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ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

New Legislation Aids the Recovery of Endangered Fish 1 Refuge Wetlands in Nevada

Ralph G. Swanson
Division of Habitat Conservation
Washington, D.C.

PUBLIC DOCUMENTS
DEPOSITORY ITEM

Endangered Species, Public and Indi...

In virtually the closing moments of the 101st legislative session in November 1990, Congress enacted a new law intended to help recover two listed fishes and restore National Wildlife Refuge wetlands in Nevada vital to migratory waterfowl and shorebirds using the Pacific Flyway.

In addition to its progressive strategies for fish and wildlife, Public Law 101-618 confronts many long-standing water problems in the Truckee and Carson River basins of western Nevada: allocation of water between California and Nevada, coordination of water storage in Federal and private reservoirs, water management at one of the first Bureau of Reclamation irrigation projects, and resolution of certain Indian water rights disputes. Most significant for the conservation of endangered species and wetlands is a new directive to acquire water rights expressly for fish and wildlife. The purchase of water at market rates should encourage the voluntary reallocation of water resources to benefit fish and wildlife in a manner that is equitable and most likely to enjoy local support.

Although the new law directly resolves only a few outstanding issues, it creates momentum for solutions and a framework within which remaining disputes will be considered. While several earlier bills failed for lack of either local or Federal support, P.L. 101-618 establishes the intent of Congress, and signals the com-

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Degraded wetlands on the Stillwater Wildlife Management Area (such as those in the top photo) will receive new water purchased under authority of the recent legislation. Millions of migrating waterfowl and shorebirds will benefit.

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Regional News

Regional endangered species staffers have reported the following news:

Region 1 - Researchers who completed a fall survey of the mainland California

population of southern sea otters (*Enhydra lutris nereis*) in November have no immediate explanation for why numbers of this marine mammal increased

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

John Turner, Director
(202-208-4717)

Ralph O. Morgenweck
Assistant Director for Fish
and Wildlife Enhancement
(202-208-4646)

Larry R. Shannon, Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, Editor
Ann Haas, Assistant Editor
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S. 11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Bob Ruesink, *Endangered Species Specialist*.

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

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Marvin Moriarty, *Acting Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *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; John D. Buffington, *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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only slightly from the year before. The 1991 count of 1,661, not as high as we were hoping to see, was up 1.5 per cent from the 1990 count of 1,636. The average annual increase in fall populations is about 2.5 per cent.

* * *

Airport displays planned for Hawaii, Guam, and the Republic of Palau will alert travelers to the impact of wildlife trade and provide a distribution point for a new brochure in English and Japanese about this important issue. Developed collaboratively by staff members in the Service's Pacific Islands Field Office and the Portland Regional Office, including Law Enforcement, the brochure will also be distributed in the Commonwealth of the Northern Mariana Islands, American Samoa, and foreign ports and embassies frequented by visitors to U.S. Pacific islands. The brochure is a positive step for wildlife conservation throughout the Pacific Basin. The Pacific Islands Office has sent copies to field offices in Region 1 and has more available.

* * *

Region 2 - Red-cockaded woodpeckers (*Picoides borealis*) have declined as much as 75 percent in the McCurtain County Wilderness Area of Oklahoma, according to biologists from the Oklahoma Department of Wildlife Conservation, who searched 11,366 acres (4,600 hectares) of the area between 1989 and 1990.

The 15 red-cockaded woodpecker clans located represent a dramatic decline from 1977 when a survey of 83 percent of the same area resulted in the discovery of 29 clans. Clans declined 62 percent (from 29 to 15), and the number of birds decreased 74-76 percent (from 86-92 to 22). Within the resurveyed areas, only 3 of 22 clusters of cavity trees (active and abandoned) were more than 437 yards (400 meters) from a cluster that was active in 1977, indicating a low rate of colonization of new areas. Productivity of the population was low during the study period; an average of only 0.69 young were fledged per nesting attempt. Linear regression was used to examine the

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Bald Eagle Numbers Continue to Rise

Charles G. Kjos
Endangered Species Biologist
Twin Cities Field Office

The bald eagle (*Haliaeetus leucocephalus*), currently listed as Endangered or Threatened in the lower 48 States, continues its steady improvement. The reported number of known nesting territories in 1990 was 3,014, up from 1,188 less than a decade ago. This encouraging news is contained in survey results for the 1990 nesting season reported to the Fish and Wildlife Service.

Surveys of occupied bald eagle territories and productivity are funded and conducted by a variety of Federal and State agencies, independent organizations, and individuals. Results for each of the five Bald Eagle Recovery Regions are presented in the following table. Typically, two separate surveys are conducted. Occupied territories, defined as those where surveyors noted eagle activity early in the breeding season, are counted first. To avoid interference with breeding success, surveys of such territories are frequently conducted before the eggs are laid or the young hatch. The second survey counts young in the later stages of the nest cycle. Figures for young per occupied territory are reached by dividing the number of young actually counted on the second survey by the number of occupied territories counted on the first survey.

1990 Bald Eagle Breeding Survey Results

RECOVERY REGION	ESTIMATED OCCUPIED TERRITORIES	ESTIMATED AVERAGE YOUNG PER OCCUPIED TERRITORY
Chesapeake		
Delaware	6	1.17
Maryland	115	1.43
New Jersey*	4	1.25
Pennsylvania*	4	1.25
Virginia*	104	1.43
West Virginia	2	2.50
Total =	235	Est. young/occ. terr. = 1.40
Northern		
Colorado	10	1.30
Connecticut	1	0.00
Illinois	8	0.88
Indiana	2	0.00
Iowa	8	1.63
Kansas	2	2.00
Maine	123	0.80
Massachusetts	5	0.80
Michigan	174	0.90
Minnesota	437	1.07
Missouri	4	2.00
Nebraska	1	0.00
New Hampshire	1	2.00
New Jersey*	0	0.00
New York	13	1.15
North Dakota	1	2.00
Ohio	16	0.75
Pennsylvania*	3	1.33
Rhode Island	0	0.00
South Dakota	0	0.00
Utah	2	1.00
Vermont	0	0.00
Virginia*	0	0.00
West Virginia*	0	0.00
Wisconsin	358	0.99**
Total =	1,169	Est. young/occ. terr. = 1.00

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Bald Eagle Numbers

(continued from page 3)

RECOVERY REGION	ESTIMATED OCCUPIED TERRITORIES	ESTIMATED AVERAGE YOUNG PER OCCUPIED TERRITORY
Pacific		
California*	93	1.06
Idaho	53	1.36
Montana	93	1.40
Nevada	0	0.00
Oregon	175	0.92
Washington	398	1.06
Wyoming	49	1.24
	Total = 861	Est. young/occ. terr. = 1.10
Southeast		
Alabama	4	0.00
Arkansas	10	0.60
Florida	535	1.09
Georgia	8	1.63
Kentucky	7	0.86
Louisiana	45	1.38
Mississippi	3	0.67
North Carolina	7	1.29
Oklahoma*	0	0.00
South Carolina	59	1.05
Tennessee	15	1.00
Texas*	29	1.00
	Total = 722	Est. young/occ. terr. = 1.10
Southwest		
Arizona	26	0.54
California*	0	0.00
New Mexico	1	0.00
Oklahoma*	0	0.00
Texas*	0	0.00
	Total = 27	Est. young/occ. terr. = 0.54

Estimated Grand Total = 3,014 Occupied Territories

* A recovery region boundary cuts through this State; parts of the State are in different recovery regions. Productivity estimates are for the portion of the State in the indicated recovery region.

** (Est. based on MI/MN ave. -no 1990 hatching data for WI)

Regional News

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relationship between foraging habitat quality and distance from the nearest active clusters. The distance from the sample points to the nearest active cluster did not explain a large portion of the variation in any of the vegetation variables for pines or hardwoods.

Overall, foraging habitat in the McCurtain County Wilderness Area meets requirements established in the 1985 Red-cockaded Woodpecker Recovery Plan. Biologists compared habitat at 18 active red-cockaded woodpecker cavity trees (cluster sites) and 18 paired non-use sites. The area surrounding active cavity trees (0.09 acres or 0.04 ha) had

significantly shorter hardwoods and less hardwood basal area than non-use sites.

* * *

In 1990, searches of areas in Oklahoma where isolated groupings of vireos have been observed since 1985 located black-capped vireos (*Vireo atricapillus*) in only two—the Salt Creek site in Blaine County and a site near Scott in Caddo County. Thirteen adult vireos were located, including six females. Five of the 6 females present in Blaine County produced 17 young. No females were seen at the Scott site. To reduce nest parasitism, the Oklahoma Nature Conservancy initiated a cowbird (*Molothrus ater*) trapping program at the Blaine County site. At the very beginning of the trapping period, cowbirds parasitized two of six vireo nests with complete clutches. Three of six male vireos and one of three females banded in 1989 returned to the site in 1990. Overall, one-year detected returns for these isolated groupings are 48 percent (14 of 29) for males and 47 percent (7 of 15) for females.

* * *

Billy Dale Inman and Curtis Collier Sayers of Marble Falls, Texas, were sentenced by U.S. Magistrate Stephen Capelle of Austin, Texas, for killing an Endangered whooping crane (*Grus americana*). Inman was sentenced on October 25, 1991, to serve 60 days in a Federal facility, pay a \$10,000 fine, perform 200 hours of community service, and be placed on 5-year probation. Inman also forfeited his gun. Sayers, who pleaded guilty to aiding in the killing, was sentenced on November 4 to 20 days in a Federal facility, fined \$2,000, ordered to perform 200 hours community service, and placed on a 3-year probation. Inman and Sayers were also required to share in paying \$8,100 in civil damages to the State of Texas for killing the bird.

Inman pleaded guilty to shooting the adult female whooping crane with a 12-gauge shotgun during a fishing trip on April 15, 1991. He and Sayers were fishing along the Colorado River near Bend, Texas, 75 miles (120 kilometers) north-

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Thirty-seven species — 21 animals and 16 plants — were proposed by the Fish and Wildlife Service during November/December 1991 for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Mexican Spotted Owl (*Strix occidentalis lucida*)

The Mexican spotted owl, one of three recognized spotted owl (*Strix occidentalis*) subspecies, is a medium-sized bird that inhabits parts of the southwestern United States and northern Mexico. Like its relative the northern spotted owl (*S. o. caurina*), which inhabits mature forests in the Pacific Northwest, the Mexican spotted owl is believed to be in danger from the loss or fragmentation of its forest habitat. On November 4, the Service proposed to list the Mexican spotted owl as a Threatened subspecies.

Mexican spotted owls are found in a region extending from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona and New Mexico, and (discontinuously) through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau in the state of Michoacan. Within this region, they primarily occur at forested mountain and canyon sites with dense, uneven-aged stands, high canopy closure, numerous snags, and a heavy accumulation of downed woody material. Habitats with these qualities are best expressed in mature mixed-conifer and pine-oak forests, although younger forests can be used if enough large trees remain. Historical records indicate that spotted owls once ranged into low-elevation riparian woodlands as well; however, much of this habitat has disappeared. Arizona, for example, has lost more than 90 percent of its low-elevation riparian habitat since the mid-1800's.

As of 1990, spotted owl records for the southwestern U.S. and Mexico totalled 291 known pairs and 198 singles. Based on sighting reports, the amount of suitable habitat, and survey results, the Service estimates there are 806 pairs of Mexican spotted owls and 548 singles in the U.S., for a total population of 2,160 birds.

There are not enough data to make an accurate estimate of the population in Mexico, but the threats to spotted owl habitat there are considered serious. Mexican forestry programs receive little or no government funding; instead, they depend for their budgets on what they can collect from logging. Sustained yield forestry and reforestation are not being emphasized, and the outlook is for accelerated deforestation. A proposal financed by the World Bank and aimed at the Copper Canyon region of western Chihuahua would extract more than 4 billion board feet of lumber from nearly 20 million acres (8.09 million hectares) over 6.5 years.

In the U.S., the Fish and Wildlife Service estimates there are currently 5.3 to 5.6 million acres (2.1 to 2.3 million ha) of suitable Mexican spotted owl habitat, most of which is on public land. However, not all of the suitable habitat is known to be occupied by spotted owls. About 91 percent of the known owls occur on national forests, 4 percent occur on national parks, 4 percent occur on Indian reservations, and 1 percent occur on Bureau of Land Management lands. The current management of these lands varies by agency. Of the estimated suitable Mexican spotted owl habitat in Arizona and New Mexico national forests, approximately 60 percent is managed for commercial timber production. At present, 95 percent of these timberlands are managed by the shelterwood system, which results in even-aged regenerated stands. Thus, the uneven-aged, multi-storied forests comprising primary owl roost and nest sites will be converted to unsuitable even-aged stands with reduced habitat diversity.

Forest fires also threaten the Mexican spotted owl. About 220,000 acres (89,000 ha) of suitable spotted owl habitat in Arizona and New Mexico have burned in recent years. In addition to direct habitat loss by logging and fire, habitat fragmentation makes spotted owls more vulnerable to predation. Hawks and great horned owls (*Bubo virginianus*), which favor "open" forests, are suspected to be a significant threat to Mexican spotted owls.

If the Mexican spotted owl is listed as Threatened, Federal agencies will be responsible for ensuring that activities they fund, authorize, or carry out — such as logging, mining, and road construction — are not likely to jeopardize the bird's survival. A designation of critical habitat was not proposed in this case on the grounds that it would not provide significant additional benefits to the owl.

Oregon Chub (*Oregonichthys crameri*)

A small freshwater fish, this species once inhabited sloughs, oxbows, overflow ponds, and other backwater habitats throughout the Willamette River drainage in Oregon. After extensive habitat alteration, however, established populations are known to survive in only about two percent of the former distribution. Because of threats to the remaining fish, the Service proposed on November 19 to list the Oregon chub as Endangered.

The most severe decline of this species was in the 1950's and 1960's, when 8 of the 11 flood control projects in the Willamette River basin were completed. Other activities, such as revetment and channelization, diking and drainage, and the removal of floodplain vegetation may also have destroyed or altered the slack water habitat favored by the Oregon chub. Threats to the remaining habitat include siltation from logging and construction, water pollution, unauthorized filling, and changes in water levels or flow conditions. The Oregon chub is further

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Listing Proposals

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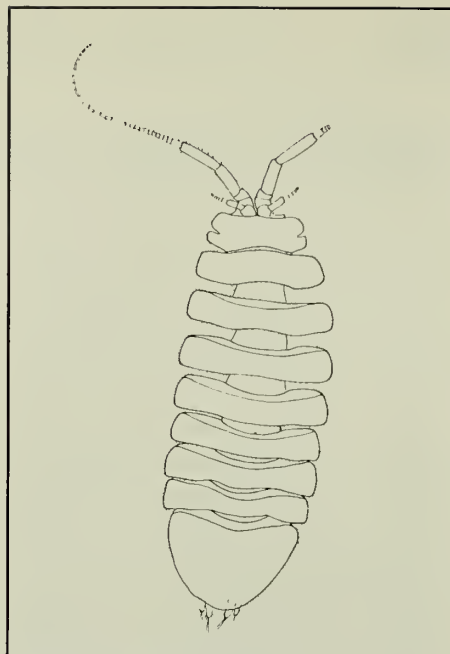
threatened by predation and competition from introduced populations of non-native fish species.

