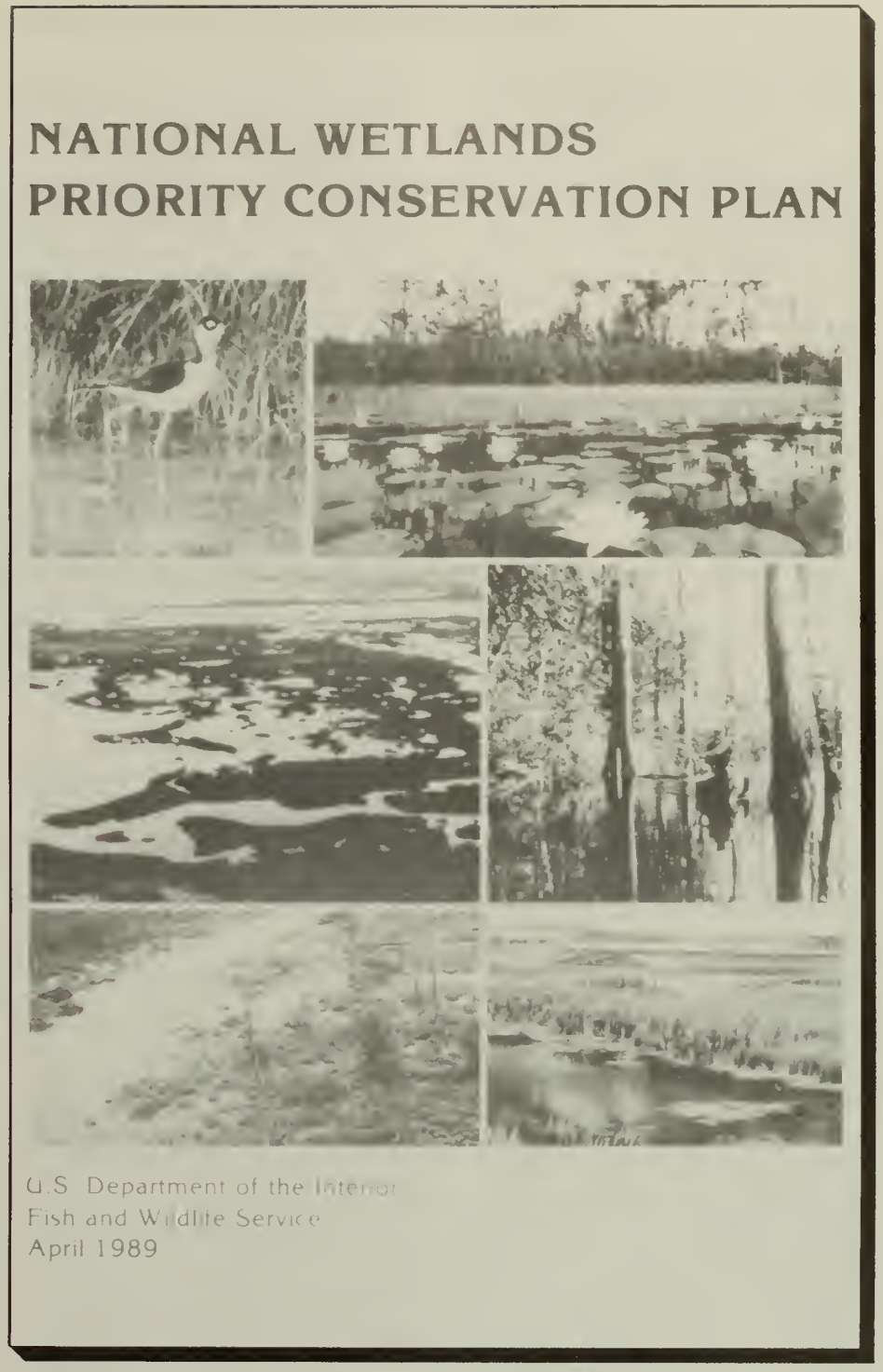
A National Wetlands Priority Conservation Plan (Wetlands Plan) was approved by the Fish and Wildlife Service this year. Mandated by Section 301 of the Emergency Wetlands Resources Act of 1986, the Wetlands Plan will assist decision-makers in identifying the types and locations of wetlands, and interests in wetlands, that warrant consideration for Federal and State acquisition through the Land and Water Conservation Fund.

In general, wetlands given priority consideration for acquisition will be those that 1) provide a high degree of public benefits, 2) are representative of rare or declining wetland types within an ecoregion, and 3) are subject to an identifiable threat. Criteria to be considered in setting acquisition priorities include functions and values of wetlands (including wildlife, federally listed Endangered and Threatened species, sport and commercial fisheries, water supply and quality, flood control, and outdoor recreation), historical wetland losses, and threats of future losses.

Wetland protection is accomplished through regulation, policy guidance, or acquisition of interests in wetlands. No single legislative authority addresses all facets of wetland conservation or use. The primary Federal regulatory mechanism for protecting wetlands is Section 404 of the Clean Water Act. However, wetland protection afforded by this program is neither completely effective nor comprehensive, and additional losses of the Nation's wetlands continue. Wetland acquisition may therefore best serve the public interest in many cases.

The Service will implement the Wetlands Plan in its Regional Offices by developing Regional Wetlands Concept Plans. Although these Concept Plans will include lists of wetland sites warranting priority for acquisition, ranking will not occur until each site has been processed through the Service's Land Acquisition Priority System.

The Interior Department encourages the private sector and all local, State, and Federal agencies to use this National Wetlands Priority Conservation Plan as a tool to assist in identifying wetlands that warrant priority consideration for protection. It is only through cooperative efforts that wetland resources can be protected for future generations.



U.S. Fish and Wildlife Service photographs on the cover are by: Black-necked stilt (*Ruth Nissen*); Water lilly and cypress (*Dan O'Neil*); Mangrove Swamp, Florida (*Bill Wilen*); Canoeist in Okefenokee NWR (*Joe Doherty*); Wetland (*Jerry Langcore*); and Wetland, Modac NWR (*Steve Lewis*)

Copies of the National Wetlands Priority Conservation Plan are available from the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation, Branch of Special Projects, Arlington Square - Room 400, Washington, D.C. 20240.

Black-footed Ferret Recovery Update

Lou Hanebury and Dean Biggins
National Ecology Research Center
Fort Collins, Colorado

In August of 1988, the Fish and Wildlife Service approved a completely revised recovery plan for one of our nation's rarest animals, the black-footed ferret (*Mustela nigripes*). The revised plan emphasizes research, captive propagation, and reintroduction. The Black-footed Ferret Research Project at the Service's National Ecology Research Center (NERC) is addressing 27 of the recovery tasks identified in the plan, and work on others is planned for this year and next.

Because of the success that has been achieved with captive breeding (see BULLETIN Vol. XIII, No. 11-12), there is increased emphasis on locating habitat suitable for ferret reintroduction. Over the past several years, the Service and other Federal agencies, States, and Canadian and Mexican agencies have been locating and mapping prairie dog complexes of sufficient quality to be considered for ferret reintroduction. This effort is being coordinated by the Black-footed Ferret Interstate Coordinating Committee and encompasses 12 States, 2 Canadian Provinces, and the State of Chihuahua, Mexico. As part of this program, a crew from the NERC joined Mexican biologists in Chihuahua, Mexico, to map and evaluate black-tailed prairie dog colonies. Eight prairie dog colonies, comprising the Janos-Nuevo Casas Grandes Complex, covered approximately 136,250 acres (55,260 hectares). This complex is the largest known in North America.

NERC biologists are working closely with the Interstate Coordinating Committee to develop a system for evaluating and ranking potential reintroduction sites. The first ranking is scheduled for December 1989. The participating government agencies will then work cooperatively with land managers to develop management agreements and special rules for selected habitats and reintroduction.

Genetic variability is low in the captive population of black-footed ferrets. The urgent need to locate additional ferrets prompted the Service to petition Wildlife Conservation International to double its black-footed ferret reward program. The reward is now $10,000 for a photograph or information that results in verification of one or more live black-footed ferrets. In addition, the reward offer has been extended until December 31, 1990. Kansas has joined Montana, Colorado, Wyoming, Nebraska, Oklahoma, South Dakota, Texas, Utah, and the Navajo Nation (eastern Arizona and western New Mexico) in cosponsoring the reward. It is being publicized by posters, magazines, newspapers, newsletters, radio, and a 30-second public service television announcement produced by the Wyoming Game and Fish Department's Communications Division.

Wyoming Game & Fish Department photo

black-footed ferret

Although reported black-footed ferret sightings increased in 1988, no ferrets were confirmed. Field crews from the NERC visited sites in several States that produced the highest ranked sightings. In two instances, photographs of black-footed ferrets or their sign were sent to the NERC under the reward program. One set of authentic black-footed ferret photos was found to be approximately 20 years old and not taken by the person reporting the sighting. The other set of photographs came from Waterton Lakes National Park in Alberta, Canada. Service personnel from Region 6 and the NERC have been working with the park staff to investigate several reported black-footed ferret sightings. Sightings in the park began in 1983 and increased in the summer of 1988, when a local naturalist began spotlighting. Photographs of two ferret-like diggings were taken by the naturalist in January 1989. In February, an NERC biologist searched the area of the photographed diggings with the assistance of two park wardens and the naturalist but found no ferrets or ferret sign. The NERC will continue to coordinate the response to ferret sighting reports during 1989-1990.

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helps ensure that the Service receives the information it requires. In return, the Service usually defrays the volunteer's expenses, including transportation, lodging, and subsistence. Volunteers are also considered Federal employees for the purpose of injury compensation and tort claims. This year's volunteer projects include status surveys of two plants, Nevius' stonecrop (*Sedum nevii*) and shoal spider-lily (*Hymenocallis coronaria*); taxonomic description of a fish, the Cahaba shiner (*Notropis* sp.); and a morphometric study of Louisiana black bear (*Ursus americanus lueteolus*) skulls.

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Region 5 - The Service was among the cosponsors of a bald eagle (*Haliaeetus leucocephalus*) workshop presented by the Catskill Center in New York. Eagle experts, wildlife managers, biologists, local officials, environmental organizations, and the general public explored strategies for protecting bald eagles in Sullivan County. Up to 50 bald eagles, approximately half of New York's winter population, are found along the Delaware River and the many reservoirs on its tributaries, making this one of the most significant winter concentration areas in the northeastern United States. Recent nesting attempts by a pair of bald eagles point toward increasing year-round use of the area. There are now eight active bald eagle nesting locations statewide, and a ninth territorial pair has been confirmed, bringing New York close to its 1990 goal of 10 pairs.

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Bald eagles at Iroquois National Wildlife Refuge in western New York produced two eaglets this spring for the second year in a row. Nesting was first observed at the refuge in 1986, with two eaglets hatching that year. In 1987, the adult female disappeared and no nesting occurred. The male returned in 1988 with a new mate and two young were produced. This year's eaglets hatched at the end of April and are doing well. An immature eagle, spotted this spring at the refuge, was identified by its wingband to be one that was hacked in 1987 in southern Indiana. The bird wintered in Missouri and was found shot with an arrow in 1988. After being rehabilitated by the State of Indiana, it was released last summer.

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A pair of bald eagles nested successfully this year at the Burnet Park Zoo in Syracuse, New York. Although the female died unexpectedly, the male took over incubation duty for 2 weeks until hatching. The zoo eaglet was then taken up to New Hampshire, where it was adopted by a pair of eagles in the wild that had earlier lost a chick.

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The Service has been involved in the U.S. Air Force Strategic Air Command's (SAC) planned use of military aircraft for low-level practice flights through the Adirondack Mountains in northeastern New York. The routes are located in the vicinity of several bald eagle and peregrine falcon (*Falco peregrinus*) nest locations. The SAC has agreed to implement altitude and distance restrictions recommended by the Service and the New York Department of Environmental Conservation to protect sensitive areas. A monitoring program is also planned to gather additional data on the effects of low-level flights.

* * *

Region 6 - The area inhabited by the last known 20 to 25 individuals of the autumn buttercup (*Ranunculus acriformis* var. *aestivalis*), proposed for listing as an Endangered species on July 22, 1988, is now secure. The Nature Conservancy, through private contributions, has purchased a 44-acre (18-hectare) spring-fed wetland pasture in south-central Utah that contains the plant's only known habitat. The autumn buttercup was rediscovered in 1982 when 450 individuals were located in the Sevier River Valley. The species has since experienced a drastic decline and the remaining plants now exist in an area less than 15 feet (5 meters) in diameter. The pasture will be managed to ensure that the plant can survive and increase in numbers.

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Region 7 - Michael Amaral, Endangered Species Specialist for the Anchorage Ecological Services Field Office, represented Region 7 at a recent meeting with the U.S. Air Force in Las Vegas, Nevada. The Air Force is proposing to establish low-level military flight training areas in interior Alaska and other western States.

Eight to 12 pairs of peregrine falcons nest along the middle and lower Yukon River in one of the Air Force's proposed military operating areas. To address some of the Service's concerns regarding potential effects on peregrine reproduction, the Noise and Sonic Boom Impact Technology Program within the Air Force has agreed to initiate a 3- to 5-year study to monitor peregrine falcon behavior, reproductive success, and population status in a test training area.

* * *

Region 9 (Washington, D.C., Office) - In response to President Bush's call for "no net loss of wetlands" and his charge to the Domestic Policy Council to address wetlands protection, this spring and summer the Service's Division of Endangered Species and Habitat Conservation (EHC) has been exploring various opportunities to assist the Director and the Department in their efforts to increase the level of protection for the Nation's wetlands. The Division will seek opportunities for protecting and recovering Endangered and Threatened species that occur in wetlands as part of this initative.

photo by C. Eugene Knoder

Aleutian Canada geese are readily recognized by the white ring at the base of the neck.

In 1982, a remnant breeding population of Aleutian Canada geese (*Branta canadensis leucopareia*) was discovered on Chagulak Island in the Islands of Four Mountains. The next year, Service biologists initiated a fox eradication effort on nearby Amukta Island. Amukta lies so close to Chagulak that it was hoped geese might naturally become established there if the predatory, non-native arctic foxes (*Alopex lagopus*) could be removed. Preliminary results from a spring nesting survey in the Aleutians brings a new milestone to the Aleutian Canada goose recovery effort: a single pair of Aleutian geese was discovered nesting on Amukta, the first documented instance of Aleutian Canada geese naturally pioneering an island from which introduced foxes have been recently removed. Although one pair does not constitute success, there is hope that many islands within the vast Aleutian Island chain may once again support nesting geese through natural pioneering.

* * *

The Region 9 EHC office is participating with the Service's National Ecology Research Center in Fort Collins, Colorado, in a review of Habitat Evaluation Procedures (HEP). EHC is also looking at what other assessment methodologies Enhancement field personnel may need. Some Regions have used HEP methodology for Endangered and Threatened species habitat evaluations. Any inquires or suggestions on this subject should be directed to Craig Johnson, EHC/Branch of Special Projects (phone: FTS 921-2201; commercial 703/358-2201).

* * *

Since the time they were first eligible, 155,961 acres (63,116 hectares) of cropped wetlands have been entered into the Conservation Reserve Program. The Service is optimistic that, because farmers are now familiar with this opportunity, a million acres (405,000 ha) will be enrolled during the July sign-up. Reestablished in bottomland hardwoods and herbaceous wetland vegetation, this acreage would show up as a wetlands gain in the Service's next Status and Trends study. A total of 30.6 million acres (12.4 million ha) are now in the Conservation Reserve Program.

* * *

On June 14, the Service approved the final 675-page Biological Opinion on the

(continued on page 12)

Regional News

(continued from page 11)

Environmental Protection Agency's (EPA) registration of 112 pesticides. This opinion was issued in response to EPA's September 30, 1988, request for Section 7 consultation. The product of a special national task force, the Biological Opinion presents information on chemicals and listed species in a user-friendly manner. Specifically, it addresses use of the 112 pesticides and their effects on one or more of 165 Endangered and Threatened species, half of which occur in or adjacent to aquatic habitats. Approximately 8,000 determinations of effect were made. In cases where jeopardy to listed species was found, the Service identified reasonable and prudent alternatives designed to avoid jeopardy.

Coordinated efforts with EPA and the Department of Agriculture are under way to ensure timely implementation of this Biological Opinion. Information on EPA's proposed pesticide program was published in the July 3, 1989, *Federal Register*. Additional material to inform the public as to how listed species can be protected from pesticides while the production of food and fiber commodities continues is under development. Copies of the Biological Opinion will be made available by the EPA's Public Information Center, 401 M Street, S.W., Washington, D.C. 20460.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	24
Birds	61	15	145	7	3	0	231	57
Reptiles	9	7	59	14	4	14	107	22
Amphibians	5	0	8	3	1	0	17	5
Fishes	45	2	11	24	6	0	88	48
Snails	3	0	1	6	0	0	10	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	1	0	7	0	0	18	12
Arachnids	3	0	0	0	0	0	3	0
Plants	159	6	1	41	7	2	216	86
TOTAL	367	50	468	109	23	39	1056*	287 **

Total U.S. Endangered 417
Total U.S. Threatened 132
Total U.S. Listed 549

Recovery Plans approved: 247

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
August 1, 1989 36 plants

July 1989 Vol. XIV No. 7

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

Recovery 2000: An Intensive Approach for Restoring Endangered Species

Region 3 Endangered Species Office
Twin Cities, Minnesota

In these days of limited budgets and staffing levels, the Fish and Wildlife Service must make increasingly difficult choices about where to focus its endangered species activities. Those species that are in the greatest danger generally have been given the highest priority for protection and recovery resources. Species that have been brought back from the brink of extinction but are not yet recovered have tended to be given lower funding priority. For this reason, many listed species that are within reach of complete recovery have remained in this uncertain position.

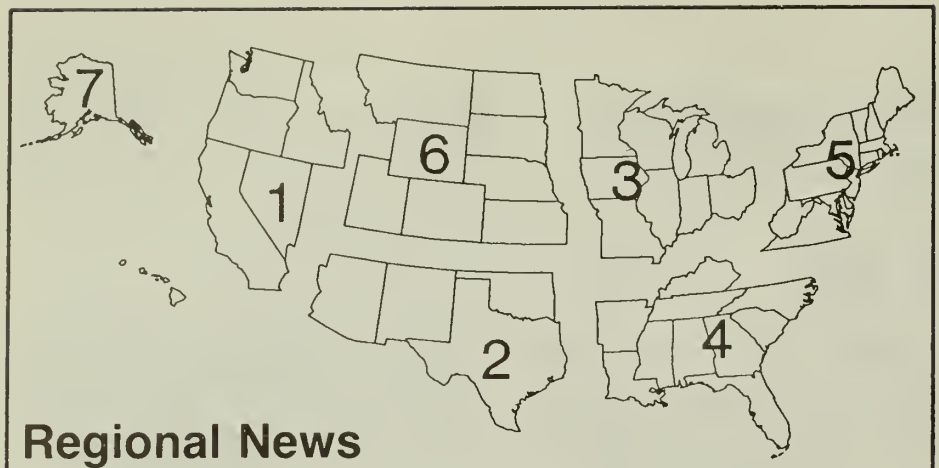
In the 1988 amendments to the Endangered Species Act, the Service was directed to give recovery priority to those species that are most likely to benefit from recovery actions. In this regard, the Fish and Wildlife Service, U.S. Forest Service, and 8 States in Region 3 (see map on page 2) have proposed an ambitious pilot initiative to recover 28 of the 41 listed Threatened and Endangered species in the Region. If *Recovery 2000* is funded and implemented as conceived, Region 3 expects that 20 of these 28 species could be fully restored and delisted by the turn of the century. Some of these animals and plants are endemic to Region 3 or occur primarily within the Region, including such species as the Higgins' eye pearly mussel (*Lampsilis higginsi*) and dwarf lake iris (*Iris lacustris*). For another 8 species, recovery within Region 3 would be achieved but delisting would depend upon recovery success in other Regions. Among these are the gray bat (*Myotis grisescens*), pink mucket pearly mussel (*Lampsilis orbiculata*), and pondberry (*Lindera melissifolia*).

Recovery 2000 calls for achieving all of the recovery plan goals for the targeted 28 species, although not necessarily all of the tasks identified in the recovery plans, within 10 years of initiating the program. Recovery strategies for the 28 species will include habitat protection, establishment

(continued on page 3)

photo by Don Kurz

Mead's milkweed (Asclepias meadii) is 1 of the 28 Threatened and Endangered plants and animals in the upper Midwest targeted for recovery by the year 2000.



Regional News

Regional endangered species staffers have reported the following news:

Region 1—A nearly white bald eagle (*Haliaeetus leucocephalus*) was observed throughout a 3-week period between Clallam Bay and Neah Bay, Oregon. It is believed to have migrated north with the estimated 1,400 or more raptors observed by participants in the Cape Flattery Spring Hawk Migration Survey. The Audubon Society and the Clallam Bay Raptor Center participated in the survey.

* * *

An analysis of data gathered during the 1988-1989 Central Idaho Public Survey of Wolf Occurrences has been completed. A considerable number (248) of gray wolf (*Canis lupus*) sightings were reported from back-country areas.

* * *

Peregrine falcon (*Falco peregrinus*) chicks went into three hack sites in Oregon and two sites in Washington. In addition, peregrines at a coastal Oregon eyrie have successfully hatched chicks. Occupation of the site had been noted in prior years, but the new observation is the first documented successful breeding at this site for many years.

* * *

Region 2—A 3-year-old female whooping crane (*Grus americana*) died July 13, 1989, while being treated by the veterinarian at San Antonio Zoological Gardens. The bird was captured on Aransas National Wildlife Refuge on April 21, when it was found emaciated and unable to fly. The bird had avian tuberculosis, for which there is no known cure, but she was treated experimentally with some antibacterial drugs. Although there was a suspected case of avian tuberculosis in an 8-month-old whooping crane in February 1983, the recent case was the first confirmation of the disease in the Aransas/Wood Buffalo National Park population. Five birds had previously been diagnosed as having avian tuberculosis in the cross-fostered Rocky Mountain flock during the 1980's.

* * *

The U.S. Whooping Crane Recovery Team and representatives of the Canadian Whooping Crane Recovery Team met recently in Jackson, Wyoming. Part of the meeting involved a review of the whooping crane/sandhill crane cross-fostering project, which is in its 15th year. After a field trip to Gray's Lake National Wildlife Refuge, Dr. Rod Drewien presented a summary of project results. Both teams subsequently recommended that the project be continued but that no additional whooping crane eggs be placed in sandhill crane (*Grus canadensis*) nests. They suggested that the new phase of experimentation concentrate on determining whether or not the cross-fostered individuals will reproduce. Thus far, there has been none. Project personnel would also continue the powerline marker research in the San Luis Valley. The Director of the U.S. Fish and Wildlife Service and Director General of the Canadian Wildlife Service will make a decision about the project in early fall.

* * *

A waterfowl hunter has been sentenced for killing a whooping crane last January 3. This man had been using a blind on the main shoreline of San Jose Island in

(continued on page 6)

U.S. Fish and Wildlife Service
Washington, D.C. 20240

John Turner, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshal P. Jones, *Chief,*
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, 1002 N.E. Holladay St., Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories **Region 2:** Arizona, New Mexico, Oklahoma, and Texas **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia **Region 6:** Colorado, Kansas Montana, Nebraska, North Dakota South Dakota, Utah, and Wyoming **Region 7:** Alaska **Region 8:** Research and Development nationwide **Region 9:** Washington, D.C., Office

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Recovery 2000

(continued from page 1)

of new populations where appropriate, augmentation of existing populations, biological research, and surveys to locate unknown populations. A vigorous public information program will be conducted to increase public awareness, understanding, and support of the effort.

Recovery 2000 is designed to be a cooperative effort involving Federal and State agencies and private landowners. While this initiative will provide funding for recovery, State and Federal agencies will further cooperate by providing the land base, personnel, and biological expertise for many recovery efforts. The Service will channel funds to the States to enhance their own endangered species recovery programs. It is anticipated that cooperating States will enter into management agreements for most of the sites acquired by the Service for habitat protection, particularly if these areas are far from existing national wildlife refuge lands.

The Forest Service has one of the larger endangered species conservation programs in the Midwest, with involvement of virtually every national forest. Eleven of the 28 targeted *Recovery 2000* species occur in national forests and ranges of 3 other species overlap national forests. For species that occur on private lands, voluntary cooperative agreements will be sought. This approach is expected to help reduce recovery costs.

Fully implementing *Recovery 2000* would require $12 million between the years 1990 and 2000, but the effort should save money over the long run. Savings should result from not needing to take all of the actions delineated in recovery plans, which are written to cover various contingencies that may arise if recovery programs are delayed or stretched out over time. *Recovery 2000* takes the optimistic view that, by spending money now, many suggested research and management actions will not be necessary. The savings could then be transferred to more complex recovery efforts for other listed species.

Recovery 2000 also would save money because it is a "package" program, designed to focus on actions that help several species concurrently. For example, Houghton's goldenrod (*Solidago houghtonii*), Pitcher's thistle (*Cirsium pitcheri*), and the dwarf lake iris are Great Lake shoreline plants that are sometimes found growing in the same areas. Because they share some of the same habitat, they will benefit from similar recovery actions. Similarly, cave-dependent species such as the gray bat and Indiana bat (*Myotis sodalis*) will benefit simultaneously when the habitats they share are given protection.

As the *Recovery 2000* program progresses, it is anticipated that there will be a decrease in funding requirements and an increase in results. Because habitat protection is often the most costly recovery item and one that needs to be addressed early, *Recovery 2000* costs will be higher in the first 3 years of the effort. Once a species' habitat is secure, less costly recovery activities can be undertaken. By the fourth year, delisting actions should have commenced for two plant species. By the sixth year, 8 of the 28 species covered by *Recovery 2000* should be in the delisting process. Finally, by the year 2000, 20 species should have been removed from the Threatened and Endangered species list or in the process of being delisted. The remaining eight species should by then be recovered within Region 3 and under evaluation for rangewide delisting.

Once the species have been recovered, additional savings will accrue from eliminating actions normally associated with administering various requirements of the Endangered Species Act. Service costs in Region 3 are expected to drop proportionally. For example, savings in law enforcement activities are projected at about $100,000 per year, and about $60,000 annually would be saved on Section 7 interagency consultations. Finally, other Federal agencies and private corporations would save money because they, too, would not need to consult with the Service or complete extensive biological surveys as they often do now.

The Service does not intend to support *Recovery 2000* by shifting funds from other protection or recovery efforts. Nor will funding be made available by reducing the listing of additional species or conservation activities for listing candidates. Instead, *Recovery 2000*, if approved, will rely on additional, short-term funding. It is also important to note that, because *Recovery 2000* is a package program, full funding will be needed for all 28 species each year. Funding only a portion of this package will not achieve complete success.

The Service is confident that if this program is funded and implemented as conceived, significant savings of both dollars and species will result. If it is successful, this prototype recovery program may well be duplicated in other parts of the country.

photo by Merlin D. Tuttle, courtesy of Bat Conservation International

***Indiana bat* (Myotis sodalis)**

Proposed Listings—July 1989

Nine plants and two freshwater mussels were proposed by the Fish and Wildlife Service during July 1989 for listing as Endangered or Threatened species. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Two Southern Appalachian Plants

Two perennial herbs native to the southern Appalachian Mountains of western North Carolina and eastern Tennessee have been proposed by the Service for listing as Endangered species (F.R. 7/21/89). Both of the following plants are subject to intensive recreational impacts on their habitat:

- **Spreading avens (*Geum radiatum*)**—This plant, a member of the rose family (Rosaceae), produces a basal rosette of leaves and stems that grow up to about 20 inches (50 centimeters) tall, topped with large, bright yellow flowers. This attractive plant faces threats from illegal collecting as well as habitat degradation. Five of the historically known populations have been eliminated, and most of those remaining have been reduced to low numbers.
- **Roan Mountain bluet (*Hedyotis purpurea* var. *montana*)**—A low-growing perennial in the coffee family (Rubiaceae), this plant forms loose tufts up to about 6 inches (15 cm) in height with bright purple flowers. One of the six historically known populations has disappeared. Those remaining are vulnerable and small; two of them occupy a total of less than 12 square yards (10 square meters).

Both species are endemic to a few scattered mountaintops, where they grow in full sunlight on the shallow, acidic soils of cliffs, rock outcrops, and talus slopes. Some of the sites also are occupied by Heller's blazing star (*Liatris helleri*) and/or Blue Ridge goldenrod (*Solidago spithamaea*), plants that are already listed by the Service as Threatened species. Six of the remaining 11 spreading avens populations are on privately owned lands; 4 are on public land administered by the U.S. Forest Service and National Park Service; and 1 is on parkland managed by the State of North Carolina. Four of the five known Roan Mountain bluet sites, and part of the fifth, are privately owned, with the remainder managed by the Forest Service.

The habitats occupied by these plants are in high demand for recreation. In the past, the greatest damage has probably come from the development of ski resorts and associated commercial enterprises. Others are experiencing trampling, soil compaction, and erosion from heavy use by hikers and sightseers.

Both the National Park Service and the U.S. Forest Service are working with the Fish and Wildlife Service to develop protection plans for these plants. Efforts to negotiate cooperative management plans with private landowners also are under way.

Five San Joaquin Valley Plants

A proposal to list five plants restricted to the native grasslands of the southern San Joaquin Valley, California, and neighboring foothills and valleys was published in the July 7 *Federal Register*. The classification of Endangered was recommended for the following:

drawing courtesy of the Endangered Plant Program, California Department of Fish and Game

California jewelflower

- **California jewelflower (*Caulanthus californicus*)**—This plant, a rosette-forming annual herb in the mustard family (Brassicaceae), grows to about 1 foot (30 centimeters) in height and bears translucent white flowers with purple to green tips. Although it once was considered abundant and was known from 40 sites, *C. californicus* has been reduced to three colonies.
- **Kern mallow (*Eremalche kernensis*)**—A small annual herb in the mallow family (Malvaceae), this plant develops a stem only 4 inches (10 cm) high. Its flowers are white to rose-pink or lavender in color. Two of the Kern mallow's six known historical sites no longer support the species.
- **San Joaquin wooly-threads (*Lembertia congdonii*)**—This plant, an annual herb in the sunflower family (Asteraceae), produces "white-wooly" stems that grow up to about 10 inches (25 cm) in length and often trail on the ground. Its small flowers, which measure only ¼ inch (6 millimeters) across, have yellow disks and lack rays. Out of 49 known populations, 33 have been lost to habitat modification.
- **Bakersfield cactus (*Opuntia treleasei*)**—A low-growing succulent in the family Cactaceae, *O. treleasei* typically spreads to form thickets of spiny pads (flattened stems) that are shaped like small beaver tails. Its attractive flowers are large and magenta in color. The remaining colonies of this historically abundant cactus are numerous but small, isolated, and vulnerable.

The status of one other San Joaquin Valley plant, while believed to be vulnerable, apparently is not as critical, and it was proposed for listing as Threatened:

- **Hoover's wooly-star (*Eriastrum hooveri*)**—This small annual herb, a member of the phlox family (Polemoniaceae), produces grayish, fuzzy stems that reach only 2 to 3 inches (5.0 to 7.5 cm) high and 5-petaled white flowers about ¼ inch in diameter. It has been eliminated from 11 of its 49 historically known sites.

Approximately 96 percent of the native grassland and scrub habitat once occupied by these species has been lost. Most was converted to agricultural uses or destroyed by urbanization. Livestock grazing, water development, oil and gas

(continued on next page)

photo by D.W. Chamberlain

The Bakersfield cactus was eliminated from the field in the background when the former grassland habitat was converted to cropland. Since this photograph was taken, the clumps of cactus in the foreground have been lost due to intensive livestock grazing.

Proposed Listings

(continued from previous page)

exploration and development, off-road vehicle use, mining, and use of low-lying areas for aquifer recharge basins or agricultural runoff collection have contributed to the modification or loss of habitat in the San Joaquin Valley. Many of these habitat changes create conditions that favor the invasion of exotic plants, which compete with native species for living space, nutrients, and water. Even air quality may be influencing plant composition; nonnative species that are tolerant of air pollution have an edge over native plants that require cleaner air.

The remaining native habitat in the San Joaquin Valley is highly fragmented, and some parcels may not be large enough to sustain colonies of the rare plants indefinitely. Most of the factors that led to the decline of suitable habitat continue to pose threats. The lands occupied by the proposed species are in Federal, State, and private ownership.

Potential Federal activities that may affect the five San Joaquin plants include flood control and water development projects, new allocations of water from existing Federal projects, and Federal loans and subsidies that promote urbanization and agricultural expansion. If the plants become federally listed as Endangered or Threatened, Federal agencies will be required to ensure that their actions will not jeopardize the survival of these species.

photo by D.W. Chamberlain

Bakersfield cactus

Palo de Rosa (*Ottoschulzia rhodoxylon*)

The palo de rosa, so named for its reddish heartwood, is a small evergreen tree that grows to a height of about 15 feet (5 m) and has thick, leathery leaves. This species, a member of the family Icacinaceae, is endemic to two Caribbean islands. A total of only nine individuals is known to exist on the island of Puerto Rico. The species also occurs on the island of Hispaniola (in the eastern or Dominican Republic side), where it is reportedly rare. Because of the species' dangerously low numbers and the potential threats to its habitat, the Service has proposed listing *O. rhodoxylon* as Endangered (F.R. 7/27/89).

Deforestation for agriculture, grazing, charcoal production, and urban and industrial development has had a significant effect on the native flora of both islands. Much of their remaining forest consists of secondary growth. An unknown number of *O. rhodoxylon* trees were lost to forest clearing. The species is known to survive in three areas of Puerto Rico, including the Guanica and Maricao Commonwealth Forests; however, because of its critically low numbers and the lingering ecological effects of deforestation, this plant is in danger of extinction.

Virginia Spiraea (*Spiraea virginiana*)

A shrub in the rose family, the Virginia spiraea grows from 2 to 10 feet (0.6 to 3.0 m) tall, with arching and upright stems. This species is a prolific sprouter under suitable conditions, and it forms dense clumps that spread in rock crevices and around boulders. Its leaves are quite variable in size and shape. During June and July, cream-colored flowers are borne on branched, flat-topped inflorescences.

Currently, the Virginia spiraea is known from 18 locations in 5 States: West Virginia, Virginia, North Carolina, Tennessee, and Georgia. It apparently is extirpated from Pennsylvania. Although the species is distributed over a wide region, it is restricted to a narrow ecological niche and occurs in limited to moderate numbers at most sites. The Fish and Wildlife Service has proposed to list the Virginia spiraea as a Threatened species (F.R. 7/21/89).

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Proposed Listings

(continued from page 5)

Spiraea virginiana is found in disturbed habitats along the scoured banks of high gradient streams or the braided features of lower stream reaches. The degree and frequency of scouring must be sufficient to prevent the encroachment of tall, shade-producing plants but not enough to remove all small species. Although it can tolerate some shading, at least for a time, the Virginia spiraea grows best in full sun.

Other significant limiting factors for the Virginia spiraea are an apparently low seed viability and a restricted gene pool. Field biologists have not reported the presence of seedlings at any population, and germination tests have produced little success. Many of the populations show aborted seeds. Although the plants can spread clonally, most of those observed were very old and the opportunities for natural colonization of new sites are probably very limited. Further, observations made during field visits suggest that each population may represent only one genotype (for a total of 18 different genotypes).

Because of reservoir construction and a variety of human-related environmental impacts, some former *S. virginiana* sites no longer support the species. Additional hydroelectric facilities have been proposed for sites upstream of two populations in Virginia and West Virginia. Both projects would require a license from the Federal Energy Regulatory Commission (FERC). If the species is listed as Threatened, FERC and other Federal agencies may be required to consult with the Service to avoid jeopardizing the plant's survival.

photo by Sharon Morgan

Virginia spiraea

Purple Cat's Paw Pearly Mussel (*Epioblasma* (*Dysnomia*) *obliquata obliquata* (*E. sulcata sulcata*))

This subspecies of freshwater mussel or clam can be distinguished from related mollusks by its 3- to 4-inch (7.5- to 10.0-cm) shell, which is purplish on the inside and has fine, wavy green rays on the outside. Historically, the purple cat's paw occurred throughout the Ohio River and its major tributaries in Ohio, Indiana, Illinois, Kentucky, Tennessee, and Alabama. Due to widespread alteration and pollution of its riverine habitat, this mussel now occurs in only two relic, apparently nonreproducing populations. The Service has proposed to list the subspecies as Endangered (F.R. 7/27/89).

Like other freshwater mussels, the purple cat's paw feeds by filtering food particles from the water. It has a complex reproductive cycle that includes a stage during which mussel larvae parasitize a host fish. The species of preferred host fish and other critical aspects of purple cat's paw life history are unknown.

The last two known purple cat's paw sites are shared by other endangered mussel species. A major factor in the decline of these mollusks has been the conversion of free-flowing habitat to large impoundments, which reduced the amount of riverine gravel/sand substratum upon which the adult mussels live and likely affected the distribution of the mussels' fish hosts. Both remaining populations of the purple cat's paw face additional threats. Those mussels in the Green River (Warren and Butler Counties, Kentucky) are vulnerable to the effects of stream flow changes from upstream reservoirs and to water quality impacts from oil and gas production. The Cumberland River population in Smith County, Tennessee, faces potential threats from river channel maintenance, navigation projects, and sand and gravel dredging.

Neither of the populations is believed to be reproducing, and both may in fact contain only old mussels that have passed their reproductive age. Unless healthier populations are discovered or methods can be developed to maintain the known populations, the purple cat's paw will become extinct within the foreseeable future.

Arkansas Fatmucket (*Lampsilis powelli*)

Another freshwater mussel, the Arkansas fatmucket is native to parts of the Oachita, Saline, and Caddo River systems in central Arkansas. It has disappeared from at least 40 percent of its presumed historical habitat, and most of the remaining populations face a number of environmental threats. This species has been proposed for listing as Threatened (F.R. 7/27/89).

The Arkansas fatmucket prefers river pools and backwater areas with a sandy/rocky substratum and a flow strong enough to periodically remove organic debris. Like many other mussels, it does not occur in impoundments. Much of this species' riverine habitat has been altered by navigation projects or inundated by reservoir construction, and additional projects are under consideration. Water quality is being affected by mine wastes, runoff of agricultural chemicals, siltation, gravel dredging, and municipal discharges. Suitable habitat and good populations occur in 20 percent or less of the Arkansas fatmucket's historical range.

Regional News

(continued from page 2)

Aransas Bay that was constructed on marshlands owned by the State of Texas. The whooping crane was reportedly mistaken for a snow goose. The last known illegal killing of a whooping crane by a hunter also occurred near Aransas National Wildlife Refuge in January 1968.

The crane killed this year was a 4-year-old female who had brought her first chick to Aransas National Wildlife Refuge last winter. The defendant was fined $15,000 under Federal charges. The State of Texas also requested $11,000 in restitution.

* * *

Mr. Wayne Shifflett, manager of the Buenos Aires National Wildlife Refuge in southern Arizona, reports that the refuge's masked bobwhite quail (*Colinus virginianus ridgwayi*) population is looking the best it has in recent history. Biologist Steve DoBrott located 17 coveys containing a minimum of 175 birds this summer,

(continued on page 8)

Final Listing Rules Approved for 10 Species

During July of 1989, listing rules for 10 vulnerable taxa—9 plants and 1 animal—were made final. Endangered Species Act protection is now available to the following species:

Shale Barren Rock Cress (*Arabis serotina*)

This biennial plant, a member of the mustard family (Brassicaceae), typically grows to a height of 1 to 2 feet (30 to 60 centimeters) and has a spreading, compound inflorescence with many tiny whitish flowers. The plant has a highly restricted range, occurring on shale deposits on southerly-facing slopes at elevations of 1,300 to 1,500 feet (400 to 460 meters). *Arabis serotina* is known from only 26 populations in 5 Virginia counties and 3 West Virginia counties. Numbers are fairly low at all 26 locations. Most of the populations occur partially or completely within the George Washington and Monongahela National Forests.

In West Virginia, five of the shale barrens supporting populations of the plant have been partially destroyed by road construction, and a sixth was affected by a small flood-control dam. In Virginia, three of the shale barrens supporting populations were partially destroyed by road construction, two were damaged by railroad construction, and one is crossed by a hiking trail. Most of the populations are moderately to severely browsed by deer, which is one of the main threats currently facing the plant. The shale barren rock cress was proposed for listing as an Endangered species in the November 17, 1988 *Federal Register* (see summary in BULLETIN Vol. XIII, Nos. 11-12), and the final rule was published on July 13, 1989.

Four Florida Plants

A final rule to list four Florida plant species, the Brooksville bellflower (*Campanula robinsiae*), Cooley's water-willow (*Justicia cooleyi*), scrub blazing star (*Liatris ohlingerae*), and Florida ziziphus (*Ziziphus celata*), as Endangered was published in the July 27, 1989, *Federal Register*. All four species are threatened by habitat loss due to residential and agricultural development.

The Brooksville bellflower, a member of the family Campanulaceae, is an annual herb about 0.4 to 6.0 inches (1 to 15 centimeters) tall, with purple bell-shaped flowers about 0.28 to 0.31 inches (7 to 8 mm) wide. It is only known to occur in three sites. Although there appears to be little danger to this plant from direct destruction, changes in land use in the surrounding watersheds could threaten the survival of the species. The plant is also vulnerable to overcollecting and vandalism.

Cooley's water-willow, a member of the acanthus family (Acanthaceae), is a rhizomatous perennial herb usually less than 16 inches (40 cm) high with bright lavender-rose flowers 0.28 to 0.31 inches (7 to 8 mm) long. The plant occurs in hardwood forests on sand to clay soils that range from moist to seasonally wet. Two of the seven sites where this species is known to occur have been modified, one by a highway right-of-way and the other by cattle grazing. In addition to impacts from residential and agricultural development, this species is threatened by limestone mining.

The scrub blazing star is a perennial herb restricted to sand pine scrub vegetation in central Florida. It is a member of the aster family (Asteraceae or Compositae) and grows up to 3 feet (1 meter) tall, with striking pink-purple flower heads. Because it has conspicuous flowers and is easily identified, the scrub blazing star has been collected frequently. Habitat loss is another problem; many of the 93 sites (71 of which are in a single county) where the plant was known to occur have already been destroyed. Most of the extant sites are small and are disappearing very rapidly.

The Florida ziziphus, a member of the buckthorn family (Rhamnaceae), is one of the rarest shrubs in North America. It grows up to 5 feet (1.5 m) high and has small, dark, glossy green leaves on conspicuously zigzag spiny branches. Only two populations are known to occur. One consists of only about 30 stems in two groups, most or all of which may be from the same rootstock.

The Service first published proposals to list the Brooksville bellflower and Cooley's water-willow as Endangered in the September 12, 1988, *Federal Register*, and the scrub blazing star and Florida ziziphus in the September, 28, 1988, *Federal Register* (see BULLETIN Vol. XIII, Nos. 9-10).

Autumn Buttercup (*Ranunculus acriformis* var. *aestivalis*)

The autumn buttercup is a herbaceous perennial plant in the buttercup family (Ranunculaceae). It normally grows about 1 to 2 feet (0.3 to 0.6 m) tall, has simple but deeply palmately divided leaves clustered at the base, and bears 6 to 10 yellow flowers. The plant is endemic to the upper Sevier River Valley in Utah, occurring on less than 0.01 acre (0.004 hectare) within a freshwater marsh. The single known population has experienced a population decline of over 90 percent in the past 6 years and now numbers only about 20 individuals. Although The Nature Conservancy has purchased the site where the last known population exists, the low numbers and limited distribution of the species makes it vulnerable to natural or human-caused stresses. The Service proposed listing the autumn buttercup as Endangered in the July 22, 1988, *Federal Register* (see BULLETIN Vol. XIII, No. 8), and the final rule was published July 21, 1989.

American Hart's-tongue Fern (*Phyllitis scolopendrium* var. *americana*)

This fern, a member of the spleenwort family (Aspleniaceae), has evergreen, strap-shaped fronds that are 5 to 17 inches (12 to 42 cm) long. The fronds arise in a cluster from a short, creeping rhizome that is covered with cinnamon-colored scales. It usually is found growing on or in close association with dolomitic limestone in areas with high humidity, shaded conditions, and a moist substrate. Apparently always extremely rare, the American hart's-tongue fern occurs in small, widely disjunct groups of populations. It is currently known from only seven counties in the Canadian Province of Ontario, two counties in New York, two counties in Michigan, two counties in Alabama, and one county in Tennessee. The species is threatened throughout most of its range by alteration or destruction of its habitat resulting from logging, quarrying, and residential or other development. On September 12, 1988, the Service published a proposal to list the American hart's-tongue fern as Threatened (see summary in BULLETIN Vol. XIII, Nos. 9-10); the final rule was published July 14, 1989.