The only established populations of the Oregon chub known to remain are restricted to a 19-mile (30-kilometer) stretch of the Middle Fork Willamette River in the vicinity of Dexter and Look-out Point Reservoirs in Lane County, which are operated by the U.S. Army Corps of Engineers (COE). There is public pressure to increase sport fishing opportunities at these impoundments by stocking additional species of large, non-indigenous game fish, which could jeopardize the remaining Oregon chubs. Additionally, both reservoirs are near rail, highway, and power transmission corridors. They are therefore vulnerable to pollution from runoff of herbicides used for right-of-way maintenance and chemical spills from truck or rail accidents.

Small numbers of Oregon chubs (one to four fish) also have been observed in recent years in the lower North Santiam River, which forms the boundary between Linn and Marion Counties, and in Gray Creek within the William L. Finley National Wildlife Refuge in Benton County. The size and viability of these potential populations remains unknown. As a precaution, Finley Refuge managers have begun to moderate the use of agricultural chemicals in the Gray Creek drainage and have ceased beaver dam removals where the chub may be affected.

Lee County Cave Isopod (*Lirceus usdagalun*)

Named *usdagalun*, the Cherokee word for "cave" or "hole under rock," this small freshwater crustacean lives only in underground streams and lacks both eyes and pigmentation. It was known originally from two cave systems in Lee County, Virginia, but was eliminated from one system when the groundwater was polluted by a nearby sawmill. The remaining population is vulnerable to several development projects under consideration. For this reason, the Service has proposed



Lee County cave isopod

to list the Lee County cave isopod as Endangered (F.R. 11/15/91).

Two major development projects of concern are an airport and a prison facility proposed for construction in the vicinity of the isopod's last known population. Some of the development options under consideration would locate these facilities over or adjacent to large sinkholes leading into the cave system. As a result, sediments and other pollutants could enter the groundwater during the construction or operation phases. The Federal agencies with jurisdiction over these proposed projects, the Federal Aviation Administration and the Bureau of Prisons, are aware of the isopod's presence in the area. It is considered likely that, with proper planning, the facilities can be constructed without adversely affecting the species.

Kanab Ambersnail (*Oxyloma haydeni kanabensis*)

Emergency protection was given to the Kanab ambersnail on August 8, 1991, when the Service published a temporary (240-day) rule listing this small terrestrial mollusk as Endangered. A follow-up proposed rule to give the snail long-term protection as an Endangered species was published November 15, and the rule was made final April 17, 1991.

When the emergency rule was issued, the Kanab ambersnail was thought to exist at only two locations, both in an area of south-central Utah. One population was almost extirpated when its marsh habitat was altered to divert water for livestock. In an intensive 1990 survey, only three snails could be found at this site, which previously supported hundreds. A significant portion of the second population was destroyed recently by earth-moving equipment. The landowners would like to sell the property, but if they cannot do so quickly they have plans to develop the area, which would result in further habitat damage. Purchasing the site may be the only effective means of protecting the population, and The Nature Conservancy is investigating this option.

Recently, the Service learned of a Kanab snail population in the Grand Canyon. This is encouraging news, but the total range and numbers for this species are still considered too small to ensure its long-term survival.



Kanab ambersnail

Eleven Freshwater Mussels

Eleven species of freshwater mussels native to the Mobile River drainage in Alabama, Georgia, Mississippi, and Tennessee were proposed November 19 for listing as Endangered or Threatened:

- upland combshell (*Epioblasma metastrata*) - Endangered
- southern acornshell (*Epioblasma othcaloogensis*) - Endangered
- Coosa moccasinshell (*Medionidus parvulus*) - Endangered
- southern clubshell (*Pleurobema decisum*) - Endangered

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Listing Proposals

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- dark pigtoe (*Pleurobema furvum*) - Endangered
- southern pigtoe (*Pleurobema georgianum*) - Endangered
- ovate clubshell (*Pleurobema perovatum*) - Endangered
- triangular kidneyshell (*Ptychobranchus greeni*) - Endangered
- fine-lined pocketbook (*Lampsilis altilis*) - Threatened
- orange-nacre mucket (*Lampsilis perovalis*) - Threatened
- Alabama moccasinshell (*Medionidus acutissimus*) - Threatened

These mollusks are found on stable gravel and sandy-gravel substrates in high-quality, free-flowing streams and rivers. Their distribution has been reduced and fragmented considerably by widespread degradation and modification of the riverine habitat. None of these species are known to tolerate impoundments. More than 1,000 miles (1,699 km) of large and small river habitat in the Mobile River drainage have been impounded for various purposes. Impoundment projects can adversely affect riverine mussel species by killing mussels during construction and dredging, suffocating them with accumulating sediments, lowering their food and oxygen supplies, and locally extirpating the host fish that mussels parasitize during their larval stage. Several additional impoundment and stream channelization projects have been proposed for parts of the Mobile River drainage.

Water pollution also is harming these and other mussel species. Point sources include municipal and industrial effluents. Non-point sources, such as runoff from agricultural operations and coal mines, degrade water quality as well.

Another threat to these species is incidental take during the commercial harvest of mussels for their shell. Even mussels that are not used can be killed during the collection process when they are dislodged from their substrate. The small rivers and streams in which the above proposed mussels occur have not traditionally supported shelling operations,

but a dramatic increase in the price of shell and increased competition is attracting commercial collectors to these areas.

If the listing proposal becomes final, Federal agencies responsible for water quality, and those involved in impoundment and stream channelization projects, will be required to take into account the potential impacts on these mussels.

Three African Antelopes

Three species of antelopes native to northern Africa were proposed November 5 by the Service for listing as Endangered:

- scimitar-horned oryx (*Oryx dammah*) - a large, rather heavy antelope standing about 47 inches (119 centimeters) at the shoulders and weighing around 450 pounds (204 kilograms). Its horns curve back in an arc and are up to 50 inches (127 cm) long.
- addax (*Addax nasomaculatus*) - a smaller animal, standing about 42 inches (106 cm) at the shoulder and weighing around 220 pounds (100 kg). Its horns twist in a spiral up to 43 inches (109 cm) long.
- dama gazelle (*Gazella dama*) - even smaller and more slender, standing about 39 inches (99 cm) at the shoulder and weighing around 160 pounds (72 kg). Its horns curve back and up, but reach a length of only about 17 inches (43 cm).

These antelope species occur in and around the Sahara Desert and the Sahel, a broad zone of semiarid grassland and savannah to the south. Each has declined drastically in recent decades because of habitat deterioration and excessive hunting. All three are already on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international treaty to control the trade in vulnerable wildlife. They are also considered endangered or vulnerable by the International Union for the Conservation of Nature and Natural Resources (IUCN).

The establishment of vast herds of livestock in this arid region has eliminated wildlife forage by overgrazing, eroded the

soils, and intensified the desertification that has been under way for several thousand years. Overhunting is another threat. These antelope species have traditionally been taken by local peoples for food and leather. A serious new problem, however, is the growing number of hunters from several Middle Eastern countries who, traveling in caravans of all-terrain vehicles and equipped with automatic rifles, have ignored local laws and devastated once large herds for sport.

Captive and free-roaming populations of these antelopes that are being maintained outside their natural range may be covered separately from natural populations in any final rule. Among the alternatives for such groups would be listing as Endangered, as Threatened (with special regulations), or "Threatened due to Similarity of Appearance" to animals from wild populations. The latter two classifications could allow for more management flexibility.

Giant Garter Snake (*Thamnophis gigas*)

As indicated by its name, this non-venomous reptile is one of the largest species of garter snakes, with a total length of at least 55 inches (140 cm). Its coloration is brownish on the back with a checkered pattern of black spots, separated by a yellow dorsal stripe and two lighter lateral stripes. Endemic to wetlands in the Sacramento and San Joaquin valleys of California, the giant garter snake inhabits sloughs, small lakes, low-gradient streams, canals, and certain other artificially maintained wetlands, where it feeds primarily on frogs and small fish. During its winter dormancy, this snake retreats to small mammal burrows above prevailing flood levels.

The extensive loss or fragmentation of valley floor wetlands and the higher elevation habitats that provide escape cover during floods are rangewide threats to the giant garter snake. It has been eliminated from many areas by agricultural development, urbanization, flood control projects, and perhaps the State's 5-year

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Listing Proposals

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drought. In addition to these continuing threats, non-native game fishes introduced for sport fishing prey on the young snakes and may be responsible for the absence of the species from some of the apparently suitable habitat that remains. On December 27, the Service proposed listing this species as Endangered. The giant garter snake is already listed by California as a threatened species under State law, and a Federal listing would provide additional protection.

The largest remaining population of giant garter snakes inhabits extensive agricultural lands in the American Basin, a large flood basin at the confluence of the Sacramento and American Rivers in Sutter and Sacramento Counties. A proposed COE project to provide 200-year flood protection for this agricultural land would likely result in conversion of the area to urban uses. Without adequate mitigation for loss of habitat, this important population could be lost. If the giant garter snake is given Endangered Species Act protection, the COE will be responsible for consulting with the Service to avoid jeopardizing the snake.

San Luis Obispo County Species

Six taxa — five plants and one snail — endemic to western San Luis Obispo County, California, were proposed December 23 for listing as Endangered:

- **Morro manzanita** (*Arctostaphylos morroensis*) - an attractive perennial shrub in the heath family (Ericaceae) that occurs within coastal maritime chaparral habitat around Morro Bay.

- **Chorro Creek bog thistle** (*Cirsium fontinale* var. *obispoensis*) - a short-lived perennial herb in the aster family (Asteraceae) primarily restricted to serpentine soil outcrops around San Luis Obispo.

- **Pismo clarkia** (*Clarkia speciosa* ssp. *immaculata*) - a delicate annual herb in the four-o'clock family (Onagraceae) growing on pockets of sandy soil within grassy openings in chaparral and oak woodlands.



Arctostaphylos morroensis



Eriodyction altissimum

- **Indian Knob mountainbalm** (*Eriodyction altissimum*) - an aromatic perennial shrub in the waterleaf family (Hydrophyllaceae) found within coastal maritime chaparral habitat around Morro Bay.

- **California sea-blite** (*Suaeda californica*) - a low-growing perennial succulent in the goosefoot family (Cheno-

podaceae) occurring in coastal marsh habitat around Morro Bay.

- **Morro shoulderband snail** (*Helminthoglypta walkeriana*) - a medium-sized land snail restricted to coastal dune and sage scrub on the south end of Morro Bay.

The low numbers and restricted ranges of these species make them vulnerable to extinction from a variety of causes. Among the continuing threats to their habitat are urbanization, road construction and maintenance, cattle grazing, off-road vehicles, water developments, competition with non-native plants, and possibly dredging in Morro Bay.

Four Vernal Pool Species

Three plants and one species of fairy shrimp that occur only in vernal pools within southwestern Riverside County and western San Diego County, California, were proposed November 12 for listing as Endangered:

- **Otay Mesa mint** (*Pogogyne nudiuscula*) - a small, aromatic annual in the family Lamiaceae that produces whorls of bright purple flowers.

- **California Orcutt grass** (*Orcuttia californica*) - a short, pungent annual grass in the family Poaceae.

- **San Diego button-celery** (*Eryngium aristulatum* var. *parishii*) - an herb in the parsley family (Apiaceae) that is usually an annual but may persist as a perennial if conditions are favorable.

- **Riverside fairy shrimp** (*Streptocephalus woottoni*) - a small, newly described freshwater crustacean in the family Streptocephalidae.

All four species are endemic to vernal pools, an unusual type of habitat that forms in areas with Mediterranean climates where slight depressions underlain with an impervious soil layer fill with water after fall and winter rains. These seasonal wetlands, which dry during spring and summer months, are considered fragile, easily disturbed ecosystems. Vernal pools are being damaged or destroyed by urban and agricultural development, mowing and livestock grazing, off-road

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photo by H. W. Meyer

photo by M. McLeod

Listing Proposals

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vehicle use, trash dumping, and invasions of weedy, non-native plants. Populations of these species near the international border are even suffering the effects of foot traffic from people illegally entering the United States. In the San Diego area alone, approximately 97 percent of former vernal pool habitat has been destroyed by a variety of causes.

Vernal pools and other wetlands are regulated by the COE under section 404 of the Clean Water Act. If the listing proposal is approved, the COE will be responsible for ensuring that permits for the discharge of fill material into vernal pools will not jeopardize these species. Other Federal agencies whose activities may affect listed species also will be required to consult with the Service to avoid jeopardy. Further, vernal pools that occur on Federal lands (e.g., Camp Pendleton, Naval Air Station-Miramar) will receive additional protection.

Five Limestone-endemic Plants

Five taxa of plants endemic to calcium carbonate deposits (limestone and dolomite) in the San Bernardino Mountains of southern California were proposed November 19 for listing as Endangered:

- **Parish's daisy** (*Erigeron parishii*) - a small perennial herb in the family Asteraceae with deep rose to lavender flowers.

- **Cushenbury buckwheat** (*Eriogonum ovalifolium* var. *vineum*) - a low, mat-forming perennial in the family Polygonaceae bearing whitish-cream flowers that turn reddish or purple with age.

- **Cushenbury milk-vetch** (*Astragalus albens*) - a small, silvery-white perennial herb in the pea family (Fabaceae) with purple flowers.

- **Cushenbury oxytheca** (*Oxytheca parishii* var. *goodmaniana*) - a small, wiry annual in the family Polygonaceae.

- **San Bernardino Mountains bladderpod** (*Lesquerella kingii* var. *bernardina*) - a silvery perennial in the mustard family (Brassicaceae) with yellow flowers.

All five plants are found along a 35-mile (56-km) stretch of calcium carbonate (primarily limestone) outcrops along the northern, desert-facing side of the San Bernardino Mountains in pinyon/juniper woodlands. Most of the populations are within the San Bernardino National Forest, which supports a wide diversity of habitats. Although this unit of the national forest system constitutes less than 1 percent of the State's land area, it contains populations of over 25 percent of all plant species that occur naturally in California. Other habitat occupied by the recently proposed plants is administered by the Bureau of Land Management (BLM), on the lower, desert-facing slopes of the San Bernardino Mountains, and a few sites are privately owned.

Limestone mining is a serious threat to the five proposed plants. Because limestone is considered a "locatable mineral," deposits on Federal land are open to claim under the Mining Law of 1872. Virtually all of the limestone outcrops in the San Bernardino Mountains are under claim, and some are already being mined. The type of mining operation typically used in this area for limestone includes a large open or terraced pit, the roads on which the blasted rock is hauled to a processing plant, the processing plant itself, and the deposition of overburden (the material moved to reach the limestone). Other threats to these plant species include sand and gravel mining, gold mining, off-road vehicle use, and (for the bladderpod) the proposed expansion of a ski resort. If the listing proposal is approved, BLM and the Forest Service will be responsible for avoiding activities—such as approvals of mining plans and rights-of-way—that could jeopardize these species.