Two Colorado Plants

The Osterhout milk-vetch (*Astragalus osterhoutii*) and Penland beardtongue (*Penstemon penlandii*) are herbaceous perennials endemic to shale badlands in Colorado, primarily at sites administered by the Bureau of Land Management. A member of the pea family (Fabaceae), the Osterhout milk-vetch is a rush-like plant that grows up to 40 inches (100 cm) tall and has large white flowers. An estimated 25,000 to 50,000 individuals are known, but about 90 percent occur on a 132-acre (53-ha) area around a proposed reservoir. Associated development and recreational use could threaten the survival of the species.

The Penland beardtongue is a short plant, growing up to 10 inches (25 cm) high, with linear leaves, several clumped, pubescent stems, and showy, bicolored flowers. This perennial belongs to the snapdragon family (Scrophulariaceae). Its population of about 5,000 plants occurs in one area approximately 1.5 miles long by

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Regional News

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and he estimates that the total pre-nesting population is twice that number. The birds are scattered throughout the refuge, and the habitat is in good condition. The nesting season coincides with the July/August rainy season. Refuge personnel are preparing to release 2,000 to 2,500 captive-reared bobwhites this year to supplement the wild population. They also are working with El Centro Ecologia de Sonora to census bobwhite and protect habitat in Sonora, Mexico, the only other location where wild masked bobwhite quail survive.

* * *

Seven northern aplomado falcons (*Falco femoralis septentrionalis*) were hacked at Laguna Atascosa National Wildlife Refuge on the Texas Coast this year. Two were killed by a barn owl, but the others reached independence. This is the fourth year aplomados were hacked on the refuge. A male sub-adult from the 1988 release returned this year to help raise the 1989 young. The young birds are produced by The Peregrine Fund at its Santa Cruz, California, facility as part of an effort to reintroduce this subspecies to the United States. Artificial nest structures have been placed in some yucca plants in preparation for the time when these birds may again try to nest in Texas.

* * *

Region 4—The U.S. Forest Service is reevaluating its regional red-cockaded woodpecker (*Picoides borealis*) management policies in light of recent population surveys indicating possible declines in small populations. As a first step, a "Policy on Cutting Within ¾ Mile of RCW Colonies on Existing Timber Sale Contracts" was made effective on March 27, 1989. Some of the important provisions of the policy include: cancellation of regeneration cuts within ¼ mile of active red-cockaded woodpecker colonies in awarded sales; cancellation of regeneration cuts in the older stands between ¼ and ¾ mile from active colonies in awarded sales; a requirement for the Regional Forester's approval for any regeneration cuts between ¼ and ¾ mile of active colonies in awarded sales; and a requirement for thinning stands within ¾ mile of active and inactive colonies to retain at least 60 square feet of basal area per acre while retaining the oldest and largest trees (those most suitable as future nesting habitat).

Other provisions include: a requirement to retain and protect relict trees within ¾ mile of active and inactive colonies; withdrawal of all advertised sales containing regeneration cuts within ¾ mile of all active and inactive colonies; and authorization only for thinning cuts within ¾ mile of active and inactive colonies in proposed sales until interim guidelines are completed.

The National Forest Products Association has voiced concerns regarding the policy, and the decision is still subject to appeal. The Service has concurred with the Forest Service decision that the policy is likely to benefit the species.

* * *

An eighth population of the Ozark cavefish (*Amblyopsis rosae*) has been discovered in Benton County, Arkansas, by Dr. Arthur Brown of the University of Arkansas. This population is in a cave on the west side of Beaver Reservoir, which likely influences the water level in the cave. Very little of this cave is accessible to people. There are unconfirmed reports of a recent sighting of Ozark cavefish in Mitchell Cave, Oklahoma. If confirmed, this would be only the third reported sighting in this cave and the first since about 1980.

* * *

The 1988 survey of the interior least tern (*Sterna antillarum*) population in the lower Mississippi River Valley resulted in a population estimate of 2,475 adult birds in 64 colonies. This fourth annual survey covered the Mississippi River from Cape Girardeau, Missouri, to Baton Rouge, Louisiana, and the Arkansas River from its confluence with the Mississippi River to the Oklahoma-Arkansas State line. The past 3 years of survey data indicate that the population ranges from 2,200 to 2,600 birds, distributed in 30 to 64 colonies. The fifth annual survey will be conducted this summer.

* * *

This spring, reptile collectors visited several of North Carolina's most important bog turtle (*Clemmys muhlenbergii*) sites and collected an estimated 25 to 30 animals, presumably for the pet trade. The demand for this Category 2 listing candidate by turtle fanciers has steadily increased in recent years, and the illegal collection of wild animals has increased concurrently. Most bog turtle populations are small and cannot withstand intense collecting pressure. The recent North Carolina collections severely disrupted an important long-term demographic research project that had accumulated 15 years of data on individual turtles' growth, reproduction, and movements.

* * *

The scrub mint (*Dicerandra frutescens*), which was listed in 1985 as an Endangered species, has been found to consist of two distinct species. The plant had been known to systematists primarily from Archbold Biological Station and a few other sites in scrub vegetation near the town of Lake Placid, Florida. A few plants collected further north, east of Sebring, had been included in the species.

When Steven Christman subquently relocated the Sebring sites during a 3-year inventory of the sand pine scrub biota for the Florida Game and Fresh Water Fish Commission, he noticed that the plants had a strong aroma of eucalyptus oil. This is in contrast to the peppermint aroma of other *Dicerandra* species. A systematic study by Robin Huck and five others, recently published in "Systematic Botany," confirms that the Sebring populations are a distinct species, which they have named *Dicerandra christmanii*. The Service has adopted the new nomenclature for the List of Endangered and Threatened Wildlife and Plants through publication of a notice in the *Federal Register* (F.R. 9/21/89). A separate action to list *D. christmanii* is unnecessary because the plants in question were already protected under the name *D. frutescens*.

* * *

Bok Tower Gardens at Lake Wales, Florida, has had encouraging initial results in its effort to propagate the Florida ziziphus (*Ziziphus celata*), an Endangered shrub. The plant's discoverer has found a second wild population, but the species is still believed to be exceedingly rare.

* * *

A unique situation may develop in the Florida Keys with the Endangered key deer (*Odocoileus virginianus clavium*). Heartwater, a tropical disease, shows

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Final Listing Rules

(continued from page 7)

0.5 miles wide (2.4 km by 0.8 km). This species could be vulnerable to off-road vehicle damage and mineral exploration.

Both plants were proposed for listing as Endangered on July 5, 1988 (see summary in BULLETIN Vol. XIII, No. 8), and the final rule was published on July 13, 1989.

American Burying Beetle (*Nicrophorus americanus*)

The American burying beetle is the largest member of its genus in North America, measuring up to 1.4 inches (36 millimeters) in length. It also is identifiable by its large orange-red pronotal disk. Once widely distributed throughout eastern North America, the species has disappeared from most of its historic range. Only two populations are known today, one on an island off the coast of New England and the other in eastern Oklahoma. The New England population was estimated at 520 beetles in 1986; the size of the Oklahoma population, which was recently discovered, is unknown. The cause of the species' decline also is unknown. The beetle was proposed for listing as an Endangered species on October 11, 1988 (see summary in BULLETIN Vol. XIII, Nos. 11-12), and the final rule was published July 13, 1989.

Regional News

(continued from previous page)

extreme pathogenicity to white-tailed deer. At present, this disease is unknown in the key deer herd, but it is carried by the tropical bont tick, which has been found on cattle egrets in Puerto Rico and other Caribbean islands. The potential for migrating birds to carry tropical bont ticks to the Florida Keys poses a distinct threat to the key deer population. The Key Deer National Wildlife Refuge manager is considering the development of a monitoring and contingency program to deal with the ticks or the disease. With only 200 to 300 key deer left, any threat must be evaluated thoroughly.

* * *

Region 6—An endangered species workshop was hosted by the Region 6 Office June 20-22, 1989, in Denver. The workshop was attended by biologists representing all of the Region's Enhancement Field Offices, and by individuals from the Divisions of Refuges, Fisheries, Federal Aid, Engineering, and Administration. The workshop covered issues relating to listing candidates, listing, delisting, reclassification, recovery, Section 6 funding, and Section 7 consultation procedures. Speakers included Mike Young of the Solicitor's Office in Washington, Margot Zallen of the Solicitor's Office in Denver, Nora Murdock from Region 4 (Asheville, North Carolina), and Jim Bartel from Region 1 (Sacramento, California).

* * *

On June 29, 1989, 9,000 greenback cutthroat trout (*Oncorhynchus clarki stomias*) were transported from the State of Montana's Blue Springs hatchery to Colorado. These Endangered fish, averaging 6 inches in length, were stocked by helicopter the following day into lakes within Rocky Mountain National Park. Despite the fact that the fish were on trucks for over 24 hours, and were transferred up to five times during the operation, less than one percent of the fish were lost during transit. The Bluewater hatchery personnel did an exceptional job of rearing and shipping the fish, ensuring that they arrived in excellent condition. The number of fish reintroduced to the wild in this single effort was over four times the number known to exist in the wild in 1973.

* * *

The only known population of clay phacelia (*Phacelia argillacea*) has declined drastically over the past several years. In 1988, the population decreased from about 50 plants to 19. The major factors impacting the plant are human disturbance and wildlife/livestock grazing. The Service has obtained permission to protect the remaining plants from deer, elk, and domestic sheep with grazing cages. The Service also plans to erect a fence around the remaining habitat. The Center for Plant Conservation and the State Arboretum of Utah have been requested to assist in recovery by establishing a horticultural population at the University of Utah. Studies are also being conducted on the reproductive and pollination biology of the plant by the U.S. Department of Agriculture's Agricultural Research Service-Bee Pollination Laboratory in Logan, Utah.

The Nature Conservancy, through its Utah Field Office, recently obtained a 1-year option to purchase the site of the single remaining population. The area will encompass 69 acres and cost $50,000. The Service has expressed its support for this land acquisition effort, which should greatly enhance the species' chances for survival.

* * *

Region 8 (Research)—National Ecology Research Center work on West Indian (Florida) manatees (*Trichechus manatus latirostris*) is supporting Section 7 consultation at the Service's Jacksonville, Florida, Fish and Wildlife Enhancement Field Office. Potential conflicts between manatee conservation and rapidly increasing coastal development are surfacing throughout Florida, and Federal permits for new marina construction require particularly close scrutiny. Decisions to approve, deny, or modify development plans must be based on the best available knowledge of local manatee movement patterns, distribution, and mortality.

A broad, geographically-referenced data base on these topics has been compiled over the years by research biologists at the Center's Sirenia Project in Gainesville, Florida, and by the Florida Department of Natural Resources. However, access to these data has been cumbersome due to a lack of automated, user-friendly tools for retrieval and display. In response, the Center's staff is completing development of a desktop mapping and data-retrieval system that runs on IBM-compatible personal computers. Called "QuickMAP," this system will allow geographically-referenced information (e.g., coordinates of manatee locations as determined by satellite telemetry) to be displayed quickly for various regions of Florida, using coastal outlines at the level of detail found in nautical charts.

QuickMAP is intentionally not as sophisticated in its analytical capabilities as complex, commercially available geographic information systems. This allows it to be inexpensive, simpler to learn, and easier to use. QuickMAP has features that facilitate the interchange of information with existing software and data bases. For example, detailed shoreline data acquired from one agency's geographic information system may be combined with manatee mortality from another agency's data base management system. QuickMAP's output can be transferred to drawing software for further annotation and even incorporated in publications with desktop publishing software. QuickMAP meets industry standards and works on a variety of hardware encountered in different agency and field offices. These qualities are a great advantage to permit reviewers.

* * *

Comparative laboratory studies of the growth rates and foraging behaviors of the Threatened Concho water snake (*Nerodia harteri paucimaculata*) and two related species, *N. erythrogaster* and *N. rhombifera*, are being performed using juveniles born in captivity at the Service's National Ecology Research Center field station at the University of New Mexico. These studies, combined with field studies of foraging behavior and the thermal characteristics of Concho water snake habitat, are designed to help explain why juvenile Concho water snakes are restricted to sites with rocky shorelines. At the same time, researchers from Texas A&M University are studying the general biology and demography of the Threatened snake.

* * *

The 1989 spring California sea otter (*Enhydra lutris nereis*) survey, conducted by biologists with the Service and the California Department of Fish and Game, yielded some encouraging results. The total count—1,864 sea otters, including 1,574 independent animals and 290 pups—was the highest recorded since the current survey methods were adopted in 1982. This spring's pup count was also the highest to date. The increased number of sea otters counted over the past 5 years is believed to result from 1) decreased mortality due to depth restrictions placed on the gill net fishery within the otters' range by the California Department of Fish and Game and 2) increased survival of juvenile animals due to several recent mild winters. These counts do not include sea otters that have been translocated to the waters around San Nicolas Island off southern California.

* * *

Region 9 (Washington, D.C., Office)—The Division of Endangered Species and Habitat Conservation's (EHC) Branch of Special Projects hosted a tour of the National Wetlands Inventory facilities in St. Petersburg, Florida, by scientists from the Soviet Union. The visitors included an aquatic biologist, a chemist, and a natural resource manager. They were part of a joint U.S./U.S.S.R. effort, sponsored by the Environmental Protection Agency, to share wetland research knowledge. The visiting scientists were very interested in the wetland mapping process; they indicated that there currently is no such program in the Soviet Union.

* * *

In order to promote more effective cooperation among the Federal agencies

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12
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86
19
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32
16
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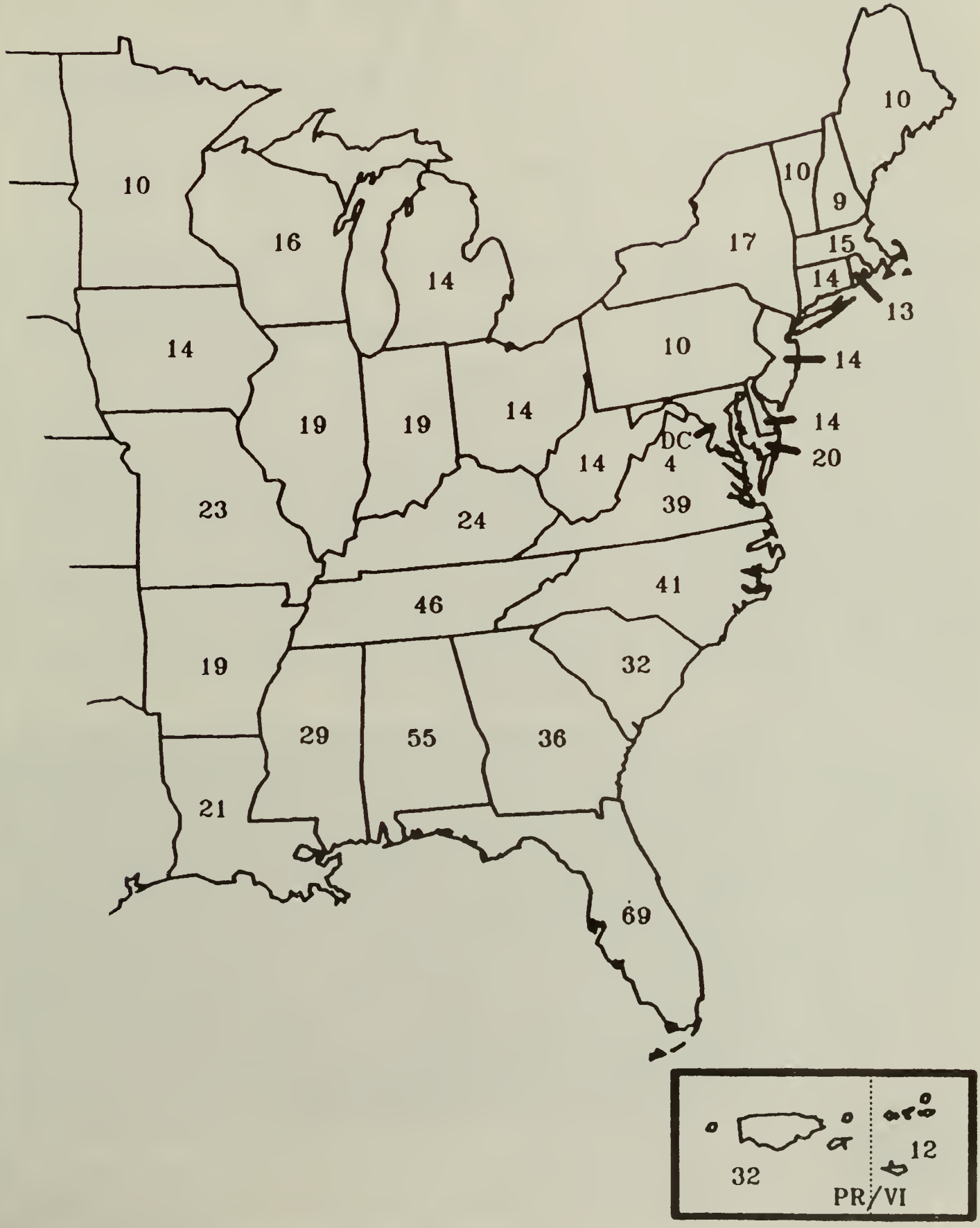
OTHER PACIFIC ISLANDS 24
5
ALASKA
58
HAWAII

LISTED SPECIES BY STATE/TERRITORY 10/31/89

(Omits some extirpated species)



Regional News

(continued from page 9)

concerned with conservation of the northern spotted owl, an informal coordinating group was formed in Washington, D.C. Originally composed of representatives of the Fish and Wildlife Service, Forest Service, and Bureau of Land Management, the National Park Service is now included. Members of the group have been involved in Congressional briefings on the owl, and have assisted offices of the involved agencies in setting up a scientific committee to develop a long-term owl conservation strategy.

* * *

On August 31, the Service's Office of Migratory Bird Management requested that a previous intra-agency Section 7 consultation with EHC be reinitiated to consider a new proposal for goose hunting in the Central Valley of California. The consultation addressed potential impacts of the hunting program on the Aleutian Canada goose (*Branta canadensis leucopareia*), an Endangered subspecies of the common Canada goose that migrates to California from the Aleutian Islands each winter. The proposal included a provision to maintain the hunting closure areas that have been in place for the past 10 years to protect the rare birds.

After considering the impacts of the proposed action, EHC issued a Biological Opinion that the proposed hunt is not likely to jeopardize the subspecies' survival. In the opinion, EHC recommended that any incidental take of Aleutian Canada geese be monitored. If a significant risk to the subspecies does arise, the Service can use its statutory authority to invoke emergency closures of the hunting season.

BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	24
Birds	61	15	145	7	3	0	231	57
Reptiles	9	7	59	14	4	14	107	22
Amphibians	6	0	8	4	1	0	19	5
Fishes	48	2	11	25	6	0	92	48
Snails	3	0	1	6	0	0	10	7
Clams	34	0	2	0	0	0	36	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	1	1	7	0	0	19	12
Arachnids	3	0	0	0	0	0	3	0
Plants	163	6	1	42	7	2	221	86
TOTAL	377	50	469	112	23	39	1070*	287 **

Total U.S. Endangered 427
Total U.S. Threatened 135
Total U.S. Listed 562

Recovery Plans approved: 247

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
October 31, 1989 36 plants

August 1989 **Vol. XIV No. 8**

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

September/October 1989 Vol. XIV Nos. 9-10

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service
Washington, D.C. 20240

Emergency Action Taken to Protect the Desert Tortoise

Citing threats from predators, habitat degradation, and a serious outbreak of disease, the Fish and Wildlife Service has taken emergency action to protect the Mojave population of the desert tortoise (*Gopherus agassizi*). An emergency rule listing the population as Endangered took effect upon publication in the *Federal Register* (August 4, 1989). During the 240-day life of the emergency rule, the Service will take steps that could lead to long-term protection. A proposal to make the emergency classification permanent was published October 13, 1989.

The emergency rule affects only those desert tortoises found west and north of the Colorado River, which are being referred to collectively as the Mojave population. All provisions of the Endangered Species Act now apply to animals in this area. Two of the Act's most important measures include prohibitions on killing or collecting tortoises without a permit and the requirement that Federal agencies avoid activities that are likely to jeopardize tortoise survival. Some changes in the management of public lands probably will be necessary, although current land uses will be accommodated where consistent with tortoise conservation.

Rangewide Concerns

The desert tortoise has a rather extensive range in the Mojave and Sonoran Deserts of the United States and Mexico, but its distribution within much of this region is spotty. Desert tortoises occur in parts of southeastern California, southern Nevada, extreme southwestern Utah, western Arizona, and the state of Sonora, Mexico. In the U.S., differences in the mitochondrial DNA of tortoises from opposite sides of the Colorado River indicate that this barrier has separated the animals long enough for the evolution of two populations with a measurable degree of genetic distinctness. Other differences in shell shapes and patterns of habitat use support the DNA conclusions.

The fragility of desert environments makes the desert tortoise particularly vulnerable to impacts from the Southwest's rapidly growing human population. The quality of tortoise habitat throughout the species' range is deteriorating, and in many cases is being lost, due to livestock grazing, urbanization, mining, oil and gas development, off-road vehicle recreation, and other competing land uses. Many activities also indirectly expand the range and numbers of tortoise predators, as well as alter the natural flora. As a result of these and other factors, biologists monitoring desert tortoise populations have discovered some disturbing trends. For example, data from eight study sites in the western Mojave Desert—a region once considered the heart of the species' range—indicate that populations have declined 10 percent or more per year for up to the past 10 years.

By 1980, desert tortoises on Utah's Beaver Dam Slope, part of the Mojave Desert population, had declined to such a vulnerable status that the Service listed them as Threatened. (See BULLETIN Vol.

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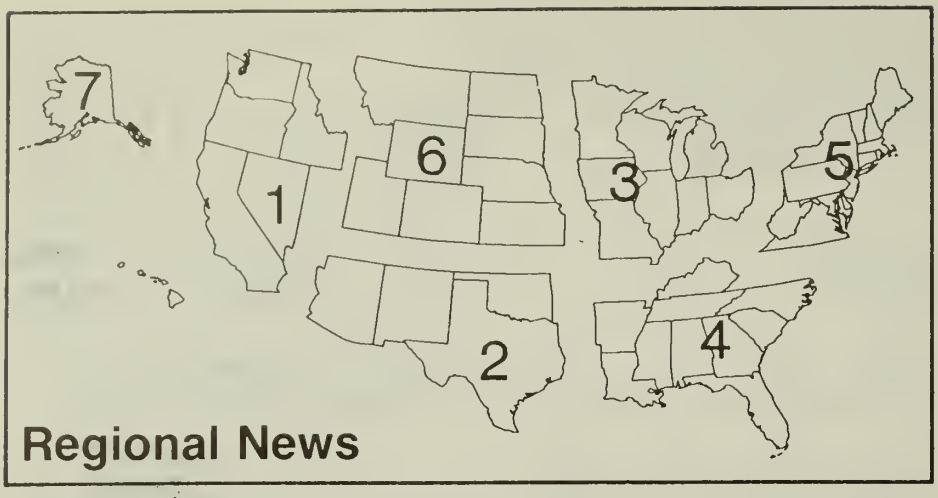
photo by Beverly Steveson

Desert tortoises are relatively large, with adults measuring up to 15 inches (38 centimeters) in shell length. They can live 50 to 100 years in the wild under natural conditions. Most of their lives are spent under ground in dens and burrows. Desert tortoise activity is concentrated in spring months, when the animals emerge from hibernation. At this time, the wildflowers, grasses, and other plants they feed upon are most abundant.



Regional News

Regional endangered species staffers have reported the following recent news:

Region 2—It appears that three small flocks of thick-billed parrots (*Rhynchopsitta pachyrhyncha*) have become established through releases in Arizona (see BULLETIN Vol. XIV, No. 4). Three to five birds are summering in the Chiricahua Mountains of southeastern Arizona. Another five or six birds, possibly as many as ten, are in mountains northeast of the Chiricahuas near the New Mexico border. Seven birds, including three nesting pairs, are in the Tonto Basin. Observers have noted adult behavior that suggested three pairs had produced eggs.

* * *

Between September 1986 and June 1989, Dr. Jerome Jackson of Mississippi State University tried to document the survival of ivory-billed woodpeckers (*Campephilus principalis*) in the southeastern United States. His work was supported by Endangered Species Act-Section 6 funds. In spite of extensive searches of available habitat throughout eight southeastern States, Dr. Jackson and dozens of his colleagues were unable to confirm the species' existence. There is, however, a possibility that one or more very small populations remains. Repeated responses of a bird to a ivory-billed woodpecker recording in one area during 1987 and 1988, along with a number of unverified sightings by competent observers within the past 20 years, lend support to this possibility. Additional efforts are being made to search for the woodpecker in the most promising sites over the next 2 years.

* * *

Shoreline erosion along the Gulf Intracoastal Waterway is threatening the wintering habitat of whooping cranes (*Grus americana*) in Texas. In some areas, only a narrow fringe of shore remains to prevent salt water from entering freshwater ponds that are rich in crane foods. In August, 150 volunteers directed by Service and U.S. Army Corp of Engineers staff protected approximately 800 feet (250 meters) of key eroding areas by placing 7,800 bags of concrete at these sites. The bags were anchored by driving steel reinforcing rods through the bags and into the shore. The Conoco Corporation provided 40 of the volunteers and lunch for all of the participants.

* * *

Canadian Wildlife Service biologist Ernie Kuyt surveyed Wood Buffalo National Park in Canada last August to count the whooping crane chicks that fledged this year. Twenty-one to 26 chicks were counted in late June, but only 12 to 18 fledged birds were estimated to have survived the summer. Although late spring water conditions were sufficient for good nesting, a severe drought was under way by late summer. Some wetlands used for nesting this past spring became completely dry. The birds scattered widely in search of food, making the late August survey difficult.

Wood Buffalo National Park seems to experience 10-year wet/dry cycles. Historically, whooping crane production drops with the dry periods. The years 1984-1988 experienced good production, with

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

John Turner, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
William E. Knapp, *Chief,*
Kenneth B. Stansell, *Deputy Chief,*
Division of Endangered Species and Habitat Conservation
(703-358-2161)
Marshall P. Jones, *Chief,*
Office of Management Authority
(703-358-2093)

Clark R. Bavin, *Chief,*
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, 1002 N.E. Holladay St., Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

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Endangered Species in the Wake of Hurricane Hugo

The aftermath of Hurricane Hugo was not limited to the tragic effects on people and property. It is becoming clear that this storm, which swept across the U. S. Virgin Islands and Puerto Rico before slamming into the Carolinas, also had serious impacts on the habitat of several Endangered animals and plants. Surveys in remote areas will take more time, but the situation as it was known by early December is summarized as follows:

Red-cockaded Woodpecker

Francis Marion National Forest, near the South Carolina coast just north of Charleston, was hit particularly hard. Before the hurricane, it contained approximately 542 colonies of red-cockaded woodpeckers (*Picoides borealis*), about 20 percent of the species' total known population. It was the only one of four potentially viable populations that had documented growth in recent years. However, initial post-hurricane surveys indicated that almost 95 percent of the suitable nesting trees have been destroyed. Woodpeckers have been seen examining the splintered ends of pine trees sheared off at mid-trunk, as if wondering what happened to their nest cavities.

Red-cockaded woodpeckers need old pine trees in which to excavate their nests. Because most pine trees over 10 inches (25 centimeters) in diameter were knocked down or severely damaged, whatever woodpeckers survived the storm have little nesting or foraging habitat. Mortality of the remaining woodpeckers on the national forest is expected to be between 25 and 75 percent, depending on how well the birds can survive at the damaged colony sites.

An interagency team of U.S. Fish and Wildlife Service and U.S. Forest Service biologists is working on ways to cope with the emergency. A detailed, colony-by-colony survey for nesting cavity trees, potential cavity trees, suitable foraging habitat, and surviving birds began October 15.

By December 4, 466 of the 542 colony sites had been surveyed. Nesting habitat at only 3 sites remained intact. At 171 sites, *all* cavity trees were lost, and the other sites lost various numbers. Checks for the birds themselves were made at 379 colonies; 295 still contained woodpeckers, but the birds at 71 of these occupied sites have lost all cavity trees. Artificial nest cavities have been placed at 68 colonies, using two methods that have yielded some success in the past. Francis Marion National Forest presents an opportunity to further evaluate these techniques in a situation where there is everything to gain and nothing to lose.

photo by John Christian

Almost all trees on Francis Marion National Forest suitable for nesting by red-cockaded woodpeckers were destroyed by Hurricane Hugo. Occupied trees were particularly vulnerable to breakage, usually snapping off at the nest cavities. One such tree is pictured above in the center background. The candle-like appearance of this broken tree is the result of pine sap that flowed down from the nest cavity. The sap apparently repels snakes that would otherwise prey on the birds and eggs.

Downed timber on the forest is being salvaged under guidelines designed to protect the remaining birds and habitat.

Red Wolf

Bull Island, South Carolina, which was a temporary home for five red wolves (*Canis rufus*), was entirely submerged by a 20-foot (6-meter) storm surge during the height of the hurricane. At first, most researchers felt the wolves—a male and his four pups—must have perished. These feelings turned to relief when signals were detected from the radio-collared animals. Apparently, all five initially survived the storm, but the adult male was found dead several weeks later. The carcass is being analyzed by the Service's National Wildlife Health Laboratory in Madison, Wisconsin, to determine the cause of death.

The five wolves were members of a family group placed last August on Bull Island, which is part of Cape Romain National Wildlife Refuge, just north of Charleston. (The female wolf apparently was killed by an alligator in early September.) They were to live on the island until the young were acclimated to the wild and ready for their ultimate home, Alligator River National Wildlife Refuge in North Carolina.

With only 2 days notice prior to the storm, it was not possible to recapture the five wolves, a process that could have taken a week or more to complete. Accordingly, they were left to ride out the hurricane, which pounded Bull Island with winds of over 135 miles per hour. Few trees remain standing on the island, and the future of the wolf acclimation project at Cape Romain is uncertain.

Puerto Rico Species

Before it reached the mainland, Hurricane Hugo slammed Puerto Rico and several nearby islands. Among the rare and endemic species affected by the storm were:

- **Puerto Rican parrot (*Amazona vittata*)**—On December 22, a census of the wild population was conducted by staff of the U.S. Fish and Wildlife Service, U.S. Forest Service, and Puerto Rico Department of Natural Resources. Approximately 20 to 22 parrots were found in the Caribbean National Forest, compared

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Correction

The bat photograph furnished with the recent story on Region 3's proposed *RECOVERY 2000* program (BULLETIN Vol. XIV, No. 8) should have been identified as that of a Mexican free-tailed bat (*Tadarida brasiliensis*). We regret the error, which should not be attributed to Bat Conservation International.

LISTING PROPOSALS—August/September 1989

A rabbit, a fresh water cave shrimp, and a fish were proposed recently by the Fish and Wildlife Service for listing as Endangered or Threatened species:

Lower Keys Rabbit (*Sylvilagus palustris hefneri*)

Although similar in general appearance to the widespread marsh rabbit, this island subspecies is endemic to a few of the lower keys in Monroe County, Florida. Within this already limited range, the lower keys rabbit is mainly restricted to marshes, both saline and fresh water. Because mangroves occupy many coastal areas and interior fresh water habitat is scarce, marshes already are naturally scarce in the Florida Keys, and they are on the decrease. The rate at which these uncommon wetlands are disappearing has prompted the Service to propose listing the lower keys rabbit as Endangered (F.R. 8/30/89).

Until recently, this subspecies was found on at least 10 of the lower Florida Keys and was probably locally common. With the filling of wetlands for residential, commercial, and military purposes, however, it is believed to be extirpated from five of these rapidly developing islands (including Key West).

A small amount of the rabbit's habitat is located on State and Federal lands, including National Key Deer Refuge. The U.S. Army Corps of Engineers, which has authority for wetlands protection under Section 404 of the Clean Water Act, must now consider possible impacts on the rabbit's habitat during evaluations of wetland dredge/fill permit applications. In some areas, permitting could become more restrictive.

Squirrel Chimney Cave Shrimp (*Palaemonetes cummingi*)

An even more highly restricted species, this crustacean is known only from a single location in Alachua County, Florida. The site, known as Squirrel Chimney, is a sinkhole that leads to a flooded cave system more than 100 feet (30 meters) deep. It supports one of the richest cave invertebrate faunas in the United States, and has been under consideration by the National Park Service since 1983 for National Natural Landmark status.

Because the Squirrel Chimney cave shrimp has such a limited range, any contamination of the sinkhole or the underlying aquifer could cause its extinction. The land surrounding the sinkhole is privately owned. Part is being managed as a pine plantation, but there is a possibility that it will be converted to a housing development. If this happens, the use of septic tanks, pesticides, and herbicides often associated with residential areas could degrade water quality in the aquifer. The current property owners have promised to give The Nature Conservancy the first option to purchase the land surrounding the sinkhole; however, even if it is acquired, the cave's aquatic habitat will remain vulnerable to impacts from nearby areas within the aquifer recharge zone.

The Service has proposed to list the Squirrel Chimney cave shrimp as an Endangered species (F.R. 8/30/89).

photo by Kent Keenlyne

pallid sturgeon

Pallid Sturgeon (*Scaphirhynchus albus*)

A large freshwater fish, the pallid sturgeon is native to the Missouri River, the Mississippi River downstream of the Missouri, and the lower Yellowstone River. Among its distinguishing features is its flattened, shovel-shaped snout. Specimens of up to 85 pounds (39 kilograms) have been taken, a size that makes this species a desirable trophy sport fish. The pallid sturgeon also is considered a fine eating fish, and its roe is suitable for caviar. During the 1950's-1960's, pallid sturgeon were relatively common in the northern Missouri River and were harvested commercially in the Dakotas.

Pallid sturgeon need large, turbid, free-flowing riverine habitat with a rocky or sandy substrate. These fish are adapted to life at the bottom of river channels, and they require areas of swifter water than those inhabited by the related but smaller shovelnose sturgeon (*Scaphirhynchus platorynchus*).

Pallid sturgeon numbers have fallen dramatically over the past 2 decades. Although expanded commercial fishing operations may have played a role in the decline, extensive habitat alterations in the Missouri and Mississippi Rivers are believed to be the main cause. Approximately 51 percent of the species' known historical range has been channelized, another 28 percent has been impounded in reservoirs, and the remaining 21 percent has been affected by related modifications in flow regimes. These changes in river habitat blocked the access of pallid sturgeon to spawning and/or feeding areas, destroyed spawning locations, and altered the condition of river channel substrates. Because of the threats to the species' survival, the Service has proposed to list the pallid sturgeon as Endangered (F.R. 8/30/89).

In recent years, no reproduction has been documented in the pallid sturgeon population. Fishery personnel captured two specimens in 1988 and attempted to develop procedures to hold the species for brood stock purposes, but the fish would not feed in captivity. Because the ability to artificially propagate the pallid sturgeon may be necessary if it is to be recovered, research into handling the fish is continuing.

* * *

Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species

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Listing Proposals

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Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are not legally binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

Desert Tortoise

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V, No. 9.) One of the main problems appeared to be the amount of forage available for the tortoises during their critical feeding periods. Most of the Slope is public land administered by the Bureau of Land Management (BLM) and leased for cattle grazing. Livestock compete with tortoises for food and alter the composition of forage plants in the flora. An abundance of less desirable plant species can result in tortoise malnutrition. Some tortoise mortality also results directly from the crushing of burrows and from the trampling of young tortoises above ground. The tortoise population on the Beaver Dam Slope is continuing to drop and is now less then half the number it was in 1980. Because these tortoises may be in imminent danger of extinction, the listing proposal for the Mojave population includes a provision to reclassify the Beaver Dam Slope tortoises from their current listing of Threatened to the more critical category of Endangered.

In 1984, the Service was petitioned by the Environmental Defense Fund, Natural Resources Defense Council, and Defenders of Wildlife to list the desert tortoise throughout the remainder of its range as Endangered. After evaluating the accompanying data, the Service decided in 1985 that the requested action was "warranted but precluded" at the time by pending listing proposals of higher priority.

Disease—The Newest Threat

The same three environmental organizations petitioned the Service again in 1989, requesting emergency protection for the desert tortoise and providing information on a serious new threat: an outbreak of a fatal, apparently contagious, upper respiratory disease syndrome. After evaluating the petition data and gathering additional information, the Service came to the conclusion that emergency listing was indeed warranted. This decision was consistent with the Endangered Species Act Amendments of 1988, which directs the Secretary of the Interior to take timely advantage of the emergency listing provisions of the Act to prevent a significant risk to the well-being of the species (see BULLETIN Vol. XIII, Nos. 11-12).

The upper respiratory disease syndrome (or URDS) appears to affect tortoises of all ages, but more mature, reproductively active tortoises have been found to be affected than juveniles. (It is not known to pose a threat to humans.) Those tortoises already weakened by malnutrition or environmental stresses seem to be more vulnerable. Once URDS is contracted by a tortoise, there is little chance of recovery, even if the animal receives intensive treatment. Because the disease also lowers the tortoise's resistance to other pathogens, most victims eventually become debilitated and die, often of secondary infections. Precipitous declines already have been detected in some subpopulations within the Mojave Desert.

Although the disease has been known for some time in captive tortoises, it was not recognized as a major problem for wild populations until very recently. In 1989, signs of the disease were found in 46 percent of 468 tortoises examined during surveys at the Desert Tortoise Natural Area near California City. In some samples, 70 percent of the tortoises showed signs of the disease. Infected tortoises also have been found in Nevada, Utah, and Arizona. There appear to be no barriers to prevent this disease from reaching epidemic proportions throughout the Mojave population.

Desert tortoises in the Sonoran Desert occur in numerous small, disjunct groups on scattered mountain slopes, in contrast to the more continuous distribution within the Mojave. The relative isolation of Sonoran subpopulations may limit spread of the disease. Cases of respiratory illness have been detected in Arizona tortoises, particularly those from a limited sampling on Saguaro National Monument near Tucson, but so far the disease has not shown signs of becoming pandemic throughout the Sonoran population. At this time, the Service does not believe that the Sonoran population as a whole is in immediate danger from disease; therefore, it was not included in the emergency listing. It will, however, remain a candidate for future listing action. Biologists with the Service and the Arizona Game and Fish Department will conduct a status review over the next 2 years, and will put together a report on tortoise management needs.

Biologists speculate that URDS was introduced into wild populations by the release of infected pet tortoises. Although it is not known to what extent collecting has affected wild populations, there are an estimated 100,000 desert tortoises in captivity. A disease believed to be URDS has been known in captive tortoises for at least several decades. Some people may have felt that sick pets would have a better chance of survival if returned to the wild, but their release has probably only spread the disease. The Service is cautioning people not to release *any* pet tortoises. Not all infected tortoises show obvious signs of the disease, and even healthy animals have difficulty readapting to life in the wild. People who have pet tortoises and no longer want them are being asked to contact their State wildlife agency. The Service is also pointing out that further collecting of desert tortoises from the wild is illegal in most States under State law.

Predation

As if the threats from disease and habitat degradation were not enough, predation of young tortoises by ravens (*Corvus corax*) is rapidly increasing. Raven populations grew 15-fold in the Mojave Desert between 1968 and 1988. They continue to rise, presumably in response to increased human uses of the desert. Land fills, sewage ponds, power lines, and other facilities provide new foraging, roosting, and nesting opportunities for the highly adaptable birds. Raven predation has become serious enough to reduce or even eliminate young tortoises in some areas. The problem is not limited to the Mojave; raven populations also are increasing in the Sonoran Desert.

Habitat Management

Although disease is the most immediate threat to the Mojave desert tortoise population, it is not one that can soon be

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Desert Tortoise

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resolved. More research must be conducted before effective treatments or preventative measures can be developed. At present, habitat conservation offers the best chance for saving the desert tortoise.

Federal land management agencies are in a position to take the lead in desert tortoise protection and recovery. Section 7 of the Endangered Species Act directs them to make use of their legal authorities for the welfare of listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of listed species. Most of the desert tortoise's habitat is on federally administered public land and is therefore subject to these conservation mandates.

At least 63 percent of the Mojave population's occupied range is under BLM jurisdiction. Other Federal managers of tortoise habitat include the Department of Defense, National Park Service, U.S. Forest Service, and U.S. Fish and Wildlife Service. These agencies now are required to consider the potential impacts of their programs on the desert tortoise and its habitat. Among the Federal actions that must be evaluated under Section 7 of the Act are military maneuvers; land transfers; and permits for grazing, mining, off-road vehicle use, construction, and rights-of-way. These activities are not necessarily prohibited, but they must be conducted in a manner that does not jeopardize listed species.

The BLM has been involved in desert tortoise research for more than a decade. Because most of the species' range is on BLM-administered land, the agency has a vital role to play in conserving tortoise habitat. In November 1988, BLM released a report, *Desert Tortoise Habitat Management on the Public Lands: A Rangewide Plan*, which calls for "no further net loss in populations or habitat conditions" on land the agency has designated as Category 1 and 2 habitat areas. Among the immediate needs identified in the plan were complete delineations of desert tortoise habitat, statewide plans for implementing the rangewide plan, and a system to track the cumulative impacts of various land uses on desert tortoise habitat.

Recently, BLM announced that it intends to disapprove any future applications for three large off-road vehicle races on public lands in the Mojave Desert: the American Motorcycle Association's Barstow-to-Vegas and Johnson Valley-to-Parker races and the California leg of SCORE's Parker 400. In making the announcement, BLM's California State Director cited the cumulative environmental impacts of these events over the years and the inability of the race sponsors to control the behavior of participants and spectators. BLM's monitoring of these events has identified recurring problems, including numerous incursions into Wilderness Study Areas, course straying and widening, and damage to the habitat of desert plants and animals, including the desert tortoise.

Competing Land Uses

With the growing demand for development in the Mojave Desert, land managers have the increasingly complicated task of minimizing the effects of human activities on desert tortoise habitat. Several recent examples from southern Nevada illustrate this point:

The Nevada-Florida Land Exchange Authorization Act of 1988 transferred approximately 38,000 acres (15,400 hectares) of BLM land in Nevada to the Aerojet-General Corporation in exchange for about 4,650 acres (1,900 ha) of the company's holdings in Florida. (The exchange also facilitated the establishment of a national wildlife refuge for the critically endangered Florida panther, *Felis concolor coryi*.) As part of the same agreement, the BLM was directed to grant Aerojet a 99-year lease for about 14,000 more acres (5,700 ha) in Nevada. The lease calls for Aerojet to contact the Service regarding the location of specified developments on the leased lands in order to minimize adverse impacts on the desert tortoise and other wildlife.

Another law affecting desert tortoise habitat in southern Nevada was passed by Congress this year. The Apex Project, Nevada Land Transfer and Authorization Act of 1989 directed BLM to sell approximately 21,000 acres (8,500 ha) of public land to Clark County for use in developing heavy industry. In accordance with the law, part of the property was resold to the Kerr-McGee Chemical Corporation for construction of a rocket fuel plant. After a Section 7 consultation with BLM on the Kerr-McGee project, the Service issued BLM a "no jeopardy" Biological Opinion but recommended that Kerr-McGee carry out a number of conservation or mitigation measures, including: removing tortoises from construction sites; placing relocated tortoises in man-made burrows during winter hibernation; building fences to exclude tortoises from roads and industrial areas; installing culverts under roads and rail corridors for "tortoise crossings"; taking measures to avoid the attraction of ravens and other predators; providing funds for radio-tracking equipment; and developing a portable public information exhibit on desert tortoise conservation. Such conservation measures isssued under a no-jeopardy Biological Opinion normally are discretionary for the consulting party; however, under the land-transfer agreement (signed October 27, 1989), they were made mandatory. On December 22, 1989, the Sierra Club Legal Defense Fund sent a letter to the Secretary of the Interior giving the required 60-day notice of intent to file suit over the terms of the Biological Opinion, charging that the Opinion does not contain a valid "incidental take" authorization.

Interest in the potential economic effects of desert tortoise conservation continues to run high in Nevada. The City of Las Vegas, the Summa Corporation, and several other plaintiffs brought suit against the Department of the Interior, seeking to prevent the emergency listing. They alleged that an emergency listing for the desert tortoise in Nevada was not warranted because URDS had not been satisfactorily documented in Nevada tortoises and because listing the tortoise would obstruct new housing developments and other construction. However, the Service had evidence before publication of the emergency listing rule that URDS was present in Nevada, and the disease subsequently was confirmed in tortoises at the Kerr-McGee site. As a result, the suit was not successful. Nevertheless, the plaintiffs have proposed a settlement of the lawsuit that would incorporate a research plan and, in the long term, a habitat conservation plan. Such a settlement, if approved, would allow some areas of desert tortoise habitat near Las Vegas to be developed in exchange for the funding of research into disease and other threats to the tortoise.