Applegate's Milk-vetch (*Astragalus applegatei*)

A perennial herb in the pea family, the Applegate's milk-vetch grows to about 1 foot (0.3 meter) in height and produces light purple flowers. This plant grows on flat, seasonally moist remnants of floodplain alkaline grassland in Oregon's Klamath Basin. Only four populations have

been reported, one of which was apparently extirpated by agricultural development. Because of threats to the remaining populations, the Service proposed November 26 to list Applegate's milk-vetch as an Endangered species.

The last three known populations are in the vicinity of Klamath Falls. One is located on privately owned land and consists of a single plant. Another small site on State land supports 10 individuals. The largest population, which may be the only one that remains viable, numbered at least 1,000 plants on a 6-acre (2.4-hectare) site in 1985. A four-lane road built through the site has probably eliminated some plants and habitat, and another road may soon be under construction. The site is zoned for industrial and commercial development. If current land use patterns continue, this population—and consequently the species—may become extinct.

Because the site lies within a moist floodplain, it may be subject to treatment by the COE as a wetland under the Clean Water Act. If it does, and if the listing proposal is approved, the COE will be responsible for ensuring that any wetland fill permits it grants do not result in activities that jeopardize the species.

Smooth Coneflower (*Echinacea laevigata*)

A rhizomatous perennial herb in the aster family, the smooth coneflower grows to a height of about 4.5 feet (1.5 m). This plant has smooth stems, few leaves, and pink to purplish flowers. Its habitat consists of forest clearings, cedar barrens, roadsides, and other open areas on magnesium- and calcium-rich soils. Natural fires, as well as large herbivores, such as elk and bison, historically maintained habitat in the open condition needed by the coneflower.

A total of 58 smooth coneflower populations were reported historically from 8 States. Since the species' discovery, however, more than two-thirds of these populations have been lost, and the plant no longer occurs in the wild in Pennsylvania, Maryland, Alabama, and Arkansas.

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Listing Proposals

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Thirty-nine populations were extirpated, partly as a result of the conversion of natural habitat for agriculture, silviculture, urbanization, and industrial development.

There are now 19 known populations of the smooth coneflower in North Carolina (6), South Carolina (6), Virginia (4), and Georgia (3), most of which are small. Three additional populations in South Carolina are believed to have been introduced. Eighteen of the 19 remaining natural populations are threatened by habitat loss or modification, and 11 are already declining. The largest population, which contains one-third of the total smooth coneflower plants known to exist, is at a North Carolina location proposed for the site of a regional hazardous waste incinerator. Because of these threats, the Service proposed December 9 to list the smooth coneflower as Endangered.

This species, like most other coneflowers, is intolerant of dense shade. Fire or some other suitable form of disturbance, such as well-timed mowing or the careful clearing of trees, is essential to maintaining the glade remnants upon which it depends. Without such periodic disturbance, the habitat is gradually overtaken by shrubs and trees. It is no accident that

most of the remaining smooth coneflower populations occur on such open areas as roadsides or utility rights-of-way. Although certain kinds of habitat disturbance are beneficial to the species, it cannot survive repeated mowing at critical stages in its life cycle, bulldozing, or the application of broadleaf herbicides.

Collection of the smooth coneflower for the pharmaceutical trade is a potential threat. For over a century, huge quantities of related coneflower species have been sold in European and American markets under the trade name "Kansas snake root." In Germany alone, more than 280 products made from various American species of coneflowers are registered for medicinal use. Drastic declines in some midwestern coneflower populations have been noted. Although declines in populations of the smooth coneflower from the pharmaceutical trade have not yet been documented, the remaining sites are easily accessible to collectors.

Alabama Streak-sorus Fern (*Thelypteris pilosa* var. *alabamensis*)

This plant, a small, evergreen fern with linear-lanceolate fronds 4 to 8 inches (10 to 20 centimeters) long, is limited to 15 sites along a 3.2-mile (5-km) stretch of the Sipsey Fork, a tributary of the Black

Warrior River in northwest Alabama. It takes root in crevices on sandstone ledges, cliff faces, and overhangs that are kept moist by shade and upslope runoff.

The fern's type locality was destroyed by bridge construction and flooding from a downstream dam. About half of the 15 remaining populations are small, consisting of 12 or fewer individuals. They would be threatened by any future dam and road construction on this stretch of the Sipsey Fork. Heavy logging near these sites could alter the fern's environment by decreasing the moisture and increasing the amount of sunlight. Recreational impacts are another concern. The areas in which the fern is found, overhangs and "rockhouses," are frequented by hikers, anglers, and campers. Intentional or incidental damage to the habitat caused by these visitors could jeopardize at least the two largest fern populations. Due to these potential impacts, the Alabama streak-sorus fern was proposed November 29 for listing as Threatened.

Most of the remaining populations are within the Bankhead National Forest. The Forest Service assisted in gathering status information on the Alabama streak-sorus fern, and will work with the Fish and Wildlife Service to conserve populations on the national forest.

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mitment of the administration, to address these disputes in a manner that considers the needs of wildlife in the context of changing water use priorities in two rapidly urbanizing river basins.

Background

The Truckee and Carson River basins lie side by side in west-central Nevada. To the north, the Truckee River flows from Lake Tahoe and terminates at Pyramid Lake. The Carson River rises in the Sierra Nevada south of Lake Tahoe and eventually disappears in the Carson Sink area of the Lahontan Valley (see map).

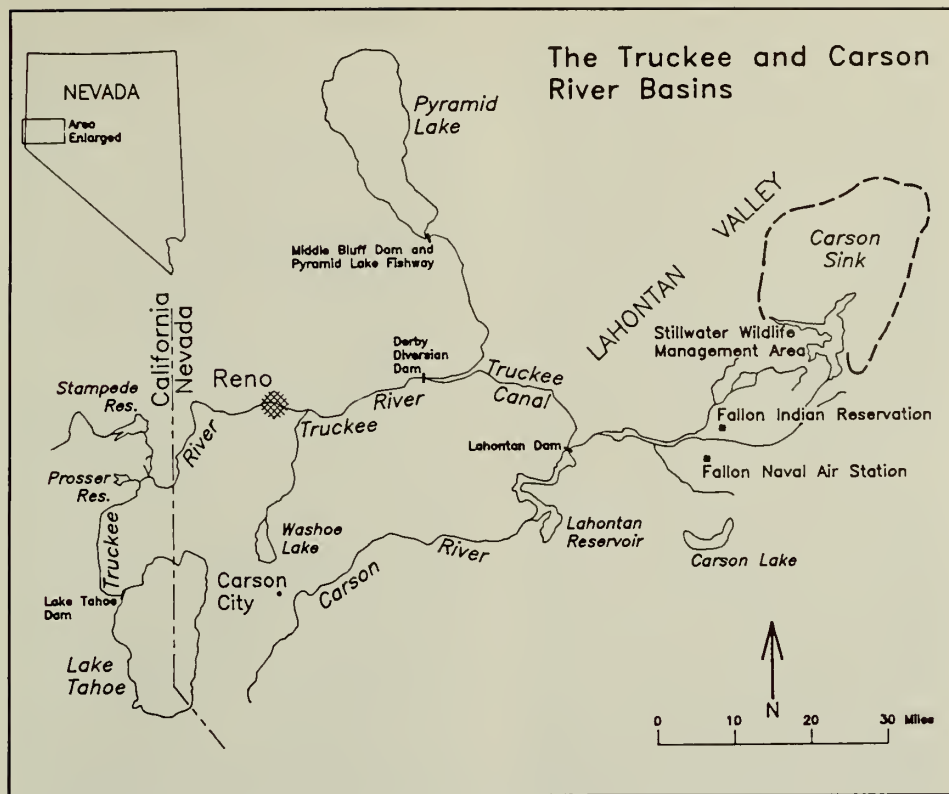
Historically, the two river basins supported over 200,000 acres (80,950 hectares) of wetlands, including Lake Winnemucca, an overflow basin adjacent to Pyramid Lake. The Lahontan Valley alone contained about 85,000 acres (34,400 ha) of wetlands visited by millions of waterfowl and shorebirds using the eastern edge of the Pacific Flyway during migrations.

Pyramid Lake, the ancestral home (and current Reservation) of the Pyramid Lake Paiute Tribe, supports two fish species of cultural and historical importance to the tribe that are now on the Federal list of Endangered and Threatened species. The cui-ui (*Chasmistes cujus*), a unique lake-dwelling sucker found nowhere else, once

was an abundant food source. The Lahontan cutthroat trout (*Oncorhynchus clarki henshawii*) was of a strain known to attain upwards of 40 pounds (18 kilograms) and supported a world-class sport fishery. Both species spawned in the Truckee River and require high, cold flows in the spring to reproduce successfully.

At the center of all water use controversies in both river basins is the Newlands Reclamation Project, one of the first Bureau of Reclamation irrigation projects authorized by Congress. Beginning in 1905, water was diverted from the Truckee River at Derby Dam for agricultural uses. In 1915, Lahontan Reser-

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The Truckee and Carson River basins showing Federal facilities of the Washoe and Newlands Projects.

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voir was constructed on the Carson River to serve the project. During many years, nearly half the annual flow of the Truckee River was diverted to Lahontan Reservoir. As a result, Lake Winnemucca disappeared completely and the level of Pyramid Lake fell 80 feet (25 meters), exposing a delta at the mouth of the Truckee River that all but ended upstream migration of the cui-ui and trout. The last spawning run of Pyramid Lake's original Lahontan cutthroat trout population was recorded in 1938, and that population is now extinct. The current population was reestablished in the 1960's from a closely related strain out of nearby Summit Lake. Only the cui-ui's natural longevity (the oldest known individuals may be more than 40 years old) has forestalled a similar fate for that species.

In later years, the Department of the Interior constructed the Marble Bluff Dam and Fishway to assist fish migration over the delta barrier, yet cui-ui still manage only infrequent spawning runs dur-

ing abnormally wet years. Although the lake is periodically stocked with cui-ui from a Tribal fish hatchery, hatchery-reared fish may not survive to join the adult population. There is no evidence of Lahontan cutthroat trout spawning in the lower Truckee River. Trout are maintained entirely by stocking from hatcheries operated by the Pyramid Lake Tribe and the Fish and Wildlife Service.

Over in the Carson basin, conditions have been equally grim for wetlands. With the advent of the Newlands Project, fresh water that traditionally charged the wetlands was replaced by a greatly diminished supply of agricultural drain water. Overall, wetland acreage in the Lahontan Valley declined by 85 percent. As the area dried, naturally-occurring trace elements—arsenic, boron, lithium, molybdenum, selenium—leached from the soil into the agricultural return flows and accumulated in the shrinking wetlands. Waterfowl deformities, an indicator of trace element toxicity, have been identified and the State of Nevada has issued health warnings against eating waterfowl from the area and fish from Lahontan Reservoir. Avian disease, aggravated by

overcrowding in the remaining wetlands, has contributed to additional waterfowl losses.

The Stillwater Wildlife Management Area (WMA), including Stillwater National Wildlife Refuge (NWR) and Carson Lake, encompasses the largest remaining body of wetlands in the Lahontan Valley. Historically, the WMA had no non-irrigation water rights. It was supported mostly by agricultural return flows and occasional operational spills of water from Lahontan Reservoir.

These wetlands, though degraded, remain a significant wildlife resource. The valley is a key migration and wintering area for up to 1 million waterfowl, shorebirds, and raptors. Each spring and fall, it hosts a significant percentage of the Pacific Flyway's canvasbacks (*Aythya valisineria*), redheads (*Aythya americana*), tundra swans (*Cygnus columbianus*), gadwalls (*Anas strepera*), northern shovelers (*Anas chlypeata*), green-wing teals (*Anas crecca*), and ruddy ducks (*Oxyura jamaicensis*), along with the largest breeding colony of white-faced ibis (*Plegadis chihi*) in North America. Endangered birds also use the area. Up to 70 bald eagles (*Haliaeetus leucocephalus*), Nevada's largest concentration, winter in the valley and American peregrine falcons (*Falco peregrinus anatum*) are known to visit.

The Lahontan Valley wetland system was named to the Western Hemisphere Shorebird Reserve Network in 1988, and it has been nominated for inclusion under the Convention on Wetlands of International Importance, attesting to the continental significance of this resource. Because it is one of only three large interior basin wetland systems along the west coast, deterioration of Lahontan Valley wetlands has already markedly reduced the carrying capacity of the Pacific Flyway.

In recent years, litigation on behalf of the Pyramid Lake Paiute Tribe has emphasized the Indian Trust responsibilities of the Secretary of the Interior and the Federal obligation to recover listed Pyramid Lake fishes. A combination of court actions and Secretarial initiatives over the years has increased the efficient use of wa-

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ter on the Newlands Project, reduced diversions from the Truckee River, and limited the spills from Lahontan Reservoir. While benefitting Pyramid Lake's listed fishes by leaving more water in the Truckee River, the consequent reduction of agricultural return flows to the Lahontan Valley has severely reduced wetland acreage. In addition, new and more restrictive operating criteria for the Newlands Project, adopted in 1988, promise to reduce Truckee diversions further, with an inevitable loss of additional wetlands.

Wetland Restoration

In all, there is a significant potential for serious wildlife losses in the Lahontan Valley unless sufficient quantities of water are obtained. To address this pending crisis, P.L. 101-618 directs the Secretary of the Interior to acquire enough water to sustain, on a long-term average, approximately 25,000 acres (10,120 ha) of wetlands in the Lahontan Valley. This is the approximate wetland acreage that remained on the managed wildlife areas after Newlands Project operations began early in this century and is considered a reasonable goal. Water may be acquired by a variety of means, including donations or exchanges, but purchases must be from willing sellers.

Because it takes as much as 5 acre-feet of water to sustain 1 acre of wetlands in western Nevada, the Service will need to secure up to 125,000 acre-feet of water to achieve this legislative goal. In a normal year, the Lahontan Valley wetlands will receive 60-70,000 acre-feet of agricultural water of acceptable quality from the Newlands Project. Under this assumption, the Service will need to acquire about 55,000 acre-feet of additional agricultural water rights. The Fish and Wildlife Service believes there is enough water currently available from willing sellers to meet the mandated wetland goal. Experience so far indicates that acquisition costs will be about \$400 to \$500 per acre-foot of water.

The wetland restoration envisioned by Congress obviously will take time and money. According to the General Accounting Office, \$50 million will eventually be required. The Service has already spent \$2.7 million to purchase about 6,000 acre-feet of water rights for the refuge. The Service's fiscal year 1991 budget included \$4.0 million for water purchases, and there is another \$4.0 million in the budget for fiscal year 1992. Under the new law, the State of Nevada is to contribute at least \$9 million toward water rights purchases or other protective measures to benefit wetlands.

The new law requires that all water acquisitions and transfers be consistent with State water law. The Service does not dispute legitimate irrigation entitlements to water-righted lands, and no one will be forced to sell or otherwise relinquish a water right. The Service is committed to ensuring that transfers of water rights will not increase Truckee River diversions.

To generate additional non-Federal funding, the law establishes the Lahontan Valley and Pyramid Lake Fish and Wildlife Fund to receive and hold State money, private donations, and other receipts. The fund will be used to benefit both the listed Pyramid Lake fishes and the Lahontan Valley wetlands, providing an opportunity for private groups and citizens to assist directly in the long-term conservation and management of wetlands and endangered species.

The Nevada Waterfowl Association and The Nature Conservancy are also cooperating in efforts to restore Lahontan Valley wetlands in concert with the implementation of P.L. 101-618. The first "new" water turned onto the refuge in June 1990 was acquired by The Nature Conservancy from Newlands farmers and donated to the Service. The Service is awaiting the approval of the Nevada State Engineer before remaining water rights acquired to date can be transferred to the refuge.

Contaminated Drain Water

Pollution by contaminated drain water is another significant problem that must

be corrected to ensure the long-term survival of the Lahontan Valley wetlands. The TJ Drain provides subsurface drainage for portions of the Fallon Paiute Shoshone Reservation near Fallon, Nevada, and empties into the WMA. Drain water from these lands is extremely toxic to fish and invertebrates, and it is increasing the salinity of dwindling Stillwater wetlands to unacceptable levels.

The new law directs the Secretary to develop and implement, in consultation with the Fallon Tribe, a plan for closure of the TJ Drain. The government will provide substitute drainage and bear all costs of the drain closure. In addition, the Service intends to close the Hunter Drain, which is primarily on the Stillwater NWR. Closure of these drain systems will not significantly reduce the total volume of return flows to the refuge, but will eliminate significant sources of trace element and salinity pollution.

Pyramid Lake Fishes

Just as it addresses wetland restoration, P.L. 101-618 pursues the recovery of listed fishes in Pyramid Lake. In perhaps the most significant provision for these species, the Secretary is directed to negotiate a formal Operating Agreement with the States of California and Nevada to govern management of the Truckee River reservoirs. Among other purposes, such an agreement would seek to improve spawning conditions in the lower river through coordinated reservoir operations. The Secretary is authorized to negotiate agreements for storage of non-Federal water in the Federal facilities of the upper Truckee River basin, for which he will collect reasonable charges. These fees will offset Federal reservoir operation costs, with remaining receipts to be deposited in the Lahontan Valley and Pyramid Lake Fish and Wildlife Fund.

The law requires that, subject to any final Operating Agreement, Federal water in two Federal reservoirs in the upper Truckee basin—Stampede and Prosser Creek Reservoirs—will be committed to recovery of the listed fishes in Pyramid

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Lake. Prior to the passage of P.L. 101-618, only the storage of Stampede Reservoir had been dedicated for that purpose. Coordinated operations of the two reservoirs, in conjunction with other storage facilities, should provide an improved water regime in the Truckee River for cui-ui and trout. Recovery of the cui-ui, in particular, will be enhanced if more frequent and successful spawning runs occur. This would create a more balanced age-class structure within the Pyramid Lake population.

In seeking to further reduce the diversion of Truckee River water, the law directs the Secretary to report on the feasibility of achieving 75 percent efficiency in the use of Newlands Project water. (The average project efficiency from 1981-85 was 55 percent.) The State of Nevada is to support this effort with \$4 million for water conservation measures on the Newlands Project, and the Federal Government is authorized to match the State contribution.

The U.S. Navy uses about 10,000 acre-feet of Newlands Project water in an agriculture program at Fallon Naval Air Station that aids in fire and dust control. This diversion is to be reduced, to the maximum extent practicable, through implementation of new land management plans that will test the feasibility of using arid-climate grasses and shrubs for soil stabilization. Although the safety of operations at the Air Station is paramount, any water that can be saved is to be managed by the Secretary for the benefit of Pyramid Lake fishes and Lahontan Valley wetlands. Water made available from the Air Station would help to offset reduced Truckee River diversions.

As an additional conservation measure, the Secretary is directed to recoup irrigation water that was previously diverted from the Truckee River in excess of Newlands Project entitlements. The Bureau of Reclamation has made a preliminary estimate of about 825,000 acre-feet of illegal diversions over the years. It is somewhat problematical how water di-

verted long ago would be effectively recaptured, but the Secretary expects to pursue the claim to this water, which could be used to benefit Pyramid Lake.

P.L. 101-618 also provides explicit authority for the acquisition of water and water rights to benefit Pyramid Lake's listed fishes. Again, the willing seller provisions will apply. In addition, improvements deriving from the Operating Agreement, dedication of Prosser Reservoir storage, and recoupment of prior over-diversions will contribute to recovery of the listed fishes.

In an ironic twist, Pyramid Lake fishes in the Truckee Basin will finally benefit from the acquisition of water for wetlands in the Carson Basin. Pursuant to past court decrees, the conversion of water from agriculture to wetland use will occur at less than the full irrigation entitlement. Therefore, a portion of each acre-foot purchased for Lahontan Valley wetlands will, on average, remain in the Truckee River and flow on into Pyramid lake.

Finally, the Fish and Wildlife Service is moving expeditiously to complete recovery plans for both Pyramid Lake fishes in order to capitalize on all of the recovery features of the new law. With the new interest in this entire issue, the Service expects an enthusiastic public response to its planning efforts.

Conclusion

It would be a mistake to construe these issues as pitting waterfowl against endangered species. The Service need not, and will not, trade off one resource against the other in a win-lose struggle for available water. Compensated transfers of water from agriculture can resolve the needs of both waterfowl and endangered species without adversely affecting other legitimate interests in the Truckee and Carson River basins.

No single piece of legislation can resolve all of the outstanding water issues that have plagued western Nevada for most of this century; however, from the standpoint of wildlife resources, the new law addresses the most significant threats

to endangered species and wetlands in the Lahontan Valley. Ultimate success, however, can only be achieved through a cooperative effort that involves Federal, State and local governments, the Pyramid Lake and Fallon Tribes, and affected private interests. Perhaps the creativity and spirit of compromise that resulted in P.L. 101-618 will encourage the resolution of conflicts elsewhere in the Nation that seem unyielding.

Editor's note: Ralph Swanson served as a Fish and Wildlife Service representative on the Departmental task force that developed the administration's recommendations on P.L. 101-618. The bill was authored by Senator Harry Reid of Nevada and was supported by the Nevada congressional delegation and local citizen's groups.

Regional News

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west of Austin, when the whooper was shot. The bird was one of a flock of five that were beginning the long journey from their wintering grounds at Aransas National Wildlife Refuge on the Gulf Coast of Texas to their nesting grounds in northern Canada. The adult female was one of only 33 breeding females in an estimated wild population of about 140 whooping cranes.

Texas Parks and Wildlife Department Game Warden Jack Reynolds discovered the whooper after investigating a tip from Roena Wharton of Bend, Texas. She reported to State Warden Reynolds that she had spotted the five birds flying near the river, heard shots, and saw three of the birds fly away. However, only one carcass was found buried in a shallow grave near the river, and it is believed the other bird successfully escaped. On November 7, Roena Wharton was presented a \$7,500 reward by Mike Spear, the Service's Southwest Regional Director, for providing information leading to the convictions.

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Eight Species Added to List of Endangered and Threatened Species in November/December 1991

Final rules listing eight species — seven plants and one animal — as Endangered or Threatened were published in November/December 1991. Endangered Species Act protection now applies to the following:

PLANTS

Three California annuals - all Endangered (F. R. 12/2/91)

- Sonoma sunshine or Baker's stickseed (*Blennosperma bakeri*) and
- Burke's goldfields (*Lasthenia burkei*) - small herbs in the sunflower family (Asteraceae) that bear yellow flowers. They occur in vernal pools and swales of the Cotati Valley in Sonoma County. Sonoma sunshine has also been reported from the adjacent Sonoma Valley. Burke's goldfields has been reported from Manning Flat and Steurmer Winery in Lake County and historically from Ukiah in Mendocino County.

- Sebastopol meadowfoam (*Limnanthes vinculans*) - A multi-stemmed member of the false mermaid family (Limnanthaceae), this plant produces white flowers. Like the two herbs listed above, it is located in the vernal pools and swales of the Cotati Valley of Sonoma County, California.

- Cumberland rosemary (*Conradina verticillata*) - A perennial in the mint family (Lamiaceae), this species grows along the banks of the Big South Fork Cumberland River, the Obed River, and the Caney Fork River in north-central Tennessee and adjacent Kentucky; Threatened (F. R. 11/29/91).

Little Aguja pondweed (*Potamogeton chystocarpus*) - This aquatic plant, a member of the pondweed family (Potamogetonaceae), is located in an intermittent stream at a single site, Little Aguja Canyon, in the Davis Mountains of southwest Texas (Jeff Davis County). It has branched, slender stems, linear leaves,

and short, cylindrical flower spikes; Endangered (F. R. 11/14/91).

Two Endemic Puerto Rico Orchids - both Endangered (F. R. 11/29/91)

- *Lepanthes eltoensis* and
- *Cranichis ricartii* are small orchids with a restricted geographic distribution; the former to the eastern part of the island, the latter to the western part.

ANIMALS

Point Arena mountain beaver (*Aplodontia rufa nigra*) - This mammal, which is different in appearance from the flat-tailed rodent most people think of as the "true" beaver (*Castor canadensis*), has small eyes, rounded ears, and a distinctive stump of a tail. Its known distribution is limited to a small portion of coastal Mendocino County, California; Endangered (F. R. 12/12/91).

Regional News

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Seventy-six miles (122 km) of the Niobrara River in Nebraska have been designated a federally protected scenic river. Passage of the Niobrara Scenic River Designation Act added this section to the Wild and Scenic River System. Another 25 miles (40 km) of the Niobrara received a degree of protection nearly as high when it was designated a recreational river. The Niobrara is also being studied as a potential national park. This river is a migration stopover for migrating whooping cranes, and the new designations will ensure protection of their habitat. The recreational segment of the river is just upstream of its confluence with the Missouri River. The scenic river segment begins just northeast of the town of Valentine and runs downstream 82 miles (132 km). A 6-mile (9.5-km) segment between Chimney Creek and Rock Creek is currently excluded but will automatically be added

within 5 years if Congress does not appropriate funds for construction of a water project on that segment.

* * *

Mitchell Energy and Development Corporation (a natural gas, natural gas liquids, and oil producer) has used dredge material to create marsh habitat for whooping cranes along the south Texas coast. Designed to help replace habitat previously lost to erosion, the project is located in the Mesquite Bay area of Aransas National Wildlife Refuge adjacent to Bludworth Island. The man-made 15-acre (6-ha) marsh is enclosed by a dike that is protected from erosion on three sides by interlocking mesh concrete matting. Service staff from Aransas Refuge have guided the project, which was approved by the Texas General Land Office, Texas Parks and Wildlife Department, U.S. Army Corps Engineers, National Marine Fisheries Service, and U.S. Environmental Protection Agency. The project is a test of how effectively dredge

material can be used to create new wetland environments for whooping cranes and other coastal wildlife.

The Service approved creating the marsh as one means of replacing whooping crane habitat lost to erosion and as mitigation for dredging that Mitchell Corporation needed to gain access to a well site in Mesquite Bay. The habitat was constructed in three stages. Bottom soil at the site was used to build a rectangular levee creating the island perimeter. The levee was then filled with 65,000 cubic yards of dredge material from the access channel being built next to the well site. The concrete mats were placed on the outside banks of the levee. In spring, the area will be planted with native marsh vegetation to duplicate the whooping crane's preferred environment.

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Region 4 - The known range of the Louisiana pearlshell (*Margaritifera hembeli*), an Endangered freshwater

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mussel, has been expanded into the Red River drainage in Louisiana. In 1988, when the species was listed, its known range was restricted to the Bayou Boeuf drainage in Rapides Parish, Louisiana. The Bayou Boeuf drainage is south of the Red River drainage and enters the Gulf of Mexico in Vermilion Bay. The Red River flows into the Mississippi River.

Although these two systems are normally separate, there is a possible connection between the tributaries of Bayou Boeuf and Bayou Rapides (part of the Red River drainage) during high floods. These flows may enable host fish to expand the pearlshell's range by transporting the glochidea (mussel larvae that parasitize a host fish) between drainages.

Based upon a report of the Louisiana pearlshell from Moccasin Branch in the Red River drainage, biologists from the Service's Jackson, Mississippi, Field Office, Louisiana Department of Wildlife and Fisheries, and Kisatchie National Forest (Forest) conducted a field survey of streams in and adjacent to the Catahoula District of the Forest last fall. They found 12 populations of the Louisiana pearlshell in three small drainages that eventually flow into the Red River. One drainage is isolated from the others by the impoundment of Lake Latt. All of the populations were in small, shallow, clear streams with gravel or firm sand substrate. Rarely were any other mussel species present, and only the little spectaclecase (*Villosa lienosa*) and the Wabash pigtoe (*Fusconaia flava*) occurred together. The typical streams where the Louisiana pearlshell was found are not generally considered to be good mussel habitat because of their small size. Biologists searched 13 other streams in the vicinity without finding the Louisiana pearlshell. Biologists with the Service, the Louisiana Department of Wildlife and Fisheries, and the Forest will survey many small streams in the Red River drainage. Upon completing these surveys, the Service will review the status of the Louisiana pearlshell to determine if its

Endangered classification is still warranted.

* * *

As a result of surveys initiated last summer, the Georgia Department of Natural Resources (GADNR) has discovered seven populations of a Threatened plant, the Mohr's Barbara's buttons (*Marshallia mohrii*). These populations, discovered in Floyd County, Georgia, mark the first documented occurrence of the plant in that State since the early 1900's. The newly discovered populations range in size from 17 to 300 plants. There are now a total of 22 known sites for the species, including the 15 populations in Alabama. GADNR is continuing its surveys and will focus on trying to relocate the historic population in Walker County, Georgia.

* * *

Region 5 - Region 5 conducted a workshop on section 7 of the Endangered Species Act for several northeastern field offices of the U.S. Army Corps of Engineers (COE). Staff from the Service's regional, field, and Washington offices shared their expertise on the agenda topics, which included listing, recovery, Critical Habitat, and section 7 interagency consultation procedures. The workshop was an excellent forum for reviewing and discussing past section 7 consultations and how the resulting decisions were made.

In a similar effort, endangered species specialists from the Service's New England Field Office teamed up with biologists from the Gloucester, Massachusetts, office of the National Marine Fisheries Service for an Endangered Species Act training session at the COE New England divisional office in Waltham, Massachusetts.

* * *

Recent field work in Pennsylvania led to the discovery of two new populations of rare plant species. A population of eared false foxglove (*Tomanthera auriculata*), a candidate for listing under the Endangered Species Act, was found in Bucks County at a Superfund cleanup site. This is the second known occurrence of the species in Pennsylvania. In

Dauphin County, a fourth Pennsylvania population of northeastern bulrush (*Scirpus ancistrochaetus*) was found on State land.

* * *

Region 6 - State and Federal biologists have undertaken genetic and morphology studies to determine the taxonomic status and distribution of several closely related members of the genus *Gila*, including the Endangered humpback chub (*Gila cypha*) and bonytail chub (*Gila elegans*), in the Colorado River Basin. Field sampling will continue through 1993 and a final report is expected in 1994.

The Bureau of Reclamation agreed to release an additional 10,000 acre-feet of water into the Colorado River each year on an as-available basis from Reudi Reservoir in western Colorado. These releases are expected to improve the late summer and fall habitat conditions for the Endangered Colorado squawfish (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) in an important 15-mile (24-km) stretch of river between Palisade and Grand Junction, Colorado.