Similarity of Appearance

Desert tortoises from the Sonoran and Mojave populations are virtually indistinguishable except to those with expertise in the morphological differences between these animals. Thus, enforcment of the Act's restrictions on trade are likely to be difficult. To make enforcement easier and more effective, the Service has proposed to designate desert tortoises from the Sonoran population as "Threatened due to similarity of appearance" to the Endangered Mojave tortoises. This provision, if made final as proposed, would apply only to Sonoran tortoises found in possession outside of the Sonoran population's natural range.

Hurricane Hugo

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with the 47 birds known in the wild population prior to the storm. If it is true that at least 50 percent of the 47 birds in the wild flock have been lost, this obviously would be a major disaster for the species, placing it on the very brink of extinction. Biologists knew of five wild breeding pairs prior to the hurricane, but only three pairs have been seen after the hurricane.

Fortunately, nest cavity trees withstood the hurricane. Damage was limited primarily to defoliation and a few broken

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Hurricane Hugo
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branches, but food will be in short supply until new fruits and seeds ripen. On a more positive note, all 54 parrots held in the captive flock survived the storm.

• **Puerto Rican plain pigeon (*Columba inornata wetmorei*)**—After Hurricane Hugo defoliated the trees preferred by this pigeon, surveyors were able to count more than 203 birds, which compares favorably with the January 1989 census of 176 birds. Unfortunately, the pigeon's most important breeding area was completely destroyed. All of the 124 pigeons in the captive breeding flock initially survived, including one that hatched in the middle of the storm and was promptly named "Hugo." A major epizootic disease, which may have been related to flooding caused by the hurricane, broke out among the captive birds a few weeks after the storm hit, affecting 90 birds.

• **Endangered plants**—Many of Puerto Rico's rarest species are plants. Widespread deforestation in the past eliminated many populations of these plants. Development, erosion, and flooding are among the main threats facing the remaining populations. About a dozen plants that are under consideration for listing as Endangered or Threatened species were endemic to areas hit hardest by the storm. The status of all listed plants has been field checked. Some plants suffered defoliation and breakage, but all species apparently survived the storm.

• **Yellow-shouldered blackbird (*Agelaius xanthomus*)**—The fate of a small, remnant population that inhabited an area near Roosevelt Roads Naval Station on the main island is unknown. To date, only 2 individuals have been observed. Winds at the station were recorded at 204 miles per hour. Fortunately, the main population of about 250 birds was not in the storm's path and survived.

U.S. Virgin Islands

The almost total destruction of housing on St. Croix, one of the U.S. Virgin Islands, illustrates the intensity of Hugo's destructive impact. Effects on wildlife are harder to determine at this point, but preliminary surveys indicate the following:

• **St. Croix ground lizard (*Ameiva polops*)**—This reptile has a severely restricted range, occurring only on two tiny islets off St. Croix. Although the taller vegetation was broken and defoliated by the storm, the ground cover used by the lizard was not greatly impacted. Initial visits to one of the cays indicated that the species was not adversely affected by the hurricane.

• **Sea turtles**—Oil from a storm-caused spill did not come ashore at Sandy Point National Wildlife Refuge, a critical leatherback turtle (*Dermochelys coriacea*) nesting area on St. Croix, but some erosion of the nesting beaches did occur. These beaches are naturally dynamic, and it is anticipated that they eventually will be restored to their former state. Two other listed sea turtles, the green (*Chelonia mydas*) and the hawksbill (*Eretmochelys imbricata*), also use the Sandy Point Refuge for nesting. (See BULLETIN Vol. IX, No. 11.)

* * *

Additional field and aerial surveys for listed species in Hurricane Hugo's path will be completed as soon as weather, staffing, and travel conditions permit.

The Manatee Hot Tub

Don Palmer
Jacksonville, Florida, Field Office

The Fish and Wildlife Service's Jacksonville Field Office recently completed a Section 7 interagency consultation involving a potential conflict between the Endangered Species Act and the Clean Water Act. In this case, the Environmental Protection Agency (EPA) had directed the Georgia Environmental Protection Division to reclassify the North River, a tributary of the St. Mary's River in Camden County, Georgia, from "Industrial" to "Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life." The State subsequently ordered a paper mill on the North River to relocate its warm-water discharge point, change its discharge of effluent to an intermittent basis, and supplement the discharge with oxygen. This action would raise the dissolved oxygen level in the North River, bringing it within the standards set by EPA and the State.

The Service became involved because relocating the company's discharge pipe required a Federal permit under Section 404 of the Clean Water Act. We were concerned that altering the discharge of warm water from a constant to an intermittent flow could have an adverse impact on the Endangered West Indian (Florida) manatee (*Trichechus manatus*). These aquatic mammals need water that is 72° F. (22° C.) or warmer during the winter months. As development has shrunk the manatee's natural habitat, artificial warm-water refugia have been created where power plants, paper mills, and other facilities discharge waters heated during industrial use. These artificial refugia have "short-stopped" the animals from moving south to natural warm-water springs and other refugia during the winter months. Abruptly discontinuing artificial warm-water discharges could lead to hypothermia, disease, and death for manatees.

Recent radio-telemetry and aerial survey information showed that manatees overwinter in the North River and move between the paper mill's discharge point and another discharge located in Fernandina Beach, a distance of less that 20 miles (32 kilometers). At low tide, the animals must leave the discharge in Fernandina Beach due to shallow water and move to the discharge in the North River. Halting the discharge at the North River site during low tide would leave the manatees without a source of warm water, probably forcing them south to Jacksonville where they would be exposed to heavier boat traffic — a leading cause of manatee mortality.

Several meetings were held with EPA, the State, and the applicant to discuss alternatives. Our intention was to maintain a 24-hour warm-water discharge while complying with water quality standards. After modeling several alternatives, a solution was developed. The idea was to excavate a lagoon or a "manatee hot tub," which would be designed so that a continuous flow of warm water would be provided to an area large enough to hold about 30 manatees but small enough not to interfere with the overall water quality of the river. All parties agreed on a design and suitable flow rates. Plans call for excavating the manatee lagoon in the fall of 1989 and having it in operation by winter.

Utah Plant Removed From Threatened Species List

On September 14, 1989, a final rule was published in the *Federal Register* removing the Rydberg milk-vetch (*Astragalus perianus*) from Endangered Species Act protection. In 1978, when the plant was listed as Threatened, only two populations were known, both of them in Utah. Extensive studies over the past 9 years, however, have identified 11 additional populations. Over 300,000 individual plants are estimated to exist in the 13 known populations. All populations are healthy, with most having adequate protection from potential threats. Based on this information, the Service proposed on October 11, 1988, that the species be delisted (see BULLETIN Vol. XIV, Nos. 1-2). Although the species has been removed from the List of Endangered and Threatened Wildlife and Plants, the Service will continue to monitor the Rydberg milk-vetch populations for 5 years, as required by the 1988 amendments to the Endangered Species Act.

Final Listing Rules Approved for 13 Species

Michael D. Rees
Divsion of Endangered Species
and Habitat Conservation

During August and September of 1989, Endangered Species Act protection was extended to five plant and eight animal species:

Sacramento Prickly Poppy (*Argemone pleiacantha* ssp. *pinnatisecta*)

This robust perennial, a member of the poppy family (Papaveraceae), has up to 12 prickly stems, white flowers, and commonly grows to a height of 20-60 inches (50-150 centimeters). The poppy is endemic to nine canyons in the Sacramento Mountains of south-central New Mexico, where it grows on north-facing slopes, in canyon bottoms, along roadsides, and near leaks in water pipelines. Surveys in 1987 and 1988 located only 1,310 individual plants on lands administered by the U.S. Forest Service and Bureau of Land Management, State and county property, and private lands. The subspecies is threatened by livestock grazing, pipeline construction, flooding, and road construction and maintenance. The Fish and Wildlife Service proposed to list the Sacramento prickly poppy as an Endangered species in the July 13, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 8), and the final rule was published August 24, 1989.

Virgin River Chub (*Gila robusta seminuda*)

The Virgin River chub is a silvery, medium-sized minnow that averages about 8 inches (20 cm) in total length. It is endemic to 134 miles (216 kilometers) of the Virgin River in southwest Utah, northwest Arizona, and southeast Nevada. This subspecies is believed to have occurred historically throughout most of the Virgin River, but it now occurs in only 50 miles (80 km) of the main river channel. It is most common in deeper areas where waters are swift, but not turbulent, and is generally associated with boulders or other cover. Major river modifications, primarily water diversions and impoundments, are responsible for the decrease in range and numbers of this species. Potential threats to the species' survival include further water removals, additional impoundments, sedimentation, pollution, channel alteration, disease, and competition and/or predation by introduced species.

The Service proposed to list the Virgin River chub as an Endangered species and to designate Critical Habitat in the June 24, 1986, *Federal Register* (see BULLETIN Vol. XI, No. 7); the final rule listing the species was published on August 24, 1989. However, the Service decided to postpone the Critical Habitat designation to allow time for an analysis of possible economic effects.

Roanoke Logperch (*Percina rex*)

This fish, which reaches up to 5.5 inches (14 cm) in length, is characterized by an elongate, cylindrical body, conical snout, and complete lateral line. The Roanoke logperch is endemic to Virginia, where it occurs in four disjunct populations located in widely separated segments of four rivers: the upper Roanoke River, a 32-mile (52-km) reach of the mainstem Pigg River, a 32-mile reach of the mainstem Nottoway River, and a 2.5-mile (4.0-km) reach of the Smith River.

The largest population, which occurs in the upper Roanoke River, is subject to potential threats from water pollution, proposed water supply and flood control projects, and road construction. The other three populations are subject to siltation resulting from agricultural activities and to potential chemical spills. The Service proposed the Roanoke logperch for listing as an Endangered species on September 7, 1988 (see BULLETIN Vol. XIII, No. 9-10), and the final rule was published in the August 18, 1989, *Federal Register*.

Two Woodland Salamanders

The **Cheat Mountain salamander (*Plethodon nettingi*)** and **Shenandoah salamander (*Plethodon shenandoah*)** are slender, lungless salamanders that reach up to about 4.5 inches (12 cm) in length. The Cheat Mountain salamander occurs in an area about 19 miles wide by 50 miles long (30 by 80 km), mostly within the Monongahela National Forest in eastern West Virginia. It lives in forested areas above 3,120 feet (950 meters). The species' preferred habitat consists of mature red spruce (*Picea rubens*) and yellow birch (*Betula alleghaniensis*) forests, which have been greatly reduced by logging and fires. Timber operations are a continuing potential threat to the survival of the species, along with coal mining and recreational development. Construction of roads and pipeline rights-of-way also may affect the viability of the remaining small, disjunct populations. Competition with other salamanders may further limit the ability of the Cheat Mountain salamander to expand its range.

The Shenandoah salamander is known only from north-facing talus slopes above 3,000 feet (900 m) on three mountains in Shenandoah National Park. This salamander's habitat also was destroyed in the past by logging and fires. Although the species' known range is now protected from human impacts by the National Park Service, the abundant red-backed salamander (*Plethodon cinereus*) is believed likely to invade the Shenandoah salamander's last remnants of suitable habitat.

The Service proposed to list the Cheat Mountain salamander as a Threatened species and the Shenandoah salamander as an Endangered species in the September 28, 1988, *Federal Register* (see BULLETIN Vol. XIII, No. 9-10); the final listing rule was published on August 18, 1989.

Small-anthered Bittercress (*Cardamine micranthera*)

This perennial herb, a member of the mustard family (Brassicaceae), grows up to 16 inches (40 cm) tall and has clusters of small white flowers. It is endemic to seepages, stream banks, and moist woods along a few small streams in North Carolina. The small-anthered bittercress was believed extinct for nearly 30 years until it was rediscovered in 1985. Four small populations have been located, the largest consisting of about 200 plants, all of which are on privately owned land. Logging, encroachment of exotic plant species, flooding, impoundments, stream channelization, and the conversion of habitat to pasture are potential threats to the species' survival. The Service proposed the small-anthered bittercress for listing as an Endangered species in the February 1, 1989, *Federal Register* (see BULLETIN Vol. XIV, No. 3), and the final rule was published September 21, 1989.

Michaux's Sumac (*Rhus michauxii*)

A member of the cashew family (Anacardiaceae), Michaux's sumac is a densely pubescent, rhizomatous, dioecious shrub that grows up to 1.3 feet (0.4 m) in height. It is endemic to the inner coastal plain and lower piedmont of North Carolina, South Carolina, and Georgia. Since its discovery, 50 percent of the known populations have been extirpated. The shrub currently is known from 15 locations in North Carolina and 1 location in Georgia. Most of these populations are very small (9 have fewer than 100 plants) and contain plants of only one sex. The species' survival is threatened by the suppression of natural wildfires (which allows encroachment by competing vegetation),

(continued on next page)

Final Listings
(continued from previous page)

conversion of habitat for silviculture and agriculture, industrial and residential development, highway construction, hybridization with other species, and geographic isolation of male and female plants. The Service proposed Michaux's sumac for listing as an Endangered species on January 6, 1989 (see BULLETIN Vol. XIV, Nos. 1-2), and the final rule was published September 28, 1989.

Prairie Fringed Orchids

The **eastern prairie fringed orchid (*Platanthera leucophaea*)** and **western prairie fringed orchid (*Platanthera praeclara*)** are closely related members of the family Orchidaceae. Both species are perennial herbs that produce showy clusters of up to 40 white flowers. *Platanthera leucophaea* primarily occurs east of the Mississippi River, while *P. praeclara* occurs west of the Mississippi. Both species usually inhabit tall grass calcareous silt loam or sub-irrigated sand prairies; *P. leucophaea* also occurs in calcareous wetlands. Approximately 52 populations of *P. leucophaea* remain in 7 States and 2 Canadian Provinces, while about 37 populations of *P. praeclara* exist in 7 States and 1 Canadian Province. The prairie fringed orchids are threatened by conversion of their habitats to croplands, overgrazing, intensive hay mowing, drainage, and fire suppression. Collecting and the use of herbicides are other potential threats. On October 11, 1988, the Service proposed to list both prairie fringed orchids as Threatened (see BULLETIN Vol. XIII, Nos. 11-12); on September 28, 1989, the listing was made final.

Cracking Pearly Mussel (*Hemistena (Lastena) lata*)

This freshwater mussel has a thin, elongated, brownish-green shell and inhabits riffle areas in moderate-sized streams. Historically, it occurred in the Ohio, Cumberland, and Tennessee River systems in Indiana, Illinois, Kentucky, Tennessee, Alabama and Virginia. Impoundments, water pollution, and other habitat changes substantially reduced the species' range. Today, the mussel is only known to survive on a few shoals in the Clinch, Powell, and Elk Rivers in Tennessee and Virginia; it may also occur in a short reach of the Tennessee and Green Rivers. All of the populations are geographically isolated from each other, and it is likely that all but the Clinch River population are below the level required to maintain long-term genetic viability. Water pollution from coal mining and oil and gas development, siltation, toxic spills, and gravel dredging potentially threaten the remaining populations. The Service proposed the cracking pearly mussel for listing as an Endangered species on February 17, 1989 (see BULLETIN Vol. XIV, No. 3); the final rule was published September 28, 1989.

Ring Pink Mussel (*Obovaria retusa*)

Formerly known as the golf stick pearly mussel, the ring pink mussel has a 3- to 4-inch (8- to 10-cm) wide yellow-green shell and inhabits riffle areas in large rivers. The mussel historically occurred in the Ohio River and its large tributaries in Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Kentucky, Tennessee, and Alabama. Most of the populations apparently were lost when impoundments were built on these rivers. The species is known to exist on two reaches of the Tennessee River in Kentucky and Tennessee, one reach of the Cumberland River in Tennessee, and one reach of the Green River in Kentucky. None of the four populations is known to be reproducing, and all are potentially threatened by water pollution, river channel maintenance, navigation projects, and gravel and sand dredging. The ring pink mussel was proposed for listing by the Service as an Endangered species on March 7, 1989 (see BULLETIN Vol. XIV, No.4), and the final rule was published September 29, 1989.

Pygmy Sculpin (*Cottus pygmaeus*)

This small fish, rarely exceeding 1.8 inches (45 millimeters) in total length, is only known to occur in Coldwater Spring and the spring run near Anniston, Alabama. The City of Anniston owns Coldwater Spring, which serves as the city's primary water source. Although the pygmy sculpin has been protected under a cooperative agreement between the city and the Service, the species and its habitat is potentially threatened by water contamination and the proposed construction of a highway bypass. The Service proposed in the February 7, 1989, *Federal Register* that the pygmy sculpin be listed as a Threatened species (see BULLETIN Vol. XIV, No. 3), and the final rule was published September 28, 1989.

Queen Alexandra's Birdwing Butterfly (*Troides alexandrae*)

Queen Alexandra's birdwing is the world's largest butterfly, with a wingspan of up to 10 inches (250 mm). Its distribution is restricted to primary and advanced secondary lowland rain forest in a small area of Papua New Guinea. The loss of the butterfly's forest habitat to logging and agriculture, including the development of the oil palm industry and cocoa and rubber plantations, is the primary threat to its survival. Overcollecting is also a potential threat. The Service proposed to list the Queen Alexandra's birdwing butterfly as an Endangered species on March 1, 1989 (see BULLETIN Vol. XIV, No. 4), and the final rule was published September 21, 1989.

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(continued from page 2)

15, 16, 21, 25, and 19 young, respectively, reaching flight age. This may be the last year of good production as we enter a dry cycle.

* * *

Biologists with the New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, and U.S. Forest Service removed 566 Endangered Gila trout (*Salmo gilae*) from Main Diamond Creek in the Aldo Leopold Wilderness of New Mexico. The removal was prompted by torrential rains, which caused heavy inflows of ash and debris from headwater drainages. A lighting-caused fire that burned approximately 10,000 acres (4,000 hectares) of forest in the creek's upper watershed precipitated the flooding conditions.

The fish were packed by mule to a hatchery truck for transport to Mescalero National Fish Hatchery. A week after the removal, the creek was checked and only one trout was observed. The kill or displacement of all fish in upper Main Diamond Creek is believed to be almost 100 percent. Excessive quantities of silt, ash, and other debris cover the stream bottom and surrounding floodplain. It may take several years for the stream to completely recover. The creek will be monitored over the next several months, and after it has stabilized, the Gila trout will be returned to their native habitat.

A team of biologists from the same three agencies also conducted surveys of several other streams in the Gila and Aldo Leopold Wildernesses believed to be void of pure Gila trout. The purpose of the surveys was to determine their potential value as Gila trout recovery sites. The team considered the presence of natural fish barriers (e.g., waterfalls that would restrict upstream movement of fish), presence of sites where barriers to non-native fish could be easily constructed, instream flows, water quality, food availability, and presence of non-native trout. The team also took tissue samples from fish that had Gila trout characteristics. The tissues will be analyzed to determine the genetics of these specimens.

* * *

The Colorado River Municipal Water District has created riffle areas at six sites on the Colorado River for the Threatened Concho water snake (*Nerodia harteri paucimaculata*). Riffle habitat is used by

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photo by Ashton Graham

John Turner, Director of the U.S. Fish and Wildlife Service; Constance Harriman, Assistant Secretary of the Interior for Fish, Wildlife, and Parks; Jim Range, Chairman of the National Fish and Wildlife Foundation; and George Archibald of the International Crane Foundation (ICF) examine a whooping crane at the Patuxent Wildlife Research Center prior to its transfer to the ICF facility in Baraboo, Wisconsin.

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juvenile snakes for feeding and for protection from predators. The Service recommended creation of the riffles in a 1986 Biological Opinion issued to the Army Corps of Engineers for permitting the District to build Stacy Dam and Reservoir in central Texas.

* * *

On August 30, John Turner, Director of the Fish and Wildlife Service, and Constance Harriman, Assistant Secretary of the Interior for Fish, Wildlife and Parks, held a press conference at the Patuxent Wildlife Research Center in Laurel, Maryland, to announce plans to establish a second captive flock of whooping cranes at the International Crane Foundation in Baraboo, Wisconsin. The Fish and Wildlife Service and Canadian Wildlife Service, which cooperatively manage the cranes, decided to divide the captive flock to prevent an epidemic or other disaster from extirpating the entire captive population. The International Crane Foundation was chosen as the site of the second center because of its extensive experience and success in breeding various crane species.

On September 16, the new crane facilities were dedicated. Pen construction and expansion of the chick-rearing facilities were funded by a $200,000 grant from the National Fish and Wildlife Foundation. Governor Tommy Thompson of Wisconsin, Dr. James Lewis (the Service's Whooping Crane Coordinator), and Mary Wickham and Dr. George Archibald (of the International Crane Foundation), spoke briefly about the significance of the new facility and its role in the whooping crane recovery effort. The International Crane Foundation will concentrate its efforts on breeding whooping cranes, while Patuxent conducts reproduction research. One proposal under consideration calls for using "surplus" cranes produced from the captive flock to establish a second wild flock.

* * *

Nine young peregrine falcons (*Falco peregrinus anatum*) were produced at Big Bend National Park in Texas this year—an increase over last year's production of seven young. The number of eyries occupied by adult pairs was also up (eight this year versus six last year), although the number of pairs producing young (five) was the same as in 1988. One pair produced three young this year, the first time that's known to have happened in Big Bend since 1985.

Region 4—Persistence pays off. The Fish and Wildlife Service classified Curtus' mussel (*Pleurobema curtum*) in 1987 as an Endangered species. After construction of the Tennessee-Tombigbee Waterway, the species was known to exist only in the East Fork of the Tombigbee River in northeast Mississippi. At the time of its listing, however, the mussel had not been collected since 1974, partly because of a lack of intensive collecting in this stream. To make some determinations on the status of this and two other Endangered mussels in the East Fork, the Service funded an Endangered Species Act-Section 6 project with the State of Mississippi in 1988 to survey the stream's 4 miles (6 kilometers). This intensive survey, directed by Paul Hartfield of the Mississippi Department of Wildlife, Fisheries and Parks, did not find any of the three listed species. The survey included transects across the river every 330 feet (100 meters), along with intensive searches of mussel habitat with the use of SCUBA equipment.

Despite several weeks of unsuccessful searching, Paul and his crew did not give up. In August 1989, he and Dr. Robert Jones, also of the Mississippi Department of Wildlife, Fisheries and Parks, again visited the East Fork. This time they found four and one-half shells that Paul believed to be *P. curtum*. Two of the shells still had soft tissue and apparently were the victims of a racoon. The left valve of each shell was provided to Dr. David Stansbery, of Ohio State University, who confirmed that at least four of the shells were indeed *P. curtum*. The other two listed species being searched for were not found in the East Fork, but are known from other tributaries of the Tombigbee River. Thanks to the persistence of Paul and Robert, the existence of *P. curtum* has been confirmed and efforts to ensure its survival will continue.