Razorback suckers were once widespread throughout most of the Colorado River system from Wyoming to Mexico. Dikes formed along riverbanks to prevent flooding into farmland have eliminated protected backwaters and pools believed to be used by razorback suckers during spawning. The loss of these backwaters, in addition to competition with 41 species of introduced fishes and the modified flows from numerous dams and diversions, has resulted in the decline of razorback suckers and some other native Colorado River fish. Nearly all the razorback suckers found in the wild are believed to be more than 30 years old and were hatched before most of the dams and diversions in the Colorado River system were built. No one knows how long these fish will live, but they are likely to die in the next 5 to 15 years.

There are now 33 wild adult razorback suckers in captivity. These fish will be placed in protected ponds and will be used to establish a broodstock for research on the species'

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Regional News

(continued from page 15)

recovery. A small number of fish produced from these adults will be restocked into the Colorado River to test their ability to survive in the wild.

* * *

Region 7 - Biologists surveying nesting Arctic and American peregrine falcons (*Falco peregrinus tundrius* and *Falco peregrinus anatum*) in Alaska last spring and summer located 313 pairs of the birds defending territories in the interior and northern parts of the State.

Private citizens joined biologists from the Fish and Wildlife Service, Bureau of Land Management, National Park Service, and Alaska Department of Fish and Game in searching for peregrines along 2,485 miles (4000 km) of rivers and coastlines. Raptor experts from Arizona, California, Colorado, Idaho, and Utah also participated in the surveys, and biologist Dr. Albinas Shalnar assisted on the Yukon River as part of the Service's technical exchange program with the former Soviet Union.

Population size continues to increase about 10 percent each year in most areas, and reproduction appears to be unimpaired by environmental contaminants. The 313 pairs raised about 500 young, 377 of which were banded for studies on migration, survival, dispersal, and nest site fidelity.

While conducting the 1991 nesting surveys, Service biologists collected

BOX SCORE

LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	249	9	22	336	33
Birds	73	153	12	0	238	69
Reptiles	16	64	18	14	112	27
Amphibians	6	8	5	0	19	7
Fishes	55	11	36	0	102	53
Snails	7	1	6	0	14	7
Clams	40	2	2	0	44	36
Crustaceans	8	0	2	0	10	5
Insects	13	1	9	0	23	13
Arachnids	3	0	0	0	3	0
Plants	271	1	70	2	344	139
TOTAL	548	490	169	38	1245*	389**
Total U.S. Endangered	548	(277 animals, 271 plants)				
Total U.S. Threatened	169	(99 animals, 70 plants)				
Total U.S. Listed	717	(376 animals, 341 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.

** There are 317 approved recovery plans. Some recovery plans cover more than one species, 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:	53 fish & wildlife 39 plants
Number of Cooperative Grant Agreements signed for the African Elephant Conservation Act:	7
Number of CITES Party Nations:	112

May 31, 1992

unhatched eggs to continue an analysis of DDE residues. Levels of DDE, a breakdown product of the pesticide DDT that

causes eggshell thinning in peregrines, decreased about 50 percent between 1984 and 1989.

January/February 1992

Vol. XVII Nos. 1-2

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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March – August 1992

Vol. XVII Nos. 3–8

ENDANGERED SPECIES

Technical Bulletin

PUBLIC DOCUMENTS
U.S. Department of the Interior
Fish and Wildlife Service

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Protection for 28 Animals and Plants Proposed During January-June 1992

A total of 28 taxa — 12 animals and 16 plants — were proposed by the Fish and Wildlife Service from January through June 1992 for listing under the Endangered Species Act. If the proposed rules become final, protection will be extended to the following:

Spectacled Eider (*Somateria fischeri*)

The spectacled, or Fischer's, eider (also known as quageq in the Yupik language and quvaasuk in Inupiat) is a large marine duck native to the Arctic and northern Pacific Oceans. Adult males are distinguished by a green head, bright orange bill, and large white eye patch enclosed by a black "spectacle." Females are brown with a less distinct, brown spectacle.

Spectacled eiders nest in coastal areas of the United States (Alaska) and Russia (Siberia). Within the U.S., the species' primary breeding range is along the Yukon-Kuskokwim (Y-K) Delta. Twenty years ago, the Y-K population was estimated to number 50,000 to 70,000 pairs. By 1991, however, only about 2,700 remained. No recent information is available on the eider's status in Siberia, although a 1967 report noted a decline within the center of the breeding range. The Service proposed in the May 8, 1992, *Federal Register* to list the spectacled eider as a Threatened species.

Unfortunately, the reasons for the eider's decline are unknown. Loss of nesting habitat is not believed to be a factor. Although the species has apparently been taken in low numbers for sub-



The large white eye patch and black "spectacle," markings that are most evident in males, inspire the name for this marine duck.

sistence, it is unlikely that this had a significant impact on historically large populations. Sport hunting of spectacled eiders, always minimal, was closed in 1991. The listing petition cited oil spills, other forms of water pollution, the effects of large-scale fishing fleets, and overharvest as potential factors affecting the spectacled eider. Determining the species' winter range and the cause(s) for the population decline will be priorities for the Service.

Western Snowy Plover (*Charadrius alexandrinus nivosus*)

The Pacific coast population of the western snowy plover, a small, pale colored shorebird, was proposed in the January 14 *Federal Register* for listing as

Threatened. This coastal population, which nests along Washington, Oregon, California, and northern Mexico (Baja Peninsula), has declined significantly in distribution and numbers. The bird's interior population, found along inland lakes and rivers, is in better condition and is not included in the listing proposal.

Sand spits, unvegetated beaches, and flat, open areas around estuaries are the preferred nesting habitat for the coastal population of the western snowy plover. In the United States, these birds historically were known to nest at 87 sites: 5 in Washington, 29 in Oregon, and 53 in California. According to the most recent surveys, however, plovers apparently now nest at only 28 sites: 2 in Washington, 6

(continued on next page 6)



Regional News

Regional endangered species staffers have reported the following news:

Region 1 — Success in the effort to breed captive California condors

(*Gymnogyps californianus*) for release into the wild continues. On May 27, the last condor chick of the 1992 breeding season hatched, which brings the number pro-

duced this year by the San Diego Wild Animal Park and Los Angeles Zoo captive breeding flocks to 12. The Fish and Wildlife Service (Service) expects to release six of these chicks into the wild next winter to join the two young California condors that were released January 14, 1992 (see *Bulletin* Vol. XVI, Nos. 9-12). Biologists are pleased with how well these two condors are adapting to life in the wild. When the next release takes place, the two young Andean condors (*Vultur gryphus*) released in January as companions for the California condor pair will be recaptured and taken to Colombia for re-release into their native South American habitat.

There are now 64 California condors, 62 in the captive breeding flocks and 2 in the wild.

* * *

Region 1 biologists have been working with the Service's Region 8 Hawaii Research Group staff to survey the 'alala, or Hawaiian crow (*Corvus hawaiiensis*), population. Only 12 birds are believed to remain in the wild, all on the Kona or west side of the island of Hawai'i (the "Big Island"). Three active nests were located this year. Unfortunately, two have been abandoned, apparently due to predation by non-native rats, and the birds did not re-nest. The third pair produced one chick, which took its first sustained flight on June 10. This fledgling is healthy and has begun to forage on its own. Predator trapping in the vicinity to protect the birds has been increased.

There are also 10 adult 'alala at the Olinda captive breeding facility on Maui. Two of the three eggs incubated this year failed due to lethal malpositions. The third egg was watched around-the-clock by the Olinda staff. After it was determined that this chick also was malpositioned, hatching was assisted by hand. The bird finally emerged from its shell on May 27 after a 33-hour effort. It is now healthy and growing. Six of the 10 adults in the Olinda population hatched in captive breeding facilities, and the new chick represents a third generation captive hatch.

* * *

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

John Turner, Director
(202-208-4717)

Michael J. Spear,
Assistant Director for Fish
and Wildlife Enhancement
(202-208-4646)

Larry R. Shannon, Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Michael Bender, Editor
Ann Haas, Assistant Editor
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S.11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Bob Ruesink, *Endangered Species Specialist*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Jamie Rappaport Clark, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *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); Ralph O. Morgenweck, *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; John D. Buffington, *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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Regional News

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Region 2 — A total of 131 whooping cranes (*Grus americana*), including 8 juveniles, migrated northward from Texas this April. Only one crane, an adult male, was lost during the winter at Aransas National Wildlife Refuge. Last year, 9 to 11 birds disappeared while overwintering at the refuge.

Canadian biologist Brian Johns reported this spring that water conditions at Canada's Wood Buffalo National Park had improved from those of the same time in 1991. The early summer appears favorable for chick rearing, in contrast to the conditions during last summer's drought.

* * *

The whooping crane captive breeding flocks are experiencing a record year for egg production. At the Service's Patuxent Wildlife Research Center in Laurel, Maryland, 8 pairs produced 47 eggs, compared to 21 eggs in 1991. Six of the pairs are young birds producing through natural copulation. Although a number of the eggs were infertile, eight chicks have hatched there. At the International Crane Foundation in Baraboo, Wisconsin, 14 eggs were laid by 3 pairs. By late May, six had hatched.

* * *

A Whooping Crane Population Viability Workshop was held last August at Fossil Rim Foundation near Glen Rose, Texas. Dr. Ulyses S. Seal of the Captive Breeding Specialists Group, International Union for Conservation of Nature and Natural Resources, chaired the 3-day session. Most aspects of whooping crane recovery and management were discussed but emphasis was on population modeling and genetic management.

A draft whooping crane studbook was completed before the meeting by Claire Mirande and Cherri Snowbank (International Crane Foundation), Dr. George Gee and Jane Nicolich (Patuxent Wildlife Research Center), and Ernie Kuyt (Canadian Wildlife Service). The studbook will provide the basis for future genetic management of the captive flocks. It also identified unique genetic qualities of the

experimental Rocky Mountain cross-fostered population, and some individuals in the Aransas/Wood Buffalo National Park population (AWP).

The AWP was modelled to predict continued egg removal, effects of inbreeding depression, delay of breeding to age 6 years, and various catastrophe frequencies. Extinction became a probability (28 to 62 percent of the simulations) only when the annual mortality rate was also increased to 50 percent. Modelling of the planned releases in Florida at various annual release numbers and release frequencies indicated zero extinction probabilities if the flock experienced a reproductive rate and mortality equivalent to that of the AWP. Variation in the release numbers and interval made little difference in the time interval until the population reached 100 birds.

Even with females breeding at age 5 years, and no effect of inbreeding depression, the modelling simulations indicated that the Rocky Mountain whooping crane population would become extinct.

* * *

The first combined meeting of the U.S. and Canadian Whooping Crane Recovery Teams was held last October at Regina, Canada. Both teams are updating their recovery plans. These revisions are expected to be completed this year. Each plan is specific to recovery actions within the boundaries of its respective nation. The meeting site was chosen because most members were also participants in the Sixth North American Crane Workshop, which began after the recovery team meetings.

One topic of discussion was what should be done with cranes remaining in the Rocky Mountain cross-fostered population. Project personnel are concentrating on completing their final report on the 17-year experiment. The recovery teams recommended capturing about two-thirds of the birds for future use in captive propagation, and to add their genetic features to the captive flocks. The teams also recommended that birds which summer at Grays Lake, Idaho, be left in the wild for potential use in another experiment. Other Regions of the

Service, State agencies, and other interested groups have been asked to comment on the teams' recommendations before a proposal is made to Director Turner.

* * *

Region 2 issued its first incidental take permit under Section 10(a) of the Endangered Species Act in February 1992. The permit involved the Bee Creek Cave harvestman (*Texella reddeni*) and the Tooth Cave ground beetle (*Rhadine persephone*), troglobites that are restricted to Travis and Williamson Counties, Texas. After 2 years of data gathering, Melvin Simon and Associates of Indianapolis, Indiana, obtained a permit for the construction of a regional shopping mall on a 116-acre tract, resulting in the loss of 2 caves that supported these Endangered invertebrates.

As part of their habitat conservation plan, Melvin Simon and Associates acquired 232 acres of habitat containing 4 caves, then conveyed the land to the Texas Parks and Wildlife Department. The developers agreed to conduct a 10-year study on the environment of 3 of these caves and a 1-year study on cave cricket food habits and populations. In addition, they will control fire ants over the 30-year life of the permit. These non-native ants are a threat to the native cave invertebrates.

* * *

Eighteen thick-billed parrots (*Rhynchopsitta pachyrhyncha*) were released in the Chiricahua Mountains of southeastern Arizona late last year to join others that have been released there since 1986. The released birds came from a variety of sources and represented several age classes. Eight older birds, presumed to have been taken from the wild by smugglers, had been forfeited to the government after being seized by Federal law enforcement officers. The younger birds had been captive-hatched and reared by cooperators. Because experience with previous releases indicated that weak flight muscles and low energy levels make parrots easy prey, the birds were conditioned prior to release. To help them

(continued on page 10)

The Boulder Darter: A Conservation Challenge

Noel M. Burkhead and James D. Williams¹

The boulder darter (*Etheostoma wapiti*) is a small-sized member of the perch family. In general, darters are a diverse group of bottom-dwelling fishes (about 140 species in the United States) that typically flourish in clean, flowing creeks and rivers. Unfortunately, when darters are brought to the attention of the public, the news too frequently is about the decline or demise of a species. Such is the case for this small fish.

The boulder darter was listed by the Fish and Wildlife Service as an Endangered species in 1988. Its only surviving population is found in the Elk River, a large tributary system of the Tennessee River in southern Tennessee and northern Alabama. The primary reasons it needed listing protection were its reduced distribution and the vulnerability of its remaining habitat. The boulder darter is currently restricted to about 63 miles (101 kilometers) of the main channel of the lower Elk River and a few of its larger tributaries. However, the species is not distributed continuously within this range, but is found at only six sites in the main channel and three sites in two of the tributaries. Historically, the boulder darter also lived in Shoal Creek, a tributary of the Tennessee River in northern Alabama, but that population has been extirpated.

Extinction of the boulder darter may follow in the next 10 to 20 years unless some way can be found to increase the number and size of the populations that still survive. This fish shares some attributes with the Maryland darter (*Etheostoma sellare*), a species that some experts now believe to be extinct.

Reasons for Decline

Many human-caused factors contributed to the decline of the boulder darter. In the Elk River, the principal impacts were impoundment of the upper river section by Tims Ford Reservoir; thermal alteration of the tailwaters below Tims



This male boulder is guarding its nest site. The eggs are present at the right margin of the nest cavity.

Ford Dam from warm to cold water; impoundment of the lower Elk River by Wheeler Reservoir; fluctuating water levels from power generation at Tims Ford Reservoir; industrial, municipal, and agricultural pollution; and extensive siltation from soil erosion. The primary reason for the demise of the boulder darter in Shoal Creek was the impoundment of the lower creek by Wilson Reservoir, siltation from agricultural erosion, and pollution from upstream municipalities in Alabama. Other populations of the boulder darter probably existed in the Tennessee River once but were extirpated by impoundments before they were detected.