Region 5—"Has everybody heard about the bird?" This phrase from the popular 1960's novelty song *Surfin' Bird* was the lead line in a recent public service ad campaign designed to alert the public about piping plovers (*Charadrius melodus*) nesting on northeastern beaches. Designed by two advertising executives in Rhode Island, the campaign included informative video and cassette tapes with "surfin' bird" music in the background. Refuge managers and other Fish and Wildlife Service personnel contacted newspapers and radio and television stations throughout Region 5, asking them to air or print the public service announcements. The focus of the campaign was to enlist beachgoers in the piping plover conservation effort by urging them to obey signs posted on beaches, keep pets on leashes (or leave them at home), and remove litter.

An estimate of piping plover nesting success in the North Atlantic Coast population should be available soon from the Region 5 office.

* * *

In January 1989, the Fish and Wildlife Service provided the National Park Service with a Biological Opinion on the effects of certain management alternatives on piping plovers at Breezy Point, Gateway National Recreation Area, New York. "Reasonable and prudent alternatives" in the Biological Opinion included closure of the beach to off-road vehicles and other high-impact recreational activities, and trapping of feral cats. The

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National Park Service implemented these alternatives at Breezy Point this summer, resulting in a tripling of the plover fledge rate.

Region 6—The best known female whooping crane in Nebraska, named "Oklahoma" because it spent its first winter in that State, finally paired with a male whooping crane and rejoined the wild flock in Wood Buffalo National Park in Canada. For the past 3 years, Oklahoma has stopped during her northward migration to roost and feed along the "Big Bend" reach of the Platte River in Nebraska. Separated from her parents in the fall of 1986 in Saskatchewan, Canada, she began travelling with sandhill cranes (*Grus canadensis*). It is believed that Oklahoma had not seen another whooping crane since being separated from her parents. Biologists had feared that she would not find a mate and therefore would not become a productive member of the Wood Buffalo/Aransas whooping crane population.

* * *

Kansas had its first documented successful nesting and fledging of bald eagles (*Haliaeetus leucocephalus*) this year. A pair of bald eagles were observed establishing a territory on the Rock Creek arm of Clinton Reservoir, southwest of Lawrence, Kansas, in late March. The Service worked with the Army Corps of Engineers, which manages the reservoir, and the Kansas Department of Wildlife and Parks to establish a buffer zone around the nests to reduce human disturbance. Signs were posted to educate people using the reservoir to the needs of the eagles during this key nesting period. The efforts paid off on April 28, 1989, when an adult was seen carrying food to the nest. Unfortunately, one of the adults disappeared just prior to this event, and it is thought that the bird—which is believed to be the female—was killed.

On May 6, 1989, the two eaglets were seen for the first time and both fledged on July 3. Two weeks later, Service biologists trapped and banded the two eagles, both of which were males and in good health. The eagles were flying up to 10 miles (16 kilometers) from the nest during the day and returning to the reservoir at night. It is hoped that the remaining adult eagle will find a new mate and return next year to breed again.

* * *

A brochure entitled "Grizzly Bears in the Cabinet/Yaak Ecosystem" was recently published by members of the Cabinet/Yaak citizens involvement group. The 20-page brochure addresses the concerns of local citizens about grizzly bears (*Ursus arctos*) in a question-and-answer format. It was prepared through a cooperative effort of Federal and State agencies and private interest groups. The brochure will be mailed to more than 12,400 residences in Lincoln and Sanders Counties in northwest Montana. This is an excellent example of a cooperative effort involving diverse interests to address a common issue.

* * *

The Colorado Division of Wildlife contracted the Colorado Bird Observatory, with the aid of Endangered Species Act-Section 6 funds, to survey those parts of Colorado most likely to support least tern (*Sterna antillarum*) nesting activity this year. Prior to 1988, no least terns had been recorded nesting in Colorado since 1977. In 1988, however, a colony of six adults was discovered on Horsecreek Reservoir in Bent County. That colony successfully fledged eight young. The 1989 tern survey located another nesting colony with eight adults on an island in Adobe Creek Reservoir, also in Bent County. This colony is believed to have been active for several years, but it was not officially recorded until this year. Three young terns fledged this summer, although it is not known whether the young came from one or more nests.

During the tern survey, it was also discovered that the piping plover is breeding in Colorado. This spring, a pair of adult piping plovers successfully hatched four young on the shores of Nee Noshe Reservoir in Kiowa County. This is the first known breeding in Colorado for this Endangered species in 40 years.

* * *

Fish and Wildlife Service and Wyoming Game and Fish Department biologists conducted the second annual Wyoming toad (*Bufo hemiophrys baxteri*) census in September on the Laramie Plains west of Laramie, Wyoming. The census was conducted to determine the current status of the only known existing population. This year, only 62 individuals were counted during the census, down from over 600 in 1988. It is not known why so few toads were counted this year; however, there are two changes from last year that may have contributed to the low number. Some of the toads may have moved out of the census area because water conditions in 1989 were lower than 1988. The Nature Conservancy also leased a portion of the toads' habitat and built a fence to exclude cattle grazing in 1989, which allowed a very dense growth of grasses to cover the lease area. Because of this dense cover, the toads could have been missed during the census.

As part of the recovery operation this year, it was decided to collect and send 12 adult and juvenile toads, both male and female, to the Wyoming Fish and Game Department's Sybille Wildlife Research and Conservation Unit near Wheatland, Wyoming. The intent of this experiment is to see if the toads will survive over the winter in captivity. If successful, the captive toads will be bred and any egg masses produced will be placed back into the toads' habitat.

Region 8 (Research)—Scientists from the Service's National Ecology Research Center field station in Gainesville, Florida, collected 12 Red Hills salamanders (*Phaeognathus hubrichti*) in south-central Alabama for mitochondrial DNA analysis. Results from this preliminary study should aid in determining levels of genetic variability and help in targeting populations for habitat acquisition and conservation agreements. In addition to this study, Service scientists are cooperating with Auburn University biologists on research into reproduction, functional morphology, and skeletochronology. (See BULLETIN Vol. XIV, Nos. 1-2.)

* * *

During the 1988 breeding season in Michigan, 77 Kirtland's warblers (*Dendroica kirtlandii*) were banded. All of these birds were captured for this first time. The banded birds will help biologists monitor population changes and identify movements of individual birds.

* * *

In the fall of 1989, 30 Mississippi sandhill cranes (*Grus canadensis pulla*) reared at the Patuxent Wildlife Research Center will be released on the Mississippi Sandhill Crane National Wildlife Refuge. Complete behavioral profiles of each bird are being documented by Ms. Mini Nagendran of North Dakota State University. After release, the birds will be monitored to see if their pre-release behavior can predict their activities in the wild.

* * *

A commercial version of a capture collar developed by Dr. L. David Mech, leader of Patuxent's Minnesota Research Group, was successfully field tested on a wild gray wolf (*Canis lupus*) in Superior National Forest. The collar was tested on the animal for 4 weeks. It can be used for a variety of functions and potentially can be used on other species. The collar can be remotely released from an animal, and it carries built-in tranquilizer syringes that can be remotely triggered to recover the animal. A data recorder also can be built into the collar.

Region 9 (Washington, D.C., Office)—The Farm Bill Sourcebook has been updated by the Service. Compiled to help Service managers implement the conservation provisions of the Food Security Act of 1985 ("Farm Bill"), the Sourcebook provides in a single document the background, policies, and procedures needed for the Service to perform its Farm Bill activities effectively and consistently. Copies of the Sourcebook have been mailed to each of the Service's Ecological Services Field Stations and to each Regional Farm Bill Coordinator. Questions on the revised material and requests for copies of the Sourcebook can be addressed to the Division of Endangered Species and Habitat Conser-

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vation, Branch of Special Projects, ARLSQ 400, Washington, DC 20240 (telephone 703/358-2201).

* * *

In July 1989, the Environmental Protection Agency (EPA) issued a notice describing its proposed program to reduce pesticide hazards to Endangered, Threatened, and proposed species. The notice proposed a new method for determining the order in which pesticides would be submitted to the Service for Section 7 consultation under the Endangered Species Act, and it proposed methods for getting the necessary cautionary instructions to pesticide users.

The proposed consultation method would involve identifying a species that is highly vulnerable to pesticide impacts and using it as a benchmark. The pesticides that would adversely affect this species would indicate which group of pesticides should be considered for further analysis. Next, the EPA would analyze those pesticides for their potential impacts on other listed or proposed species nationwide. The Service would then determine, in a Biological Opinion, what actions, if any, would be necessary to minimize hazards to those species.

After providing an opportunity for public review of the Service's Biological Opinion, EPA would direct pesticide manufacturers to label their products with a notice that the chemical should be used in accordance with a county-specific bulletin that would explain whatever precautions need to be observed.

EPA is currently analyzing the approximately 250 responses it received on the proposal, and it plans to make a final decision next spring.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	25
Birds	61	15	145	7	3	0	231	58
Reptiles	9	7	59	14	4	14	107	22
Amphibians	6	0	8	4	1	0	19	5
Fishes	49	2	11	25	6	0	93	48
Snails	3	0	1	6	0	0	10	7
Clams	34	0	2	0	0	0	36	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	1	1	7	0	0	19	12
Arachnids	3	0	0	0	0	0	3	0
Plants	163	6	1	42	7	2	221	89
TOTAL	378	50	469	112	23	39	1071*	292 **

Total U.S. Endangered **428**
Total U.S. Threatened **135**
Total U.S. Listed **563**

Recovery Plans approved: 252

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
36 plants

January 3, 1990

September/October 1989 Vol. XIV Nos. 9-10

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, U S Fish and Wildlife Service, Washington, D C 20240

November–December 1989 Vol. XIV, Nos. 11–12

ENDANGERED SPECIES

I 49.77:14/11-12
Endangered Species, Vol. 14...

Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Listing Proposals — October/November 1989

Sixteen species—11 plants and 5 animals—were proposed by the Fish and Wildlife Service during October and November 1989 for listing as Endangered or Threatened. All are native to the United States. If the proposed listings are approved, Endangered Species Act protection will be extended to the following:

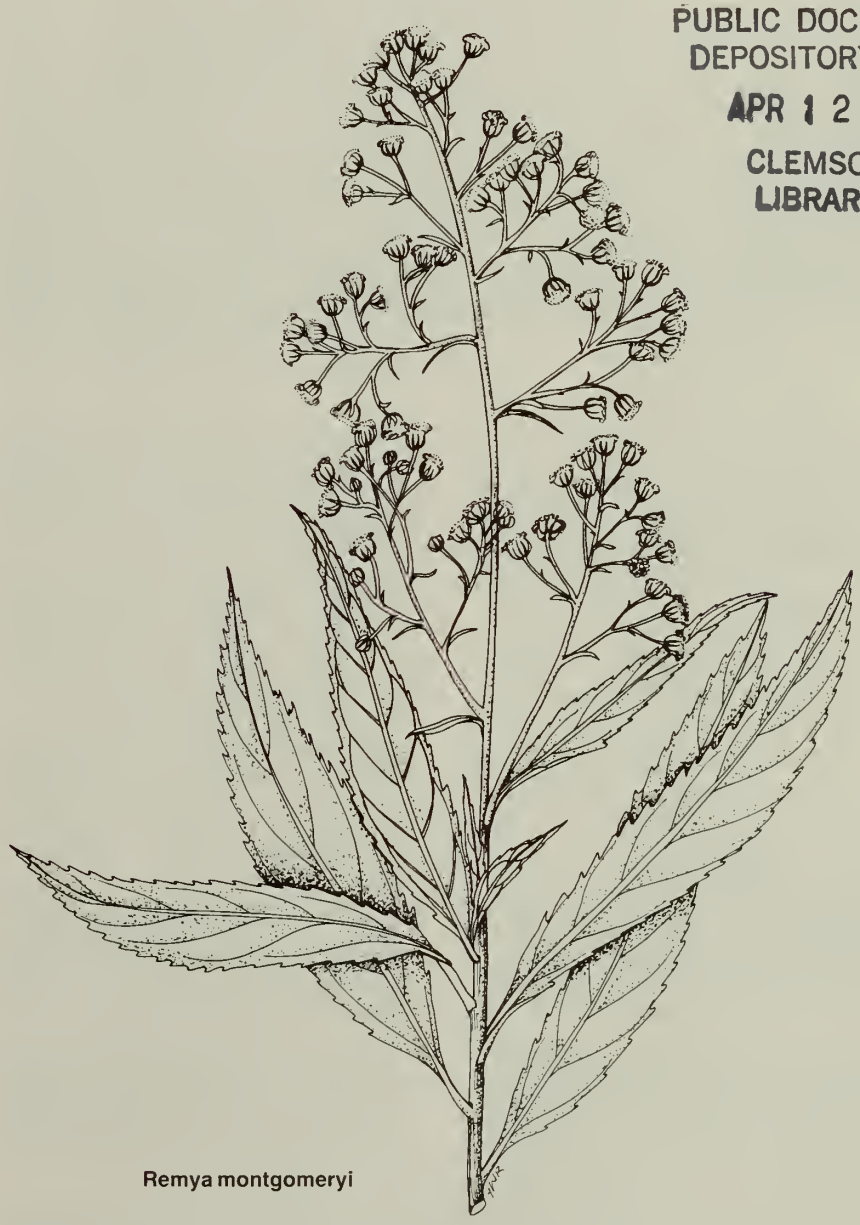
Remya spp.

Remya is a genus of small perennial shrubs in the aster family (Asteraceae, also known as Compositae). It comprises three species, all of which are endemic to the Hawaiian Islands. These plants grow to about 3 feet (1 meter) tall, with many slender, sprawling branches. The narrow leaves are up to 6 inches (15 centimeters) in length and coarsely serrated. Small, dark yellow flowers are clustered at the ends of the stems.

The quality of the natural Hawaiian environment has been degraded steadily since the introduction of many non-native animals and plants. Grazing and browsing by feral and domesticated animals, the erosion and other habitat degradation they cause, and competing naturalized plants are the greatest threats. Many of Hawaii's endemic plants and animals, which evolved in isolation, have declined in range and survive only in pockets of relatively undisturbed habitat.

All three species in the genus *Remya* were proposed on October 2 for listing as Endangered:

- ***R. mauiensis*** — This species is known from two small populations in the western part of the island of Maui, where they occur on adjacent ridges. There appear to be 20 to 25 plants at one site and 1 or 2 at the other. The State of Hawaii has fenced the larger population to protect it from cattle.
- ***R. montgomeryi*** — Apparently restricted to the island of Kaua'i, *R. montgomeryi* is known from only one site on the sheer, virtually inaccessible cliffs below the upper rim of Kalalau Valley. The population's size is unknown, but is believed to number fewer than 50 plants.
- ***R. kauaiensis*** — Another Kaua'i endemic, this species is known from five small populations in the Koke'e State Park area. The sites contain a total of about two dozen individuals.



Remya montgomeryi

drawing by Yevonn Wilson-Ramsey

Dwarf Iliau (*Wilkesia hobdyi*)

The dwarf iliau, a Hawaiian plant in the aster family (Asteraceae), is related to the spectacular and more widely known silversword. It apparently occurs only on two steep ridges in the Na Pali coast area of western Kaua'i. Both populations are on State-owned land within the Pu'u ka Pele Forest Reserve, and they total approximately 350 individuals.

Wilkesia hobdyi has been proposed for listing as Endangered (F.R. 10/2/89). The

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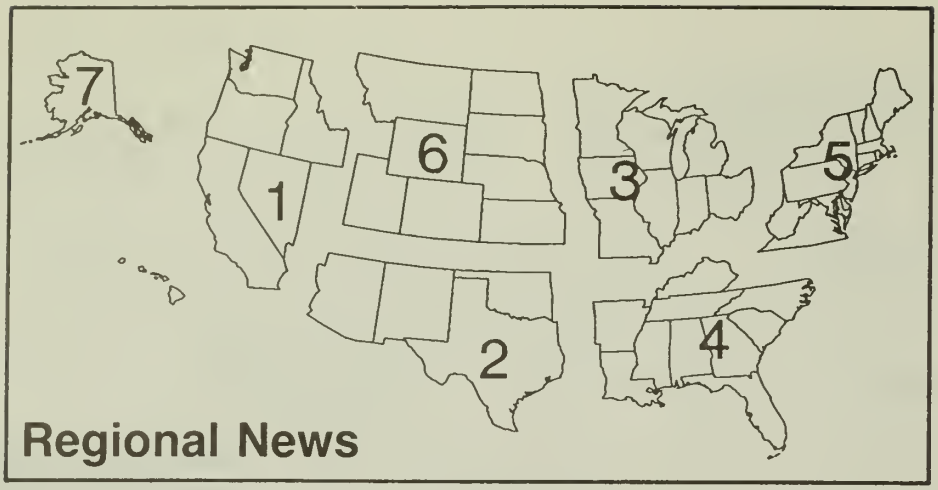

Regional News

Regional endangered species staffers have reported the following news:

Region 1—Between July and August, 28 sea otters (*Enhydra lutris*) were captured along the central California mainland and released at San Nicolas Island off southern California. At least 14 of the otters were still at the island by the end of August. An aerial survey also found three in the "no otter" management zone and one back in the mainland range. (See BULLETIN Vol. XIII, No. 4, for more details on the San Nicolas Island translocation effort.)

As recommended by the Sea Otter Recovery Team, the Fish and Wildlife Service is proceeding with two modifications to enhance the translocation program. The Service has applied for a modified permit to use radios that can be implanted in the otters. Such equipment will significantly enhance the ability of biologists to locate and track sea otters. The Service also is planning to propose a rule change to allow the translocation and reintroduction of adult females with dependent pups.

* * *

Biologists are continuing to track 29 woodland caribou (*Rangifer tarandus caribou*) with active radio collars in northern Idaho's Selkirk Mountains ecosystem. This has not been a good year for the herd. Preliminary information indicates that caribou reproduction was poor in 1989. Only 2 or 3 calves have been observed with the 19 radio-collared cows. In addition, five adults and one yearling died in August, the highest observed mortality in one month since the caribou were introduced from Canada. One caribou was killed by a mountain lion (*Felis concolor*), three are suspected to have been killed by bear, and two died of unknown causes.

* * *

Sixteen grizzly bears (*Ursus arctos*) in the Selkirk Mountains ecosystem are wearing active radio collars, including four grizzlies that were captured in British Columbia, Canada, last June. (Some bears frequently move back and forth across the international border.) This year, the first bear captured in the Selkirks—a female caught in 1983—was tracked to a spring range southwest of Priest Lake. The Service is proposing to add this habitat to the Selkirk grizzly bear recovery zone in an upcoming recovery plan revision.

In the North Cascades grizzly bear evaluation area, personnel from the Service's Olympia Field Station are participating in the grizzly bear monitoring effort being conducted by the Washington Department of Wildlife. Biologists have been searching here for evidence of the bears for the past year. In late fall, two separate grizzly bear tracks were confirmed by biologists in the North Cascades—the first time grizzlies have been positively identified in this ecosystem in over 20 years.

* * *

Forty-five dead desert tortoises (*Gopherus agassizi*) were recently found on 274 acres (111 hectares) north of Las Vegas, Nevada, that were recently transferred from the Bureau of Land Management (BLM) to the Kerr-McGee Chemical Corporation. About half of the tortoises appeared to have died in the past year.

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U.S. Fish and Wildlife Service
Washington, D.C. 20240

John Turner, *Director*
(202-343-4717)
Ralph O. Morgenweck
Assistant Director for Fish and Wildlife Enhancement
(202-343-4646)
Larry Shannon, *Chief, Division of Endangered Species*
(703-358-2171)
William E. Knapp, *Chief, Division of Habitat Conservation*
(703-358-2161)
Marshall P. Jones, *Chief, Office of Management Authority*
(703-358-2093)
Clark R. Bavin, *Chief, Division of Law Enforcement*
(703-358-1949)

TECHNICAL BULLETIN
Michael Bender, *Editor*
(703-358-2166)

Regional Offices

Region 1, 1002 N.E. Holladay St., Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director;* Robert P. Smith, *Assistant Regional Director;* Jim Teeter, *Chief, Division of Endangered Species and Habitat Conservation.*

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); Michael J. Spear, *Regional Director;* James A. Young, *Assistant Regional Director;* Steve Chambers, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); James C. Gritman, *Regional Director;* Gerald R. Lowry, *Assistant Regional Director;* James M. Engel, *Endangered Species Specialist.*

Region 4, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director;* John I. Christian, *Deputy Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Galen Buterbaugh, *Regional Director;* Robert E. Jacobsen, *Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Walter O. Stieglitz, *Regional Director;* Rowan Gould, *Assistant Regional Director;* Ron Garrett, *Endangered Species Specialist.*

Region 8 (FWS Research and Development nationwide), Washington, D.C. 20240; Richard N. Smith, *Regional Director;* Al Sherk, *Endangered Species Specialist (703-358-1710).*

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Red Wolf Recovery Continues to Gather Steam

Michael D. Rees
Division of Endangered Species
and Habitat Conservation
Washington, D.C.

Since our last story on the red wolf (*Canis rufus*) recovery effort (see BULLETIN Vol. XIV, Nos. 1-2), much has happened. With an unexpected natural disaster, additional wolf releases, and planning for new island propagation sites and a new mainland release site, this year has been a busy and exciting time.

Thirteen red wolves now roam Alligator River National Wildlife Refuge in eastern North Carolina. Three of them are juveniles that have been in the wild since they were pups. Two of these juvenile wolves were born and raised in the wild at Alligator River; the other was born on Bulls Island, part of the Cape Romain National Wildlife Refuge on the South Carolina coast, and released at Alligator River in January 1989. These wolves are doing well. Another Bulls Island wolf pup that was released at Alligator River in January 1989 was struck and killed by a car on November 21.

The Fish and Wildlife Service released 12 wolves at Alligator River last summer. Two of these, an adult pair consisting of a 7-year-old male and a 3-year-old female, were released July 3. On July 24, the Service for the first time released an entire family unit together. The family unit consisted of two adults (the only two remaining wolves of the original eight released at the refuge in 1987), three female pups, and one male pup. All four of these pups were born in captivity at the refuge last winter. In mid-August, a pair of 2-year-old wolves that had not bred also were released, followed by another 2-year-old pair a few weeks later.

Two of the wolves released at Alligator River in 1989 subsequently died. An adult male released on January 3 was killed by a car on July 31. In early September, the adult male from the family unit released July 24 was found dead. Dr. Nancy Thomas from the Service's National Wildlife Health Laboratory in Madison, Wisconsin, determined that it had been killed by another wolf. (A juvenile wolf has since paired with the adult female.)

In spite of these losses, Service biologists are satisfied with the progress being made at Alligator River. The mix of 13 experienced adults, yearlings, and pups should put the refuge's wild wolf population in good shape for the next breeding season. To help ensure that the refuge's wild wolf population increases, the Service is planning to capture at least one of the adult female wolves in late February 1990 and artificially inseminate her. This will mark the first time the Service has attempted to artificially inseminate red wolves.

Fish and Wildlife Service photo

Service biologist Mike Phillips moving a red wolf at Alligator River National Wildlife Refuge

Although the Alligator River Refuge is becoming well known as the only place where there are red wolves in the wild, the refuge is also the world's second largest red wolf captive breeding facility. With the release of 12 wolves last summer, space in the wolf pens has been freed. Red wolves will be brought in from other captive breeding facilities to acclimate them to the area. Some of them will be adult pairs that can be released if the free-ranging pairs fail to reproduce. The Service has learned through experience that it is necessary to have a large number of wolves on hand to meet various management contingencies.

One unexpected event that occurred this year was Hurricane Hugo, which played havoc with the Bulls Island propagation site (see BULLETIN Vol. XIV, Nos. 9-10). All five wolves on the island survived the storm, but one died a short time later. Although the condition of the four remaining wolves had not been ascertained as of early December, there is still prey on the island for the wolves to feed on and the wolves are moving around the island. After assessing the situation, Warren Parker, the Service's red wolf coordinator, decided that the project would continue on schedule. The original pen destroyed by the storm will be rebuilt, and sometime in mid-winter the wolf pups will be recaptured and moved off the island.

There are now seven pups and an adult male wolf ranging the Horn Island propagation site off the coast of Mississippi, part of the Gulf Islands National Seashore (administered by the National Park Service). The male's mate was found dead in an emaciated condition in mid-September. Dr. Nancy Thomas examined this wolf and found that it had died of pancreatic cancer—a very rare event. (Only about a hundred or so cases are known in the literature of canids with this type of cancer.) The other wolves are doing well.

If all goes according to plan, an adult breeding pair with pups will be released this winter on a new propagation site on Durant Island, off the coast of Alligator River Refuge. The Service has developed a cooperative agreement with the private owners for this release.

The Service is planning to establish another propagation site in January on St. Vincent National Wildlife Refuge, a barrier island off the Florida panhandle. An adult pair will be placed on the 12,000-acre (4,680-hectare) island to breed and provide wild pups for the mainland release sites. Two of the pups from Horn Island or Bulls Island also may be placed on this island.

Planning for a second mainland release site is also proceeding. The Service is considering several possible locations within the red wolf's historical range in the Southeast. If everything works out, a second mainland release site will be established in 1990.

It is worth pointing out that the red wolves the Service has reintroduced back into the wild have not been responsible for any known livestock depredations, injuries to people, or drops in game populations. The Service is carefully monitoring all the reintroduced red wolves to ensure that human-wolf problems are minimized.

photo by Derral Herbst

The dwarf iliau (Wilkesia hobdyi) branches from its base and grows to about 2 feet (60 cm) in height. Whorled tufts of narrow leaves grow at the top of each branch. Cream-colored flowers about 0.75 inch (2 cm) across are borne in clusters up to 18 inches (45 cm) long.

Listing Proposals

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greatest threat to its survival is browsing by feral goats. Large herds roam the cliffs upon which the plants grow and are responsible for a great deal of damage. They not only eat the plants but accelerate erosion of the fragile ridge soil. The goat herds are increasing rapidly due to game management practices aimed at maintaining high numbers for hunting.

Aupaka (*Isodendrion hosakae*)

The fifth Hawaiian plant proposed during October (F.R. 10/10/89) for listing as Endangered, *I. hosakae* is found on the island of Hawai'i (the "Big Island"). This woody shrub, a member of the violet family (Violaceae), grows up to 30 inches (76 cm) in height. It has narrow, lance-shaped leaves and small flowers that are yellowish-green to white in color. This species is one of four in the genus *Isodendrion*, which is endemic to the Hawaiian Islands.

About 275 individuals grow on three volcanic cinder cones in the Waikoloa area of the South Kohala District. All three sites are on privately owned land. The greatest immediate threat to *I. hosakae* is browsing and habitat disturbance by domestic cattle. Feral pigs also have been observed in the area and their rooting may pose additional problems for this species, as it does for many other Hawaiian plants. On several occasions in the past, the entire area has been leased on a temporary basis to the U.S. Army for ground troop training exercises. Such military activities could pose an additional threat, as could range fires during the dry season.

Aristida portoricensis

This plant, a grass in the family Poaceae, is another species endemic to an island ecosystem, occurring only in southwestern Puerto Rico. Currently, it is found at two sites on privately owned land. Both populations are threatened by habitat loss, and the Service has proposed listing *A. portoricensis* as an Endangered species (F.R. 10/10/89).

Known locally as pelos del diablo (devil's hair), *A. portoricensis* grows as bunches of tufted stalks that can reach up to 20 inches (50 cm) in height. The species apparently was once more widespread in southwestern Puerto Rico, but the clearing of land and introduction of competing grass species for cattle pastures may have eliminated *A. portoricensis* from parts of its range. Collection sites from 1903 and 1927 appear to have been lost to residential and commercial development.

Habitat loss continues to threaten the species. Both remaining *A. portoricensis* sites are subject to residential development, and the larger population is in an area proposed for copper and gold mining.

Harrisia portoricensis

Three small islands off Puerto Rico contain the only remaining range of another rare plant, *Harrisia portoricensis*. Known locally as the higo chumbo, this plant is a columnar cactus that grows with other cacti in semi-open dry forests. Its slender, usually unbranched stem grows to about 6 feet (2 meters) in height. Large, greenish-white, funnel-shaped flowers open at night. The fruits of this cactus are a preferred food of the yellow-shouldered blackbird (*Agelaius xanthomus*), another Endangered species. *Harrisia portoricensis* was proposed October 18 for listing as Threatened.

This cactus once occurred in the southwestern section of Puerto Rico, but it disappeared from the island as its habitat was converted to urban, industrial, and agricultural uses. It is now found only on the islands of Mona, Monito, and Desecheo. Mona and Monito are being managed as wildlife reserves by the Puerto Rico Department of Natural Resources; however, Mona, which has most of the species' habitat, has been proposed several times in the past as a site for a prison and a superport/oil storage facility.

Once again, the effects of feral livestock are the main threats. Pigs on Mona damage the cacti when digging for edible roots, and goats on both Mona and Desecheo are believed to be altering the vegetational composition of these islands. Desecheo is managed by the Service as part of the National Wildlife Refuge System. Goat control on this island would likely be part of a recovery effort for the cactus.

photo by Sue Rice

Harrisia portoricensis

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Listing Proposals

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Michigan Monkey-flower (*Mimulus glabratus* var. *michiganensis*)

A semi-aquatic perennial herb in the snapdragon family (Scrophulariaceae), this plant occurs primarily along lakeshores and streams in the Mackinac Straits and Grand Traverse regions of northern Michigan. It grows as clumps of up to several hundred clonal stems, each about 14 inches (36 cm) in length and lined with coarsely-toothed leaves. The solitary yellow flowers are tubular and two-lipped, with the tube and lower lip irregularly spotted.

Currently, the Michigan monkey-flower is known from only 12 sites, 8 of which contain fewer than 10 individual plants. Due in part to the species' association with water, its habitat is rapidly being developed for recreational and residential purposes. Three historical populations already have been lost, and two others have been severely damaged. Some incidental commercial use has occurred as well. One population was discovered after a botanist was served a sprig of the plant as a garnish on his restaurant dinner plate.

Populations of the Michigan monkey-flower occur in Sleeping Bear Dunes National Lakeshore (managed by the National Park Service), a University of Michigan biological station, and two local parks. Almost two-thirds, however, are on privately owned land. Several of the landowners have advised the Service of their plans to protect the plant. Nevertheless, because the species as a whole is believed vulnerable to extinction, the Service has proposed to list *Mimulus glabratus* var. *michiganensis* as Endangered (F.R. 10/2/89).

Sentry Milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*)

The Latin name *cremnophylax*, meaning "watchman of the gorge," aptly describes the location of this plant. It is found at one site on the very edge of the South Rim of the Grand Canyon. Unfortunately, because the site is also a popular scenic viewpoint, the sole population of this plant is being trampled by park visitors. Accordingly, the Service has proposed to list it as Endangered (F.R. 10/18/89).

The Sentry milk-vetch, a low-growing plant, forms mats less than 1 inch (2.5 cm) high with short, creeping stems, compound leaves, and whitish or pale purple flowers. It is part of the dwarf plant community that grows in the shallow soils of Kaibab limestone "pavement."

A thorough census in 1989 indicated that the population contained fewer than 500 plants. A 1989 inventory of monitoring plots established the previous year revealed a 14 percent decline in plant numbers. The cause is believed to be trampling and drought. A paved walkway leads through the species' habitat, but many visitors take a short-cut from the parking lot to the canyon rim and walk directly over the plants. In response, the National Park Service has proposed to erect a fence around the population.

Barneby Ridge-cress (*Lepidium barnebyanum*)

Named after Rupert Barneby, who discovered it in 1947, this small plant is a perennial herb in the mustard family (Brassicaceae). The species is known only from Duchesne County, Utah. It apparently is restricted to a narrow soil type, and the plants grow only on a series of shale barrens topping three ridgelines near Indian Creek. Approximately 5,000 individuals occupy fewer than 500 acres (200 hectares) of habitat. The entire range is within the Uintah and Ouray Reservation of the Ute Indian Tribe. Because the species' range is limited and is subject to habitat degradation, the Service has proposed to list *L. barnebyanum* as Endangered (F.R. 11/27/89).

The habitat is being damaged by off-road vehicle recreation, which in this area is concentrated on the sparsely vegetated ridgelines. In addition to soil compaction and erosion, the plants themselves are being trampled. The Bureau of Indian Affairs, which is responsible for assisting the Ute Tribe in resource management on the Reservation, is attempting to protect the habitat but lacks statutory authority for effective control.

The area is also immediately adjacent to active oil and gas fields. Further development of these fields could threaten the Barneby ridge-cress unless specific actions are taken to protect the occupied sites. The Bureau of Land Management is responsible for oil and gas leasing on lands that are under Federal jurisdiction, including Indian Reservations.

If *L. barnebyanum* is listed, both agencies will have legal authority and responsibility under the Endangered Species Act to protect the habitat.

drawing by K. H. Thorne

The Barneby ridge-cress (*Lepidium barnebyanum*) grows to about 6 inches (15 cm) high from a deep tap root and forms clumps about 8 inches (20 cm) across. It bears small, white to cream-colored flowers from May to July.

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Listing Proposals

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Kral's Water-plantain (*Sagittaria secundifolia*)

An aquatic plant, Kral's water-plantain is restricted to the Little River system in northeastern Alabama and northwestern Georgia. Only one of two historically known populations survives, and it faces impacts from water quality degradation and a potential hydroelectric impoundment. On October 18, the Service proposed to list this species as Threatened.

Clearing of adjacent river banks for silviculture, residential/recreational development, surface mining, and agriculture pose a significant threat to the aquatic habitat. Erosion resulting from these activities increases stream turbidity and siltation. Such impacts probably led to the extirpation of the other *S. secundifolia* population and reduced the amount of suitable habitat for the species as a whole. Additional impacts on the species may result from garbage dumping and leaking sewage systems, which lead to increases in the amount of filamentous algae in the water. Extreme turbidity and dense growths of algae reduce the amount of light available to the plants for growth and flowering.

Impoundments have been created over large areas of habitat presumed suitable for *S. secundifolia*, and undocumented populations may have been destroyed. Approximately 33 percent of the habitat occupied by the one remaining population would be destroyed if a proposed hydroelectric impoundment is constructed on the Little River. However, the power company promoting the facility views the Little River site as the least desirable of several alternatives it is evaluating.

Inflated Heelsplitter (*Potamilus inflatus*)

This freshwater mussel receives its common name from its inflated shell and the sharp, wing-like ridge formed where the two shells join. The inflated heelsplitter once inhabited parts of seven rivers in Alabama, Louisiana, and Mississippi, but extensive habitat alteration has eliminated this mollusk from most of its historical range. The Service has proposed to list *P. inflatus* as Threatened (F.R. 10/27/89).

Currently, the inflated heelsplitter can still be found in parts of the Amite River in Louisiana and the Tombigbee and Black Warrior Rivers of Alabama, although its range has declined significantly in all three rivers. The species has been extirpated from the Tangipahoa River, Louisiana; the Pearl River, Mississippi; and the Alabama and Coosa Rivers, Alabama. These rivers have been extensively altered for a variety of purposes. Some *P. inflatus* populations disappeared when the free-flowing habitat was impounded for navigation, flood control, and hydropower. Others were lost as rivers were channelized for navigation and dredged for gravel mining. Sedimentation from surface mining, along with water pollution from urban and industrial effluents, have contributed to the decline. Most of these factors threaten the remaining *P. inflatus* populations.

Fanshell Mussel (*Cyprogenia stegaria* (= *C. irrorata*))

Another freshwater mollusk, this species historically occurred throughout the Ohio River and its large tributaries in Virginia, West Virginia, Pennsylvania, Ohio, Indiana, Illinois, Kentucky, Tennessee, and Alabama. Currently, however, only three reproducing populations are known to remain. The collection of a few old specimens over the past decade indicates that some small, apparently nonreproducing populations may persist in other areas. Because of continuing threats to the habitat, the Service has proposed listing the fanshell mussel as an Endangered species (F.R. 10/2/89).

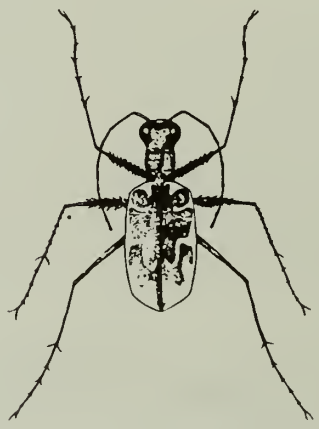
The factors that reduced the range and reproductive capacity of the fanshell mussel apparently are similar to those that affected the inflated heelsplitter. Much of the riverine habitat in the Ohio River system has been converted to reservoirs and navigation channels, dredged for channel maintenance and gravel/sand mining, and/or degraded by pollution. The fanshell's only known breeding populations are in sections of the Clinch River, Tennessee and Virginia; Green River, Kentucky; and Licking River, Kentucky.

Two Tiger Beetles

Endangered Species Act protection was recommended for two species of tiger beetles known primarily from river and ocean beaches in the northeastern United States (F.R. 10/2/89). The **Puritan tiger beetle (*Cicindela puritana*)** was proposed by the Service for listing as Threatened, and the **northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)** was proposed as Endangered.

There are many species of tiger beetles. These day-active insects capture small arthropods in a "tiger-like" manner, grasping prey with their mandibles (mouthparts). As larvae, they live in burrows. They are voracious predators even during this stage, fastening themselves near the tops of their burrows by means of abdominal hooks and reaching out to seize passing invertebrates. Because of their interesting behavior and variety of forms and habitats, tiger beetles have received much study. A journal devoted exclusively to these beetles, "Cicindela," has been published since 1969. Tiger beetles also are believed to be more highly sought-after by amateur collectors than insects of any other single genus.

- The Puritan tiger beetle historically occurred in scattered locations along the Connecticut River in New Hampshire, Massachusetts, and Connecticut, and along the Chesapeake Bay in Calvert and Kent Counties, Maryland. The reasons for this disjunct distribution are unclear. However, the habitat in both areas is similar, characterized by narrow, sandy beaches with adjacent bluffs or cliffs of sand and clay. Puritan tiger beetles have a one-year life cycle, and during their larval stage they burrow into moist areas of the cliffs or back beaches. They emerge as adults in early summer to feed and mate in beach areas.



drawing by Josephine Thoms

Puritan tiger beetles (*Cicindela puritana*) are brownish-bronze above with a metallic blue underside. They usually measure under 0.5 inch (11 millimeters) in length.

The 17 dams built along the Connecticut River above Hartford probably inundated some Puritan tiger beetle populations and decreased the water flow necessary for habitat maintenance at other areas. Pollution of the Connecticut River may have extirpated other populations, although the largely successful clean-up effort taking place on this river may permit reestablishment in some areas. Cliff stabilization activities also have modified the beetle's habitat, eliminating the newly exposed areas needed for egg-laying and burrow construction.

- The northeastern beach tiger beetle historically occurred in abundance on sandy beaches from Cape Cod, Massachusetts, to central New Jersey, and along the Chesapeake Bay in Maryland and Virginia. Unlike the larvae of the Puritan tiger beetle, northeastern beach tiger beetle larvae

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Listing Proposals

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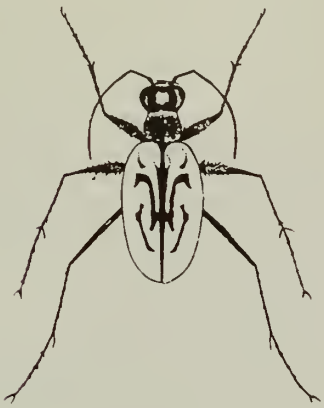
occupy burrows directly on the beach, in and above the high-tide zone. Another difference is that northeastern beach tiger beetles have a 2-year life cycle, over-wintering twice as larvae.



drawing by Josephine Thoms

Northeastern tiger beetles (*Cicindela dorsalis dorsalis*) have white to light-tan elytra (anterior wings) with a bronze-green head and thorax. They reach up to 0.6 inch (15 mm) in length.

The dependence on beach habitat and the length of its larval stage make the northeastern beach tiger beetle particularly vulnerable. Because the larvae occur only in the intertidal zone, they are unavoidably in the path of beach users and their vehicles, which crush the animals and their burrows. Studies conducted in Maryland and Virginia point out that as beach use increases, tiger beetle numbers decrease. Oceanfront development is a growing threat as well. Due to these factors, the northeastern beach tiger beetle is believed to be extirpated from all of its range north of Maryland, except for a small population on the island of Martha's Vineyard.

Desert Tortoise (*Gopherus agassizi*)

The Mojave population of the desert tortoise, consisting of those tortoises to the north and west of the Colorado River, was proposed October 13 for listing as Endangered. (See feature in BULLETIN Vol. XIV, Nos. 9-10.) Habitat degradation, predation, and disease are believed to threaten the population with imminent extinction. Currently, the Mojave population is protected under a temporary, emergency listing rule. The Service plans to make a final decision on long-term protection for the Mojave population by April 1, when the emergency listing expires.

* * *

Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are not legally binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

Final Listing Rules Approved for Two Desert Fishes

Final listing rules were published recently for two small desert fishes in the minnow family, the Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) and Independence Valley speckled dace (*Rhinichthys osculus lethoporus*).

Before the region became drier at the end of the Pleistocene, these fishes may have occupied all of the streams and wetlands maintained by small springs in Clover and Independence Valleys in northeastern Nevada. Today, they are restricted to a few spring systems. The Clover Valley speckled dace occurs in three springs and outflows, and the Independence Valley speckled dace is known to occur in only one spring system. All of these habitats are on private land used for ranching. The size of the current populations is unknown.

These desert fishes have been adversely affected by habitat alterations to facilitate irrigation and by the introduction of non-native fishes. Some of the springs and wetlands that once supported both subspecies have been ditched and impounded to support ranching operations. Because of their extremely limited distribution, the effects of introduced fish species, and continuing threats to their habitats, the Service proposed the Clover Valley and Independence Valley speckled daces for listing as Endangered in the September 18, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 10); the final rule was published October 10, 1989. (The two subspecies were incorrectly given the same scientific name in the table in the October 10 *Federal Register*. This error was corrected in the November 17 *Federal Register*.)

Utah Cactus Delisted

The Fish and Wildlife Service has published a final rule to remove the purple-spined hedgehog cactus (*Echinocereus engelmanii* var. *purpureus*) from the Endangered Species List (F.R. 11/27/89). A 1988 study determined that *E. e. purpureus* is merely a sporadically occurring color and spine phase of *E. e. chrysocentrus*, a common species in the Mojave Desert in southwestern Utah. Because *E. e. purpureus* exhibits no population integrity independent of *E. e. chrysocentrus*, and cannot be defended as a distinct species, subspecies, or taxonomic variety, it is not eligible for Endangered Species Act protection. The subspecies was proposed by the Service for delisting on January 19, 1989 (see BULLETIN Vol. XIV, Nos.1-2).

Aleutian Canada Goose Proposed for Reclassification

Michael D. Rees

In 1967, the Aleutian Canada goose (*Branta canadensis leucopareia*), a small Canada goose subspecies faced with extinction, was listed as Endangered. At the time, biologists were aware of only one breeding area in Alaska, and the migration routes and wintering grounds were unknown. Twenty-two years later, after an intensive recovery effort, Aleutian Canada goose numbers have increased enough for the subspecies to be proposed for reclassification from Endangered to the less critical status of Threatened.

Aleutian Canada geese probably once occurred on islands from the western Gulf of Alaska and Alaska Peninsula region to the Commander and Kuril Islands of the Soviet Union. The subspecies, distinguished from most other Canada geese by its small size, abrupt forehead, and ring of white feathers at the base of the neck, used to nest and rear young on most of the larger Aleutian Islands. We now know that most Aleutian Canada geese leave their Alaska breeding grounds in September and winter in the upper San Joaquin Valley of California. Two small subpopulations spend the winter further north in the Sacramento Valley and near Pacific City, Oregon. The geese leave their wintering areas in April and return to Alaska.

Decline of the Species

Through the late 1800's, Aleutian Canada geese were numerous throughout the Aleutian Island chain, which stretches southwest from the Alaska Peninsula for over 1,000 miles in the Bering Sea. The decline in the numbers and range of this subspecies is largely attributed to the introduction of arctic foxes (*Alopex lagopus*) onto the islands. Commercial fox farmers released these non-native foxes on most of the Aleutian Islands from 1836 to about 1930. The foxes multiplied rapidly and were easily trapped on the islands. Unfortunately, the Aleutian Canada geese on these islands became easy prey for the foxes. By the late 1930's, surveys of the Aleutian Islands indicated that the geese were rare or extirpated on islands where foxes had been introduced.