These powerful forces degrading the Elk River ecosystem have reduced the boulder darter population to small, isolated subpopulations, an alarmingly familiar pattern in southeastern rare fishes (some of which were relatively common only 20 to 30 years ago). When the population of a species becomes highly fragmented, the species loses its ability to respond to the extremes of nature. For example, it may no longer be able to survive extended periods of severe weather, disease, or dramatic fluctuations in food sources.

The loss of biological adaptability in a species directly arises from the loss of its genetic diversity, which is a consequence of the species losing segments of its total population.

The spotty occurrence of the boulder darter in the Elk River results in part from the rarity of its preferred habitat. As its common name suggests, the boulder darter lives among boulders. However, it is not found among boulders anywhere in the river bed; the location of the boulders is important. The boulders must occur in water 2 to 4 feet (0.6 to 1.2 meters) in depth. Also, the boulders must occur in flowing water that is not too swift, such as in riffles or rapids, and not too slow, as in slightly flowing pools.

Most of the Elk River between the reaches affected by impoundment consists of long, heavily silted pools that have little or no boulder substrate. The relatively few riffles and runs are predominately floored with gravel and rubble substrates. At two of the six sites that harbor boulder darters, the boulders are in fact parts from old collapsed structures, a stone bridge and a spillway dam. The

(continued on next page)

Boulder Darter

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survival of the boulder darter is amazing considering the rarity of its preferred habitat and the severe and chronic degradation of the Elk River.

Laboratory Observations

Biologists have long recognized the critical importance of knowing the reproductive biology of any imperiled species, especially for developing conservation measures to protect and recover the species. Until recently, however, virtually nothing was known about the life history of the boulder darter. Our first goal in research on this species was to observe its spawning behavior and to identify the area(s) of the river that served as spawning habitat. Unfortunately, observing boulder darter spawning behavior was not possible in the Elk River because of the water's consistent turbidity. Further, the river below Tims Ford Dam is subject to significant water level fluctuations resulting from power generation at the dam. In order to overcome the obstacles to studying the darter in its natural environment, 10 darters were captured, transported to Gainesville, Florida, and placed in an artificial stream.

The artificial stream is a 4 by 8 foot (1.2 by 2.4 m) plexiglass aquarium in which current is generated by an electric trolling motor. We mimicked important aspects of the boulder darter's habitat in the artificial stream, notably flow, temperature, photoperiod, and substrate composition. The boulder darters spawned in May and June 1991, yielding the first observations of reproduction for this Endangered species. What we learned in this short period provided important insight into the inherent frailties of this darter at the critical point of creating the next generation.

Reproductive Habitat

The boulder darter spawns in the same habitat in which it normally lives: boulders in flowing water with a velocity of about 1 to 2 feet (0.3 to 0.6 m) per second. The boulder darter belongs to a reproductive guild of darters known as egg clusterers because the eggs are laid in clusters in spaces beneath rocks. The male darter remains at the nest site and aggressively guards the eggs against intruders.

The male boulder darter is picky about the spaces he selects for nest cavities. In fact, the nesting sites must have specific attributes: 1) the space must be between two boulders, not between a boulder and

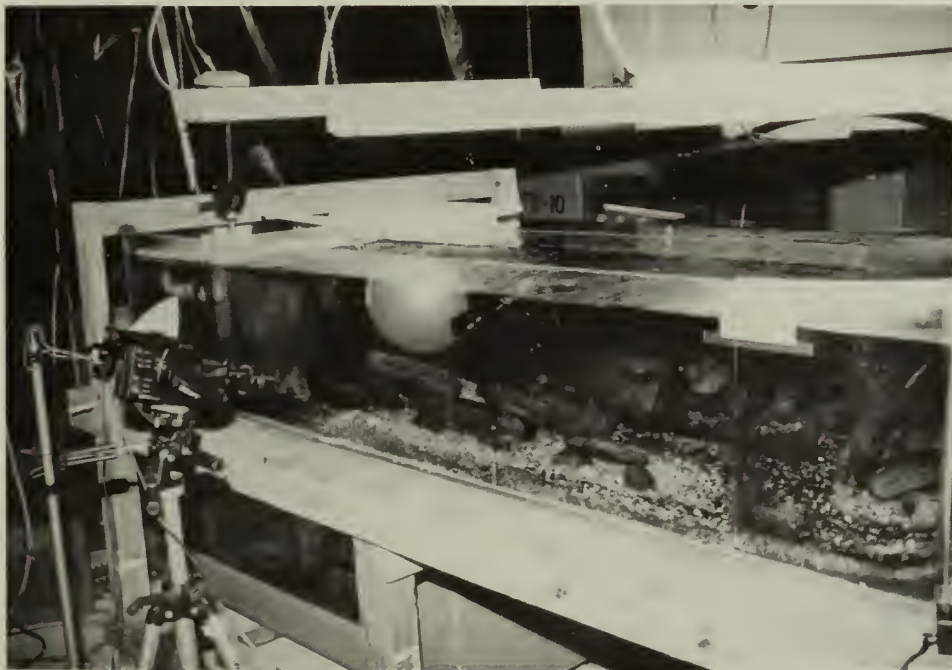
gravel or a boulder and pieces of rubble, although a space created between a boulder and bedrock might be acceptable; 2) it must have a wedge-shaped configuration, with the two boulders touching at a relative narrow angle, creating a space into which the female wedges her eggs; 3) the site must have current flowing across it; 4) the cavity must be roughly horizontal (no vertical or nearly vertical spaces were selected); and 5) the boulders must not only be in the correct depth and current ranges, but they must also occur in a certain configuration relative to the current and to each other.

The critical importance of current flow across the nest space was revealed when one trolling motor failed during a weekend. All of the eggs in that nest died. Current is obviously important for oxygenating the eggs and possibly for keeping the egg surface swept free of particulate debris and silt. This observation also suggests that the persistent siltation of the Elk River must be very limiting to the survival of egg and possibly larval life stages of the boulder darter. It is well known that silt will smother fish eggs, and species such as the boulder darter that spawn on the bottom are the most vulnerable.

A critical insight gleaned from these observations is that fluctuating water levels from power generation (2 to 3 feet changes in depth) must significantly alter the specific habitat features (depth and water velocity) of the nest cavity the male selected for spawning. It is quite possible that some boulder darter nests may be left stranded out of the water when water levels drop during periods of decreased power generation. Conversely, if a male spawned in a nest cavity during low water levels, how would the survival of the eggs be affected during high water levels? It is possible that fluctuating water levels may be reducing, perhaps significantly, the reproductive success of this Endangered species.

What will be the fate of the boulder darter? At this time, we simply don't know. State and Federal agencies will work together and attempt to patch the

(continued on page 6)



An artificial stream was used to mimic important habitat features of the boulder darter. The video camera was set up to record behavior.

Boulder Darter

(continued from page 5)

ecosystem wounds created by the hand of the human species. Perhaps some ways can be found to create new habitat. Artificial propagation may also play an important role in the recovery of this imperiled fish. One thing is fairly certain: if nothing is done, the boulder darter, like the Maryland darter, will slip from the face of the earth.

¹ National Fisheries Research Center,
7920 N.W. 136th Street, Gainesville,
FL 32606

Listing Proposals

(continued from page 1)

in Oregon, and 20 in California. In addition to the loss of nesting habitat, declines in the overall breeding population have been documented. Fewer than 1,500 birds are estimated to remain within the three States. The status of western snowy plovers along the Baja coast is not fully known, but the birds there are probably subject to the same threats facing those in the U.S.

Poor reproductive success has become a serious problem for the coastal population. A primary cause is human disturbance during the plover's nesting season. The loss of plover breeding sites to residential, industrial, and recreational development is another major factor in the bird's decline. Because plovers need open areas in which to nest, the encroachment of European beachgrass (*Ammophila arenaria*), a non-native plant introduced to stabilize dunes, further limits the amount of suitable breeding habitat. Due to the reduced numbers and range, plover populations also are increasingly vulnerable to both native and introduced predators.

Many of the plover's remaining breeding sites are on lands managed by Federal agencies. In the limited instances where human disturbance of nesting plovers has been precluded, either by area closures or by natural events, reproductive success has improved. However, few measures have been implemented so far to protect critical nesting areas.



Peninsular bighorn sheep

Desert Bighorn Sheep (*Ovis canadensis*) — Peninsular Ranges Population

The Peninsular Ranges population of desert bighorn sheep is endemic to seven mountain ranges that run from the vicinity of Palm Springs, California, south into Baja California, Mexico. Peninsular bighorns are similar in appearance to other desert bighorns, with pale brown pelage and massive, coiled horns (in males).

The Peninsular bighorn was once described as having the most dense and

stable population of all bighorn sheep in California. By 1979, however, only an estimated 1,171 Peninsular bighorns remained, and there are now fewer than 400 in the U.S. portion of the range. The Service estimates that 1,500 to 2,500 still occur in Mexico.

Among the factors leading to the Peninsular bighorn's decline are habitat loss and degradation; competition with domestic and feral livestock for forage and water; and human disturbance. The main threat now, however, is disease.

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western snowy plover

photo by B. "Moose" Peterson/WRP

photo by B. "Moose" Peterson/WRP

Listing Proposals

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The bighorns are susceptible to a variety of bacterial, fungal, and viral infections, and may be experiencing an immune system deficiency caused by ecological stress. The survival rate for lambs is too low throughout most of the range to maintain even the current population size. In the northern Santa Rosa Mountains, for example, no lambs survived in 1990. Because of the serious threat posed by disease, as well as the population's reduced range and numbers, the Service proposed on May 8 to list the Peninsular bighorn as Endangered.

The desert bighorn has long been one of the most highly sought big game species in North America. There is no longer any legal sport hunting of Peninsular bighorns in either the U.S. or Mexico, but poaching is known to occur.

Most of the Peninsular bighorn's remaining U.S. range is in a checkerboard pattern of public/private ownership. If the population is listed, the Bureau of Land Management and the Forest Service will be required to ensure that grazing programs they administer do not jeopardize its survival.

Five California Freshwater

Shrimp

On May 8, the Fish and Wildlife Service proposed to list the following species of freshwater shrimp in California as Endangered:

- Conservancy fairy shrimp (*Branchinecta conservatio*)
- longhorn fairy shrimp (*Branchinecta longiantenna*)
- vernal pool fairy shrimp (*Branchinecta lynchi*)
- California linderiella (*Linderiella occidentalis*)
- vernal pool tadpole shrimp (*Lepidurus packardii*)

These small crustaceans are endemic to ephemeral wetlands, such as vernal pools and swales, in the Central Valley, Coast Ranges, and a limited number of sites in the Transverse Range and Santa Rosa Plateau. Their scattered distribution within

vernal pool complexes indicates that they may have very specific water chemistry requirements. All five species produce eggs that can withstand heat, cold, and prolonged dessication. The eggs hatch when the vernal pools and swales fill with rainwater, and hatchlings develop rapidly into adults in order to produce eggs for the next generation.

The unusual habitat upon which these animals depend is threatened by a variety of activities, primarily urban development, water management projects, conversion to agricultural use, off-road vehicle (ORV) use, and disposal of garbage. In the Central Valley alone, approximately 90 percent of the historic vernal pool habitat had been destroyed by 1970, and the loss continues. Much of what remains is being affected indirectly by activities in the surrounding watershed.

Under section 404 of the Clean Water Act, the discharge of fill material into wetlands — including the swales and vernal pools occupied by these shrimp — is regulated by the U.S. Army Corps of Engineers. Accordingly, if the listing proposal is made final, the Corps will be responsible for consulting with the Service before granting any fill permits that may affect the shrimp.

Karner Blue Butterfly (*Lycaeides melissa samuelis*)

Although currently classified as a subspecies of the Melissa blue butterfly, the Karner is considered by some lepidopterists as a separate species. Karner blues have a wingspan of 22 to 32 millimeters (0.87 to 1.26 inches). Males are silvery or dark blue with narrow black margins on the backs of their wings, and females are grayish-brown. On the ventral surface, both sexes are slate gray with orange bands and black spots circled by white.

Historically, the Karner blue occurred at scattered sites within a band extending from eastern Minnesota, across portions of Wisconsin, Illinois, Indiana, Michigan, Ohio, Canada (Ontario), Pennsylvania, New York, Massachusetts, and New Hampshire. This butterfly is found primarily at grassy openings in pine barrens

and oak savannas characterized by the presence of wild lupine (*Lupinus perennis*), the only known plant upon which Karner blue larvae feed. Due to the widespread loss of suitable habitat, the Service proposed on January 21 to list the Karner blue as Endangered.

Over the past 100 years, the butterfly's numbers apparently have declined approximately 99 percent. More than 90 percent of this decline has occurred in the last 10 to 15 years. The subspecies is now believed to be extirpated from Illinois, Massachusetts, Pennsylvania, Ohio, and Ontario. Some Karner blue sites have been destroyed directly by urban, agricultural, and silvicultural development. In other areas, vegetative succession has crowded out the lupine, upon which the Karner blue depends.

Carolina Heelsplitter (*Lasmigona decorata*)

A freshwater mussel, this species inhabits cool, slow-moving, small- to medium-sized streams and rivers. Historically, the Carolina heelsplitter was fairly widespread in the Saluda and Pee Dee River systems in South Carolina and the Catawba and Pee Dee River systems in North Carolina. Due to habitat modification and degradation, it now survives in only a small portion of its former range, and the Service has proposed to list this mollusk as Endangered (E.R. 5/26/92).

The decline of the Carolina heelsplitter is attributed to several factors, including siltation resulting from poor agricultural, forestry, and construction practices; runoff and discharge of municipal, industrial, and agricultural pollutants; and habitat alteration associated with impoundments, channelization, dredging, and sand mining. This species is known to survive in only a few short reaches of Waxhaw Creek (Catawba River system) and Goose Creek (Pee Dee River system) in North Carolina and the Lynches River (Pee Dee River system) and Flat Creek (a Lynches River tributary) in South Carolina. Many of the activities that led to its decline threaten the remaining populations.

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Clubshell (*Pleurobema clava*) and Northern Riffleshell (*Epioblasma torolusa rangiana*)

Two other freshwater mussels, the clubshell and northern riffleshell, were proposed June 18 for listing as Endangered. Both were once widely distributed but have been eliminated from more than 95 percent of their historical range.

The northern riffleshell formerly occurred in the tributaries of the Ohio River, western Lake Erie, and the St. Clair and Detroit Rivers. It is now extirpated from Illinois, Indiana, West Virginia, and Ontario, Canada. The remaining populations are limited to short reaches of six streams in Kentucky, Michigan, Ohio, and Pennsylvania. The clubshell was widespread in the Ohio River basin and tributaries of western Lake Erie in nine States, but it has disappeared from Alabama, Illinois, and Tennessee. This species now occurs only in segments of 12 streams in Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and West Virginia.

The clubshell and northern riffleshell both depend on high quality stream habitat with clean sand and gravel substrates swept by steady currents. Their decline resulted from the same factors affecting the Carolina heelsplitter: water quality degradation and direct habitat loss due to impoundments and dredging. To make matters worse, a new danger has surfaced. The zebra mussel (*Dreissena polymorpha*), a prolific pest species accidentally introduced into the Great Lakes from Europe in the 1980s, poses a severe threat to the entire native mussel fauna of the Great Lakes and Mississippi River drainages through competition for living space, food, and survival of glochidea (mussel larvae). (See feature in *Bulletin* Vol. XV, No. 11.)