By the time the Aleutian Canada goose was listed, it was speculated that only 200-300 geese remained. Nesting was believed restricted to a single island, Buldir, near the western end of the Aleutian chain. Foxes had not been introduced on Buldir because of its small size (4,914 acres; 1,990 hectares) and rugged topography. Two other remnant goose populations were subsequently discovered. In 1979, a breeding population of geese was found on Kiliktagik Island (230 acres; 93 ha), south of the Alaska Peninsula. Another remnant breeding population was discovered in 1982 on the 2,082-acre (842-ha) Chagulak Island.

Hunting and the loss of wintering habitat also may have contributed to the decline of the Aleutian Canada goose. The Aleuts, the local native people, historically hunted the goose on its nesting areas. In the recent past, Aleutian Canada geese were hunted recreationally and for food within the Pacific Flyway, particularly in California. Hunting in the migration and wintering areas was likely responsible for preventing the recovery of the remnant breeding populations.

The Recovery Effort

After the Aleutian Canada goose was listed as Endangered, an intensive effort was launched in Alaska, California, and Oregon to recover the species. In Alaska, the area west of Unimak Pass was closed to Canada goose hunting in 1973. The recovery effort in the breeding grounds focused on eliminating arctic foxes from former nesting islands, reestablishing breeding populations on fox-free islands, and conducting surveys to discover and monitor new nesting populations.

Even before the Aleutian Canada goose was listed in 1967, efforts were being undertaken to eliminate fox populations on islands that had once been occupied by nesting geese. By 1965, the Service had eradicated all foxes from Amchitka Island; by the late 1970's, Alaid, Nizki and Agattu Islands also were free of fox. More recently, Amukta and Rat Islands were cleared. Apparently all foxes also have been eliminated from Kiska Island, although additional surveys are needed to verify this. Altogether, more than 244,000 acres (98,800 ha) are now free of foxes in the Aleutians, including several small islands that either escaped fox introductions or where fox populations have died out.

The Service began an effort to reestablish breeding populations of the goose on islands where foxes were eliminated. In 1963, the Service removed 18 goslings from Buldir to begin a captive breeding population. Captive-raised geese were then released on selected islands. These early releases, however, proved largely unsuccessful. In 1979, an effort was begun to transplant wild family groups from Buldir to fox-free islands. This approach proved more successful. In 1984, the Service confirmed that a small population of nesting geese had been reestablished on Agattu Island—the first nesting of wild Aleutian Canada geese on

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Fish and Wildlife Service photo

Aleutian Canada goose

Aleutian Canada Goose

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that island since the 1930's. Small breeding populations subsequently were confirmed on Nizki and Alaid Islands in 1988, and a single pair of nesting geese was discovered on Amukta Island in 1989. Although more than 450 geese have been released on Amchitka and 116 geese were released recently on Little Kiska, nesting on these islands has not yet been confirmed.

In the Aleutian Canada goose's wintering grounds, a major effort was undertaken to protect the wintering flock from hunting and to preserve roosting and feeding habitat. Federal, State, county, and municipal governments worked together with hunting and waterfowl groups. The States of California and Oregon assisted in the recovery effort by identifying key migration and wintering areas, initiating hunter education programs, and modifying hunting regulations. Hunting closures in selected areas began in California in 1975 and in Oregon in 1982. Several key staging and wintering habitats in Oregon and California have been protected through easements and inclusion within the National Wildlife Refuge System. Other important areas have been acquired by the California State Wildlife Area and Park systems.

As a result of the recovery effort in both the breeding and wintering grounds, the Aleutian Canada goose population has increased in the wild from fewer than 800 birds in 1975 to approximately 5,800 today. On the California wintering grounds, the number of geese has increased an average of 16 percent annually from 1975 to 1988. In its breeding range, the bird now nests on seven islands. Based on the best current estimates available, the Service believes that the primary breeding population on Buldir numbers 1,100-1,500 pairs; 20-22 pairs on Kiliktagik Island; 35-40 pairs each on Agattu, Nizki and Alaid Islands; and 50 pairs on Chagulak Island. More than 140 geese are also being held by zoos and waterfowl propagators in the United States and Canada.

The Reclassification Proposal

The Aleutian Canada goose population now exceeds the minimum criteria in the Aleutian Canada Goose Recovery Plan (approved in 1977 and revised in 1982) for reclassification from Endangered to Threatened. After reviewing the substantial improvement in the status of the Aleutian Canada goose and other relevant information, the Service believes that a change in classification under the Endangered Species Act is warranted. The proposal to reclassify the status of the species was published in the September 29, 1989, *Federal Register*. A final decision on the proposal should be published within a year.

Although significant progress has been made in recovering the Aleutian Canada goose, the Service believes the subspecies still requires Endangered Species Act protection. The small, isolated breeding populations are vulnerable to extirpation from random environmental events, such as storms and earthquakes. Less than 15 percent of the habitat once used by nesting geese has been cleared of foxes. In California, the wintering flock is often concentrated on roosting and feeding sites. In these areas, the threat of disease, such as avian cholera, will increase as the population grows in number. The greatest remaining threat to the survival of the species, however, is the loss of unprotected wintering habitat. Important wintering areas are threatened by changing agricultural practices and conversion to housing, highway, and commercial development.

The proposed change in classification from Endangered to Threatened would not significantly alter the protection of this species under the Endangered Species Act (although it would allow greater management flexibility). Anyone taking, attempting to take, or otherwise illegally possessing an Aleutian Canada goose would be subject to the same penalties now in force. Section 7 of the Act also would continue to protect this species from Federal actions that would jeopardize its survival.

The recovery program will continue until the Aleutian Canada goose has reached a secure, self-sustaining status. Meanwhile, the Service will continue to remove arctic foxes from historical nesting islands and reintroduce wild geese on fox-free islands. Aleutian Canada goose hunting closures will be maintained in key migration and wintering areas. The Service will also monitor population trends and mortality from hunting, disease, and other factors.

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(continued from page 2)

The cause of their deaths was determined to be upper respiratory disease syndrome. The Nevada die-off is comparable to the number of tortoises that died per acre in the Desert Tortoise Natural Area in California, according to the BLM's District Office in Riverside, California. (See BULLETIN Vol. XIV, Nos. 9-10, for more details on this disease.)

* * *

This summer, staff from the Service's Patuxent Wildlife Research Center and numerous local volunteers set up a second remote release site for Andean condors (*Vultur gryphus*) in the Sespe Condor Sanctuary, California. On September 4, three young pre-flight Andean condors were brought to the new site. All of the condors showed few signs of stress during the trip and began feeding at the site.

Four Andean condors (Y-1, R-4, R-5 and R-7) are now flying in the sanctuary, using known flight paths of California condors (*Gymnogyps californianus*). (See BULLETIN Vol. XIV, Nos. 1-2.) The condors are feeding regularly at the remote feeding platforms. After another condor, R-6, showed increasing interest in human activities, she was taken into captivity to undergo behavioral modification at the Los Angeles Zoo. Different techniques will be tried on R-6 to determine if she can be conditioned to avoid humans.

Region 2—The carcass of a yearling male whooping crane (*Grus americana*) was discovered October 30 in a pasture in Hitchcock County, Nebraska. Evidence at the scene and necropsy results indicated that the bird struck a two-wire electric distribution line as it flew to or from a temporary wetland in the pasture. The whooping crane was last seen alive accompanying two other whoopers in Saskatchewan, Canada, on October 24. Eighteen other whooping cranes are known to have collided with electric wires in the past, resulting in 13 deaths.

* * *

Twenty-two whooping cranes have been moved from the Service's Patuxent Wildlife Research Center in Laurel, Maryland, to the International Crane Foundation in Baraboo, Wisconsin, to establish a second captive flock (see BULLETIN, Vol. XIV, Nos. 9-10). Eight cranes were flown up to Baraboo on November 8 on a U.S. Marine Corps C-130 aircraft, which was participating in a training flight. Six cranes were flown up on November 16 by Northwest Airlines, which donated space for the birds as a contribution to the recovery of this Endangered species. The other eight birds were transferred on December 7. All of the birds were shipped without injury, and they underwent a 30-day quarantine to ensure they were free of disease organisms and parasites.

On November 21, a subadult female whooping crane died at the Foundation during an examination. The bird appeared normal before and during the 10-minute check but collapsed shortly after release. Although the Foundation's veterinarian immediately attempted to resuscitate the

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bird by injecting fluids and applying CPR, the effort was unsuccessful. A post-mortem examination at the Service's National Wildlife Health Research Center in Madison, Wisconsin, suggested that the whooping crane died from shock, complicated by internal hemorrhage from a small puncture in the bird's jugular vein where a blood sample had just been withdrawn. The blood may have failed to clot due to high blood pressure associated with stress.

* * *

An aerial survey by Fish and Wildlife Service biologist Tom Stehn on November 24 located 144 whooping cranes, including 20 fledged young, on Aransas National Wildlife Refuge, Texas. Canadian biologist Ernie Kuyt had been predicting 12 to 18 fledged young, but late summer surveys were difficult because birds were widely scattered due to drought (see BULLETIN Vol. XIV, Nos. 9-10). One adult pair and several subadults have not been seen since last spring, but may show up later at the refuge. If all the missing birds are alive, the total number of whooping cranes in the wild will be 151.

Region 4—The Nature Conservancy's Alabama Chapter recently purchased land in Cherokee County to protect the Endangered green pitcher plant (*Sarracenia oreophila*). This site supports one of the largest remaining populations, consisting of several hundred individuals. The Service is managing most of the other green pitcher plant populations in Alabama, and is working with The Nature Conservancy in managing its site. The Alabama Forestry Commission also is assisting in the green pitcher plant recovery effort, conducting an annual burning program on sites that support the plant. Such burning controls the growth of brushy vegetation that could displace the pitcher plant.

* * *

Grammitis nimbata, a primarily tropical fern thought to have been extirpated a decade ago from its only known North American locality, was recently rediscovered in North Carolina. The species, a Category 2 candidate for listing, is believed to survive only in gametophytic form (i.e., the fern's sexually reproductive stage) at that site. The plant's status in Cuba, the main part of its range, is unknown.

* * *

In October 1989, the North Carolina Wildlife Resources Commission, with the assistance of the National Park Service and University of Tennessee, transplanted 48 Threatened spotfin chubs (*Hybopsis monacha*) from the Little Tennessee River, North Carolina, into Abrams Creek in Great Smoky Mountains National Park, Tennessee. This is the second consecutive year that spotfin chubs have been transferred to and from these locations.

Abrams Creek also was stocked with yellowfin madtoms (*Noturus flavipinnis*) and smoky madtoms (*Noturus baileyi*) this year. This project, which involves the Service, U.S. Forest Service, National Park Service, Tennessee Wildlife Resources Agency, and Aquatic Specialists of Knoxville, Tennessee, is in its fourth year. The status of these fish populations, as well as the spotfin chub, in Abrams Creek is unknown, but studies of their survival and reproductive success are expected to be conducted in 1990.

* * *

The Endangered fat pocketbook mussel (*Potamilus capax*) is known to occur in the St. Francis River system in six Arkansas counties. A recent survey found this species in a tributary of the system, the Little Bay Ditch, approximately 3 miles (5 kilometers) beyond its known range. The mussel also is known to occur in the St. Francis River system in Missouri, the Wabash River in Indiana, and the Cumberland River in Kentucky. The Missouri Department of Conservation recently relocated approximately 2,000 fat pocketbook mussels from 10 miles (16 km) of the St. Francis River system that were being dredged to two sites on the Mississippi River.

* * *

Biologists from the Mississippi Department of Wildlife, Fisheries and Parks have completed this year's survey of the Endangered penitent mussel (*Epioblasma penita*) and Judge Tait's mussel (*Pleurobema taitianum*) in the Buttahatchie River, Mississippi. Efforts to sample the river were hampered by unusually high water most of the summer. Despite the difficulty of sampling, it was apparent that the two listed species were not as abundant as observed during a preliminary survey in 1987. The cause of this apparent decline has not been determined.

* * *

High levels of mercury have been found in a dead Florida panther (*Felis concolor coryi*) in the Shark River Slough area adjacent to Everglades National Park. A necropsy of the 4-year-old female panther was conducted by the Florida Game and Fresh Water Fish Commission. When the cause of death could not be identified, the Commission sent the animal to the Service's Patuxent Wildlife Research Center in Laurel, Maryland, to test for pesticides and heavy metal contaminants. The results of an initial survey indicated that the panther had 98 parts per million wet weight of mercury in the liver—an extremely high level. A second analysis showed an even higher mercury level.

Biologists from the Service and the Florida Game and Fresh Water Fish Commission are currently analyzing 33 tissue samples from 15 other dead panthers that have been archived. The initial results of the analyses indicated that all the panthers had mercury above background levels, although none were as high as those found in the dead female panther. The level of mercury contamination varied among the panthers, indicating that this problem is not confined to the east Everglades area. It is suspected that the east Everglades female panther and other panthers that are feeding on raccoons (which usually eat fish and other aquatic animals) are bioaccumulating mercury.

Additional blood and hair samples will be taken from living cats across the Everglades this winter. These samples will confirm how widespread mercury contamination is among Florida panthers.

Region 5—The Fish and Wildlife Service's Northeast Regional Office endangered species staff has developed a computerized database for tracking the recovery of listed species in the Region. One use of the database is to help prepare a biennial report to Congress on progress being made to develop and carry out species recovery plans.

* * *

Maryland's sole Canby's dropwort (*Oxypolis canbyi*) population declined to only three plants this year. Two of the plants were removed and brought into cultivation at the North Carolina Botanic Garden in order to preserve the gene pool of this northernmost population and eventually reestablish the species at the site. There are 24 other extant populations of this plant in Delaware, Georgia, and North and South Carolina.

* * *

Atlantic Coast piping plover (*Charadrius melodus*) production was up this year, thanks to increased habitat protection and public education. Over 700 pairs (about 60 more than last year) nested on coastal beaches. Productivity rates varied widely around the Region, from 0.9 in Maryland to 2.38 in Maine.

* * *

Although the productivity of bald eagles (*Haliaeetus leucocephalus*) in Region 5 was slightly lower than in previous years, the birds continued to do well. In 1989, 324 bald eagle pairs produced 293 young, which met one of the Service's recovery targets for the species in the Region.

* * *

The peregrine falcon (*Falco peregrinus*) also continued on the road to recovery. In 1989, 83 pairs were on territories in the Region and 105 young were fledged, versus 67 pairs and 85 young in 1988.

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Regional News

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The U.S. Forest Service is working with the U.S. Fish and Wildlife Service to conserve habitat of the Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) in the Monongahela National Forest, West Virginia. Areas scheduled for logging are being surveyed for the presence of this Endangered subspecies, and any colonies found are avoided. Information gathered thus far indicates that there are 8 populations consisting of about 36 squirrels in the Monongahela. In addition, the Forest Service has purchased approximately 40,000 acres for addition to the national forest, including some Virginia northern flying squirrel habitat.

* * *

The Cheat Mountain salamander (*Plethodon nettingi*) also occurs in the Monongahela National Forest, in habitat related to that of the squirrel. With funding from the Fish and Wlildlife Service under Section 6 of the Endangered Species Act, the West Virginia Department of Natural Resources is conducting a population study of this Threatened amphibian. Once again, the Forest Service is cooperating by considering the salamander's habitat during its timber management planning.

* * *

A new running buffalo clover (*Trifolium stoloniferum*) population has been found near Elkins, West Virginia, along a historical buffalo (bison)/elk trail. It is believed to be the largest known population in the State. Many botanists speculate that a major reason for the decline of this Endangered plant from its once abundant, widely distributed status is the absence of bison and elk, which once provided the soil enrichment, periodic habitat disturbance, and seed dispersal this species apparently needs to thrive.

* * *

With Section 6 funding from the Service, the West Virginia Department of Natural Resources has found six new populations of the flat-spired three-toothed snail (*Triodopsis platysayoides*) in the Cooper's Rock area of the Cheat River Gorge.

* * *

Region 6—The first effort to relocate gray wolves (*Canis lupus*) in Montana as part of the northern Rocky Mountain wolf recovery program met with disappointment. Last spring, an adult male wolf was killed by a rancher near Marion, west of Kalispell, far outside the designated wolf recovery area. This area is primarily owned by private cattle ranchers and timber corporations. The Service subsequently discovered a den in the area where the male wolf was killed. This den was being used by a pack that included another adult male, an adult female, and three pups. Service biologists from the Helena Fish and Wildlife Enhancement Office, together with the local landowners, monitored the situation through the summer. At the end of August, a decision was made by the Service, in consultation with the local landowners, to relocate the pack to reduce the potential of livestock depredations. It was hoped that the pack would stay together in its new home in Glacier National Park, Montana, and that the adults would continue to care for the pups. In Minnesota, the only area in North America where wolf pup relocation has been succesfully attempted, most radio-collared and ear-tagged pups relocated at this age survived.

All members of the pack were trapped by September 9 (except for one pup), fitted with radio collars, and released in Glacier National Park. (The pup that was not trapped was last reported to be on U.S. Forest Service land south of Marion, but its fate is unknown.) The adult female almost immediately began to travel in the direction of the den site. At last report, she had settled down on national forest land in the Swan Valley, southeast of Kalispell. The adult male also left the park, moving into an area near a livestock ranch. When efforts to haze this wolf out of the area failed, a biologist discovered that the animal's front paw, injured and treated when he was first trapped, had become badly infected. As a result of this injury and the animal's emaciated condition, a decision was made to euthanize the wolf. Unfortunately, the two wolf pups, which had remained in the park, also died. Their cause of death was found to be starvation. As a result of this experience, the Service is reevaluating its management plans for future wolf relocations.

* * *

After trying for 4 years, a pair of bald eagles has finally fledged two young at Barr Lake State Park, about 15 miles (24 kilometers) northeast of Denver. This represents the first time bald eagles have been known to successfully fledge young along the Front Range of Colorado since 1985. The pair nested in a live cottonwood tree next to a large double-crested cormorant (*Phalacrocorax auritus*) rookery. The two young eagles, a male and a female, hatched in late March and fledged by mid-April. Later in the summer, the banded eaglets were flying up to 10 miles (16 km) from the nest site. Early this fall, the birds were found roosting in cottonwoods along the South Platte River, north of Barr Lake. It is hoped that the eaglets will return to the Front Range of Colorado to nest when they reach sexual maturity.

Region 8—The Service's National Wildlife Health Research Center at Madison, Wisconsin, is continuing its investigation of whooping crane tuberculosis. Center scientists used DNA hybridization assays to identify two *Myobacterium* isolates from hunter-killed sandhill cranes (*Grus canadensis*) and snow geese (*Chen hyperborea*).

* * *

The Service's National Ecology Research Center (NERC) in Fort Collins, Colorado, hosted a meeting on November 6 and 7 to present available information on the biology, ecology, habitat requirements, and population status of the desert tortoise. The research needs for recovering the species were also discussed. The meeting was attended by biologists from the Service's Region 1, 2, and 6 offices, Colorado State University, Bureau of Land Management, and State wildlife agencies.

Region 9—According to the U.S. Department of Agriculture, over 4.2 million acres (1.7 million hectares) were bid by landowners for entry into the Conservation Reserve Program during the June/July sign-up. States with large wetland acreages had larger sign-ups. North and South Dakota accounted for over 1.2 million acres (486,000 ha) of the total sign-up. The Agricultural Stabilization and Conservation Service estimates that about 800,000 acres (324,000 ha) of wetlands and adjacent buffer areas throughout the nation were included in the sign-up. (See BULLETIN XIV, No. 5, for a description of the Conservation Reserve Program.)

* * *

The Fish and Wildlife Service has always recognized the importance of wetlands for maintaining fish and wildlife. Among their many values, wetlands provide essential habitat for approximately 40 percent of the Nation's endangered and threatened species. The Service is now completing work on a unified approach to wetlands conservation. The Wetlands Action Plan describes the role of the Service in helping to meet the President's goal of "no net loss of this Nation's wetlands." It will highlight the Service's existing activities (e.g., endangered species activities, Farm Bill programs, the North American Waterfowl Management Plan) and new initatives (e.g., a national coastal and estuary program, an urban wetlands conservation plan, an effort to encourage private lands stewardship).

* * *

The Endangered Species Act Amendments of 1988 require all Federal agencies, and encourage States that receive Section 6 matching grants, to report "reasonably identifiable" expenditures to conserve listed species. The International Association of Fish and Wildlife Agencies recently provided the Service with a species-by-species breakdown of the States' reasonably identifiable expenditures. For fiscal year 1989, the States reporting expended approximately $4.1 million to conserve listed species.

* * *

The Service recently published a new brochure entitled "Pesticide Use and Endangered Species." The brochure describes how determinations are made of the possible effects of pesticides on listed species and their habitats, and what precautions users can take. Copies are available by writing the Regional Directors (see BULLETIN page 2).

Experimental Population of the Guam Rail is Approved

The Fish and Wildlife Service has published a final rule authorizing a nonessential experimental population of the Endangered Guam Rail (*Rallus owstoni*) under Section 10(j) of the Endangered Species Act (F.R. 10/30/89). Currently, the species survives only in captive breeding facilities. The wild population will be established on the island of Rota in the Commonwealth of the Northern Mariana Islands, which is outside the probable historical range of the species. This exception to normal reintroduction policy is necessary because the species' primary habitat on Guam has been "indefinitely altered" by the accidental introduction of the predatory brown tree snake (*Boiga irregularis*), which has virtually wiped out the island's native birds.

It is hoped that wild rails from the Rota experimental population eventually can be reestablished on Guam after a way is found to control the snakes. Designating the Rota population as nonessential provides considerable flexibility in managing the population. The Service proposed the experimental population designation on June 19, 1989. (See BULLETIN Vol. XIV, No. 7, for background on this story.)

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES TOTAL	SPECIES WITH PLANS
Mammals	32	19	241	6	2	23	323	25
Birds	61	15	145	7	3	0	231	58
Reptiles	9	7	59	14	4	14	107	22
Amphibians	6	0	8	4	1	0	19	5
Fishes	49	2	11	25	6	0	93	48
Snails	3	0	1	6	0	0	10	7
Clams	34	0	2	0	0	0	36	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	1	1	7	0	0	19	12
Arachnids	3	0	0	0	0	0	3	0
Plants	163	6	1	42	7	2	221	89
TOTAL	378	50	469	112	23	39	1071*	292 **

Total U.S. Endangered 428
Total U.S. Threatened 135
Total U.S. Listed 563

Recovery Plans approved: 252

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
36 plants

January 3, 1990

November–December 1989 Vol. XIV, Nos. 11-12

ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20240

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