Cave Crayfish

Cambarus aculabrum is a small, cave-dwelling crayfish distinguished from related species by its reduced eyes and total lack of pigmentation. It is endemic to

two sites, Bear Hollow and Logan Caves, in Benton County, Arkansas. Water quality degradation is a serious threat to this aquatic crustacean, and the Service proposed May 26 to list it as Endangered.

Both Bear Hollow and Logan Caves are limestone solution caverns that contain streams fed by surface drainage. Run-off from residential and agricultural development is entering the groundwater and threatens to contaminate *C. aculabrum* habitat. If the crayfish is listed, Federal agencies with regulatory authority over activities that may affect this species will be required to consult with the Service on ways to avoid jeopardy.



The Pima pineapple cactus is an attractive plant that grows up to 7 inches (17.5 centimeters) tall and bears silky yellow flowers. Each spine cluster has one strong, straw-colored, hooked central spine and six radial spines.

Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*)

The Pima pineapple cactus occurs over a relatively large area, including parts of southern Arizona and northern Sonora, Mexico, but it is distributed very sparsely within its range. This variety of cactus is believed to be declining due to habitat degradation and destruction from livestock overgrazing, urbanization, mining, agricultural development, road construction, ORV use, and certain range-management activities. The Service estimates that up to 50 percent of the historical habitat has already been lost. Illegal collecting of this cactus also is a documented

threat. For these reasons, the Service proposed April 20 to list the Pima pineapple cactus as Endangered.

Some Pima pineapple cacti occur on public lands administered by the Bureau of Land Management, Forest Service (Coronado National Forest), and Fish and Wildlife Service (Buenos Aires National Wildlife Refuge). If this plant is listed, all three agencies will be responsible for ensuring that their management activities are not likely to jeopardize its survival.

Puerto Rico Cactus

A very different species of cactus was proposed for listing as Endangered on May 20. *Leptocereus grantianus*, which has no common name, is a sprawling or suberect cactus with elongated stems that reach to just over 6 feet (2 meters) in length and about 2 inches (5 centimeters) in width. This species is nearly spineless and produces green and cream-colored nocturnal flowers.

Leptocereus grantianus is a very rare cactus endemic to Culebra, an island located just off the northeastern corner of Puerto Rico. Only one population of about 50 individuals is known to exist. It grows in a dry thicket along the coast on a rocky slope. Culebra is subject to intense pressure for various types of development, and the sole *L. grantianus* colony is currently proposed as a site for the construction of housing projects.

Seven Desert Milk-vetch Taxa

Seven taxa of milk-vetch in the genus *Astragalus*, plants belonging to the pea family (Fabaceae), were proposed May 8 for protection as Endangered or Threatened species. The following five taxa were proposed for listing as Endangered:

- Lane County milk-vetch (*A. jaegeirianus*)
- Coachella Valley milk-vetch (*A. lentiginosus* var. *coachellae*)
- Fish Slough milk-vetch (*A. lentiginosus* var. *piscinensis*)
- Peirson's milk-vetch (*A. magdalenae* var. *peirsonii*) and

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- **triple-ribbed milk-vetch** (*A. tricarinatus*).

The other two are not in as great a degree of danger and were therefore proposed for listing as Threatened:

- **shining milk-vetch** (*A. lentiginosus* var. *micans*) and
- **Sodaville milk-vetch** (*A. lentiginosus* var. *sesquimetralis*).

All seven of these perennials are highly endemic to certain sites within the Mojave and Sonoran Deserts in California and Baja California (Mexico), and the Great Basin Desert in Nevada. Their sparse distribution reflects adaptation to habitats with specific soil or moisture conditions. Three taxa are known to occur at only one location, and three more are found at only two or three sites. One plant, the triple-ribbed milk-vetch, was recently observed for the first time in 3 years. Six of the seven taxa occur entirely or primarily on Federal lands administered by the Bureau of Land Management (BLM). The Fish Slough milk-vetch, however, occurs primarily on land owned by the Los Angeles Department of Water and Power, with a smaller portion of the population found on BLM land.

The threats to the survival of these plants are varied and include one or more of the following: grazing and trampling by livestock and feral burros; ORV use; trampling by other recreational users; military training exercises; competition from non-native plants; urbanization; construction related to fisheries development; and activities that alter soil hydrology.

The BLM has taken some steps to reduce the habitat damage caused by off-road vehicles and grazing, but these measures are not enough to ensure the conservation of the seven desert milk-vetch taxa.

Three Florida Rosemary Mints

Three species of plants in the genus *Conradina* were proposed May 20 for listing as Endangered. *Conradina*, or minty rosemary, is a genus of minty aro-

matic shrubs in the family Lamiaceae that resemble the true rosemary (*Rosmarinus officinalis*), an herb native to the Mediterranean region. The three minty rosemaries recently proposed for listing are endemic to Florida.

As its name implies, the **Apalachicola rosemary** (*C. glabra*) occurs near the Apalachicola River in northern Florida. This very narrowly distributed species is threatened by habitat modification due to certain forestry and roadside right-of-way maintenance practices. The **short-leaved rosemary** (*C. brevifolia*) is restricted to dry scrub vegetation in central Florida's Lake Wales Ridge, an area with many endemic species that is being destroyed by agricultural and residential development. The **Etonia rosemary** (*C. etonia*), which occurs near Etonia Creek in Putnam County, also is vulnerable to residential development.

The State of Florida and The Nature Conservancy are engaged in land conservation programs to purchase some of the remaining pockets of Florida sand scrub habitat. This effort is being carried out in coordination with the Service, which has proposed the establishment of a Lake Wales Ridge National Wildlife Refuge. Some *C. brevifolia* sites are within the proposed system of preserves. The other two rosemary mint species occur on privately owned land.

Seabeach Amaranth (*Amaranthus pumilus*)

An annual herb in the family Amaranthaceae, the seabeach amaranth can form a clump of a hundred or more branches and sprawl up to about 3 feet (1 meter) in diameter. The stems of this attractive plant are fleshy and bright pink or red. This species is endemic to Atlantic coastal plain beaches, occurring mainly at the accreting ends of barrier islands and on spits. It cannot tolerate competition with other plants, and does not survive where the dynamic nature of its habitat is altered by beach stabilization projects. It often shares the habitat used for nesting by plovers, terns, and other colonial shorebirds.

The seabeach amaranth has been eliminated from two-thirds of its original nine-State range. It no longer occurs in Massachusetts, Rhode Island, New Jersey, Delaware, Maryland, or Virginia. The 41 populations known to have disappeared were probably lost to habitat damage resulting from "hard" beach stabilization structures (e.g., seawalls, rip rap), storm-related erosion, and heavy summer beach use of ORVs. Webworms also have attacked some colonies. These threats continue to face the 55 known populations that remain in the States of New York, North Carolina, and South Carolina. Most of these populations are small and tenuous. For these reasons, the Service has proposed to list the seabeach amaranth as Threatened (F.R. 5/26/92).

Other amaranth species have been cultivated as food in North, Central, and South America for thousands of years, and they are still grown as an important crop in temperate and tropical climates throughout the world. Amaranth seeds have a high nutritional value, and are rich in several amino acids that are often lacking in diets that include little meat protein. The seabeach amaranth is being investigated by the U.S. Department of Agriculture, as well as several universities and private institutes, for its potential use in crop development and improvement. Its favorable traits of salt tolerance and large seeds could be of commercial value if combined with other desirable crop traits. The seabeach amaranth is also valuable as a sand binder. A single large plant is capable of creating a dune up to about 2 feet (60 cm) high containing 70 to 105 cubic feet (2 to 3 cubic meters) of sand.

Okeechobee Gourd (*Cucurbita okeechobeensis*)

This plant, which is native to the south shore of Lake Okeechobee in southern Florida, is an annual in the family Cucurbitaceae. It is a climbing vine with large, heart-shaped leaves, cream-colored, funnel-shaped flowers, and round gourds 3 to 4 inches (7 to 9 cm) in diameter.

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The vines trellis themselves on available shrubs, historically pond apple but now usually elderberry or Brazilian pepper. The gourds have been described as hanging "like Christmas ornaments."

Although the bitter flesh of the Okeechobee gourd is poisonous, the seeds are edible and nutritious, and the flesh has detergent properties. This species also is resistant to powdery mildew and at least five crop viruses. It contains germplasm that can be introduced into commercially valuable crops to improve their disease resistance.

Until the 1920's, the species was abundant in swampy pond apple forests along the south shore of Lake Okeechobee. However, at least 95 percent of its original habitat was destroyed by agricultural development. The remaining habitat is vulnerable to further development, herbicide use, adverse changes in water level man-

agement, and the spread of non-native plants. Because of these threats, the Service has proposed to list the Okeechobee gourd as Endangered (F.R. 5/20/92).

Godfrey's Butterwort (*Pinguicula ionantha*)

A carnivorous plant in the family Lentibulariaceae, Godfrey's butterwort produces a rosette of fleshy leaves covered with short, glandular hairs that trap insect prey. The flowers are pale violet to white. This plant has been reported from only 20 sites within 4 counties in the Apalachicola region of the Florida panhandle. Much of the species' remaining habitat is on the Apalachicola National Forest.

Godfrey's butterwort inhabits bogs and seasonally wet depressions in grassy pine flatwoods and savannas. The open habitat this species needs historically was maintained by frequent, but low intensity, fires. With fire suppression, the

plant's habitat is vulnerable to encroachment by evergreen shrubs. The resulting thickets eliminate grasses and perennial herbs, including Godfrey's butterwort. This species also is threatened by shading when its open native habitat is converted to pine plantations. Because of its dependence on wetland habitat, drainage is another danger. On May 20, the Service proposed to list Godfrey's butterwort as Threatened.

The unusual nature of carnivorous plants often makes them the targets of commercial and private collectors. During the 1970's, Godfrey's butterwort was among a number of native carnivorous plants avidly collected by hobbyists. Collection of this species probably still occurs, and a comment on the listing proposal stated that the species has been offered for sale recently, but the extent of trade appears to be small.

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learn natural food sources, they were given branches with pine cones attached. Thick-bills feed primarily on conifer seeds and, to a lesser extent, on acorns and juniper berries. To gain strength, the parrots were subjected to rigorous flight conditioning.

In the initial post-release period, five parrots were killed by predators (hawks), two died of starvation, one died of unknown causes, radio contact was lost with one, and one was recaptured because it failed to flock with the others. At last report, the other eight from this release were being offered supplemental pine cones at the release site and were doing well. An additional nine captive-reared birds are being raised for wild release later this year.

* * *

Region 4 — The known range of the Louisiana pearlshell (*Margaritifera hembeli*) has expanded into the Red River drainage in Louisiana. When this mussel was listed in 1988 as Endangered, its known range was restricted to the Bayou Boeuf drainage in Rapides Parish,

Louisiana. The Bayou Boeuf drainage is south of the Red River drainage and enters the Gulf of Mexico in Vermilion Bay. The Red River flows into the Mississippi River.

Although the two systems are normally separate, there is a possible connection between the tributaries of Bayou Rapides, of the Red River drainage, and Bayou Boeuf during high flood flows. These flows may enable host fish to expand the pearlshell's range into these drainages. Based upon a report of the Louisiana pearlshell from Moccasin Branch in the Red River drainage, biologists from the U.S. Fish and Wildlife Service's (Service) Jackson Field Office, Louisiana Department of Wildlife and Fisheries, and Kisatche National Forest (Forest) conducted a field survey of streams in and adjacent to the Catahoula District of the Forest last fall. Twelve populations of the Louisiana pearlshell were found. These populations were in three different small drainages that eventually flow into the Red River. One drainage is isolated from the others by the impoundment of Lake Iatt. All of the populations were found in small, shallow, clear streams with gravel

or firm sand substrate. Rarely were any other mussel species present.

The typical streams where the Louisiana pearlshell was found are not generally considered to be good mussel habitat because of their small size. Thirteen other streams in the vicinity were searched without finding the Louisiana pearlshell. Many small streams in the Red River drainage will be surveyed by the Service, the Louisiana Department of Wildlife and Fisheries, and the Forest. Upon completion of these surveys, the Service will review the status of the Louisiana pearlshell to determine if its Endangered classification is still warranted.

* * *

Biologists surveying the Black Warrior River system are becoming increasingly concerned about the decline of its native mussels and other aquatic species. The river and its three major tributaries, the Sipsey, Mulberry, and Locust Forks, collectively drain over 6,000 square miles in west-central Alabama. Historically, this river system supported at least 45 species of unionid mussels, including the Endangered penitent mussel (*Epioblasma penita*)

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and the Threatened inflated heelsplitter mussel (*Potamilus inflatus*), as well as five species considered as candidates for listing. A 1975 mussel survey of the Black Warrior River main channel encountered only 18 species of unionid mussels, and results indicated that the diversity and abundance of the unionid fauna had been severely reduced due to the impoundment of the river.

During a 1985 status survey of the flat-headed musk turtle (*Sternotherus depressus*), biologists collected 28 species of unionid mussels, including four listing candidates, from tributaries of the upper Black Warrior River drainage. In 1990, the Jackson Field Office conducted a mussel survey of 73 sites in the upper Black Warrior River drainage. Apparently suitable mussel habitat was observed at most sites; however, only six live mussels of two species were found, none of which were listed or candidates. Biologists encountered freshly dead specimens of nine other species.

The mussel fauna in the entire Black Warrior River System has experienced a severe decline in diversity, distribution, and abundance. The range of the heelsplitter in the drainage has been severely reduced, and the penitent mussel has been extirpated from the Mulberry Fork. Six major impoundments have inundated many historic mussel collecting areas in the drainage. Water quality degradation from agricultural activity and urban drainage affect many free-flowing tributaries. Nonpoint pollution from poultry and cattle feedlots has been identified by the Alabama Department of Environmental Management as a major water quality problem throughout the drainage. Coal surface mines are also common in the drainage. Mine drainage can result in acidification, mineralization, and sediment loading of streams and rivers, all of which are detrimental to the unionid fauna.

This past year, the Service proposed to list 11 species in the Mobile River system as Threatened or Endangered. Nine of these were known to have occurred in the

Black Warrior River and its tributaries, part of the Mobile River drainage. Recent surveys have found four proposed mussels, the dark pigtoe (*Pleurobema furvum*), triangular kidneyshell (*Ptychobranchus greeni*), Alabama moccasinshell (*Medionidus acutissimus*), and orange-nacre mucket (*Lampsilis perovalis*), surviving in several small headwater streams of the Black Warrior River.

Mussels are not the only species in trouble in the Black Warrior River system. The watercress darter (*Etheostoma nuchale*) is listed as Endangered and the flattened musk turtle is listed as Threatened. In addition, a recent study by the Geologic Survey of Alabama (Survey) found a decline in the numbers and distribution of nine fish species in the lower reaches of the Sipsey, Mulberry, and Locust Forks. In a related study, the Survey believes that nine snail species and seven mussel species within the drainage are in danger, and it considers the status of several aquatic reptiles and amphibians to be either poorly known or of special concern.

* * *

Biologists from the Jackson Field Office have discovered colonies of the Endangered tulotoma snail (*Tulotoma magnifica*) in Choccolocco Creek, a tributary of the Coosa River in Alabama. A relict population of this large aquatic snail was discovered in the creek's lowermost unimpounded shoal. The shoal is long and wide, and it has the abundant large rock habitat required by the species. Tulotoma snail colonies were found along the north bank of the shoal for a distance of about 100 meters. Although habitat appeared to be excellent and abundant throughout the shoal, only a single snail was found in the middle, and none were encountered on the south bank. The largest colonies were found at the head of the shoal; downstream colonies generally had fewer than 25 individuals. Juvenile snails (those less than 10 millimeters in shell length) were common in the larger colonies. Although habitat in four other upstream areas was considered common to abundant, no snails were found in these locations. However, small populations of tulotoma snails may exist upstream be-

cause this species can be difficult to locate where it occurs in small numbers.

Tulotoma snails were relatively abundant in the lower 10 to 12 miles of Choccolocco Creek before over half of the known occupied habitat was flooded by Logan Martin Dam. Repeated searches of the unimpounded reaches of Choccolocco Creek in recent years had failed to relocate the snail in the drainage. Water quality degradation probably caused the disappearance of the tulotoma snail, as well as a once abundant unionid mussel fauna, from unimpounded habitat. Prior to the 1991 discovery, the last sighting of the snail in Choccolocco Creek was in 1963. Historically, this species occurred from the Coosa River and its tributaries in Etowah County, northeast Alabama, to the Alabama River in Monroe County, southeast Alabama. In January 1991, when the species was listed, it was only known to occur at one site in the Coosa River, and in localized portions of four Coosa River tributaries.

* * *

To assist in the recovery of the Endangered red wolf (*Canis rufus*), North Carolina artist Janet Walker is selling limited-edition color prints of her painting, "Return to the Wild - Red Wolf." Ms. Walker will donate 50 percent of the profit from each print to the recovery program. This money will be matched (up to \$40,000) through a challenge grant administered by the National Fish and Wildlife Foundation. The total size of each print is 23 inches by 28 inches; the actual image size is 18 inches by 24 inches and is reproduced on heavy, acid-free stock. Each print comes with a certificate of authenticity and a note from Ms. Walker. Checks for the purchase price (\$85 for regular prints, \$100 for regular artist proofs, and \$185 for color-remarked artist proofs) can be made payable "Return to the Wild." Please add \$5 for shipping costs. North Carolina residents should also include 6 percent sales tax. Payment should be mailed to the Red Wolf Recovery Program, Alligator River National Wildlife Refuge, Post Of-

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Post Office Box 1969, Manteo, North Carolina 27954.

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Region 5 — The U.S. Atlantic Coast piping plover (*Charadrius melodus*) population remained stable in 1991, with a count of 742 pairs compared with 739 pairs in 1990. Plover censuses in Atlantic Canada tallied 245 nesting pairs in 1991, compared with 229 pairs in 1990. The apparent increase is attributed to the much more intensive effort exerted in Canada during the 1991 international piping plover census.

Average U.S. Atlantic plover productivity in 1991 was 1.23 chicks per pair, compared with 1.06 chicks per pair in 1990. These productivity figures reflect 68 percent and 81 percent of nesting pairs in 1990 and 1991, respectively. Highest productivity was documented in Maine and Massachusetts, where good production was ascribed to intensive management, lack of nest flooding, and low nest predation.

* * *

For the past year, New England Field Office staff have been working closely with a local high school science teacher to develop a set of "Piping Plover Lesson Plans." The lesson plans, consisting of species background information, a set of slides, a simulation game, and other activities, are designed for grades 5 through 7 and are currently being tested by several teachers in area schools.

Beaches where piping plovers nest may be closed to visiting school children, teachers, and the general public during spring and early summer, the time when plovers are present. These lesson plans were developed as a substitute teaching experience in lieu of actual beach trips. Anyone looking for more information on "The Piping Plover Lesson Plans" can contact Linda Morse at the New England Field Office (603/225-1411).

* * *

The Service's New York Field Office has been working with the New York City Department of Environmental Protection (NYCDEP) on protection and



"Return to the Wild - Red Wolf"

management of a new piping plover nest area on a city owned beach in Queens on Long Island. The NYCDEP contacted the New York Field Office for technical assistance after it was learned that plovers had nested in the area in 1991. The Service recommended monitoring and protecting the nesting area, and eliminating beach grading operations in order to preserve the habitat. The New York State Department of Environmental Conservation has been monitoring the site this year and reports that eggs from all three plover nests have hatched. Seven adults and six juveniles have been observed in the area.

* * *

Region 5 has furnished scoping comments on a U.S. Air Force proposal to convert aircraft (from A-10s to F-16s) at two New England Air National Guard bases. The Air Force also proposed lowering the ceiling for training flights to 100-300 feet above ground level in several military airspace areas within Maine, New Hampshire, Vermont, New York, Pennsylvania, and New Jersey.

According to the Service's review, the proposed activity has the potential for affecting bald eagles (*Haliaeetus leucocephalus*) at 17 currently active nesting locations in northern New England

and New York, and more than one-third (14 of 40 active pairs) of the nesting peregrine falcons (*Falco peregrinus*) reestablished in the northeastern U.S. The Service has informed the Air Force and its consultants, Science Applications International Corporation, that a biological assessment is required.

* * *

In Virginia, the James River contains the largest winter concentration of bald eagles in the State and the largest known summer concentration of bald eagles in the eastern United States. To protect one of the summer night roosts, the Service purchased 3,537 acres in 1991 and added 613 acres this year to create the James River National Wildlife Refuge.

* * *

West Virginia Division of Natural Resources personnel who conducted winter bat surveys at 26 caves during the 1991-1992 season discovered two new small colonies of Indiana bats (*Myotis sodalis*). In addition, the Indiana bat population in Martha's Cave, Pocahontas County, now exceeds historic levels (approximately 150 bats), and the population stands at 210. After a population decline in the 1970's, the cave entrance was fenced to protect the bats.

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Two round-bar cave gates at Cave Mountain Cave in Pendleton County were replaced with angle-iron gates in March 1992. This project was carried out under a Challenge Cost-Share Agreement between the West Virginia Division of Natural Resources and the U.S. Forest Service (Monongahela National Forest). Roy Powers designed and supervised construction of the new gates. This cave harbors a large maternity colony of Virginia big-eared bats (*Plecotus townsendii virginianus*). The gates were completed March 29, 1992, and by April 7 over 300 *Plecotus* had returned to the cave.

* * *

The Service's New Jersey Field Office recently reviewed a draft work plan for wetland restoration at a Clean Water Act-section 404 violation site. A large, previously unknown population of a Threatened wetland plant, the swamp pink (*Helonias bullata*), was nearly destroyed as a result of the violation, which involved a clay-mining operation (see *Bulletin* Vol. XVI, No. 3). In a letter to the violator, the Philadelphia District of the U.S. Army Corps of Engineers identified all of the Service's recommendations concerning restoration of the 17-acre wetland site and purchase of another swamp pink site as corrective measures required to resolve the violation. In the draft work plan, the violator outlined design studies and a preliminary restoration plan.

* * *

Informal consultation with the Maine Department of Transportation has prevented adverse impacts on the Furbish lousewort (*Pedicularis furbushiae*), an Endangered plant in the snapdragon family. A stretch of highway along the St. John River will be relocated, thus avoiding the necessity of placing riprap on approximately 500 feet of habitat containing a number of lousewort plants.

* * *

The Pine Barrens in Concord, New Hampshire, contain the only remaining New England population of the Karner blue butterfly (*Lycaeides melissa samuelis*), recently proposed by the Service for list-

ing as Endangered. The habitat is located on and near airport land owned by the City of Concord. Because such airport lands are under the jurisdiction of the Federal Aviation Authority (FAA), the Service will have the opportunity to work with the FAA and the City to promote the conservation of Karner blue habitat.

Several months ago, the City of Concord initiated plans for a land exchange that would remove 74 acres of habitat from FAA oversight authority. A private development corporation was to be the recipient of the surplus airport property. The corporation proposed construction of an airport industrial park, anchored by a U.S. Postal Service Mail Distribution Center. As recently as the mid-1980's, Dr. Dale Schweitzer reported that this habitat supported a colony of approximately 1,000 Karner blue butterflies. Because the loss of this pine barren habitat would threaten the survival and recovery of the sole New England population of Karner blue butterflies, intensive negotiations began among the Service, The Nature Conservancy, the City of Concord, and the development corporation. The goal was to protect the most valuable butterfly habitat while accommodating industrial development in the lower quality habitat areas.

After numerous meetings, the involved parties signed a Memorandum of Understanding and Cooperative Agreement on January 10, 1992. The agreement endorses a land exchange that provides the development corporation with land for the Post Office and a somewhat more limited industrial park. In exchange, the City will receive a parcel of property for future development of an airport terminal. The Service will acquire deeded conservation easements on about 28 acres within the industrial park and a management agreement with the City for about 100 acres on airport grounds. As currently envisioned, the protected habitat will become an addition to the newly established Great Bay National Wildlife Refuge (formerly Pease Air Force Base).

* * *

Researchers from The Nature Conservancy reported the results of 1991 status

surveys for the sandplain gerardia (*Agalinis acuta*) in New York. The surveys were conducted for the New York Natural Heritage Program and the Service with funding provided under Section 6 of the Endangered Species Act. This Endangered plant occurs at 6 locations on Long Island, with only 11 sites throughout its distribution in the north-east.

Individual plants have been counted since 1986. Overall, the 1991 season was a poor one for the New York sites, with numbers totaling 515, down slightly from 1990. The highest numbers were recorded in 1989 with a total of 1,808 plants at the New York sites. Hot, dry weather from mid-June through July may have resulted in the loss of young plants. Habitat management activities were undertaken at several of the sites, and management is a continuing need. The Nature Conservancy is preparing formal management plans for each of the sites under a Section 6 funding agreement.

* * *

After meeting with the Service's New York and Long Island Field Offices, Town of Babylon officials have agreed to work with the Service and The Nature Conservancy to protect habitat for piping plovers and seabeach amaranth (*Amaranthus pumilus*) at the Town's Overlook and Cedar Beaches on Long Island. Protection measures being implemented include fencing and posting the habitat, restricting vehicular traffic, and development of a written management agreement with The Nature Conservancy. The Service is providing public outreach literature, and is assisting the Town in the development of interpretive signs about the piping plover and the coastal dune ecosystem.

* * *

The Service held a public meeting in Jonesville, Virginia, on the proposed Endangered listing for the Lee County cave isopod (*Lirceus usdagalun*). Local interests are concerned that listing the isopod would stop the construction of a Federal prison facility and an airport planned for Lee County. Service representatives ex-

(continued on page 14)

Regional News

(continued from page 13)

plained the Endangered Species Act's section 7 process and the need to protect the groundwater in the karst (highly porous limestone) area where these facilities might be sited. The public responded favorably, and we are working with Federal and local planning authorities to provide protection for the isopod during the siting, construction, and operation phases of the proposed facilities.

* * *

The recovery effort for the American burying beetle (*Nicrophorus americanus*) received a boost this past winter when the Cincinnati Zoo Insectarium reported that it had successfully raised over 300 larvae from 13 pairs of this Endangered insect that are on loan there. Re-pairings are being conducted to maximize the reproductive output of the short-lived adult beetles, which have only a 12-month life span. It is hoped that habitat suitable for reintroduction of this species can be identified in the Ohio area this summer.

Currently, American burying beetles are known to survive in the wild in Rhode Island and eastern Oklahoma. A reintroduced population on a small island in Buzzard's Bay, Massachusetts, is also showing signs of success. While Cincinnati's zoo is the only one involved in the recovery program for this species, other captive American burying beetle populations are being maintained at Boston University and the Oklahoma Biological Survey.

* * *

An analysis by the Service's Delaware Estuary program of New Jersey's 1991 stranding statistics for sea turtles and marine mammals showed that 25 (36 percent of all strandings reported in the State of New Jersey) were loggerhead turtles (*Caretta caretta*) caught on the intake structures of the Salem Nuclear Power Plant. As a result of a monitoring program required by the National Marine Fisheries Service, nearly all of the turtles are being recovered alive and released offshore.

* * *

State Natural Heritage Program personnel, Federal endangered species biolo-

gists, and other botanists from 4 States met February 24 to discuss recovery criteria, strategies, and tasks for the northeastern bulrush (*Scirpus ancistrochaetus*) draft recovery plan. Also discussed was the recent discovery of three previously unknown populations of this plant in Franklin and Cumberland Counties, Pennsylvania. This brings the number of known surviving populations to 16 rangewide. Eleven of these populations are on private lands and are threatened by habitat loss (primarily by wetland draining, dredging, and filling for residential development, recreation, and agriculture).

* * *

Biologists with the Service's New England Field Office have concluded an intensive Section 7 consultation with the Federal Highway Administration on a proposed riverbank stabilization project along the Connecticut River in New Hampshire within and adjacent to populations of the dwarf wedge mussel (*Alasmidonta heterodon*). A no-jeopardy opinion was issued. This biological opinion was based on close coordination with the New Hampshire Department of Transportation (NHDOT) that led to project modification and a number of protective measures.

The NHDOT redesigned the project to eliminate all stone fill below ordinary high water. They also reduced the project length, developed erosion control guidelines, and agreed to hire one person to monitor water quality before, during, and after the construction. Water quality, especially turbidity, will be monitored to determine the effectiveness of erosion control measures. Weekly activity logs, including daily multiple sampling of turbidity, will be submitted to the New England Office for review throughout the duration of the project.

* * *

Region 6 — A 25-pound pallid sturgeon (*Scaphirhynchus albus*) was captured in the Yellowstone River near Fallon, Montana. This fish was found upstream of a rock irrigation diversion structure, and it marks the first time since 1950 the species has been documented so far up-

stream. Record spring flows on the Yellowstone River may have allowed fish passage over the diversion structure for the first time in many years.

The first recapture of a tagged pallid sturgeon occurred on the Missouri River in the fall of 1991 near Williston, North Dakota. This fish was originally captured in February 1991 below Fort Peck Dam in Montana. At that time, the fish was tagged with a disk tag and a PIT (passive integrated transponder) tag. It then travelled in excess of 150 miles before being netted in North Dakota.

Two female pallid sturgeon were recently added to the Blind Pony State Hatchery in Missouri. These fish, plus the six males already at the facility, will be used in future captive propagation programs.

* * *

A contaminant evaluation of interior least tern (*Sterna antillarum*) and piping plover eggs and chicks on the Missouri River in South Dakota was completed by the Service's South Dakota Fish and Wildlife Enhancement Office in 1991. The evaluation identified naturally occurring selenium and cadmium in the shale bluffs along the Missouri River. These substances are being released into the river through wind and water erosion. Levels of selenium detected in the eggs were found to be elevated enough, based on the results of other studies, to cause embryo toxicity, but the selenium impacts on these Missouri River eggs were unknown. Although there are no known PCB sources in South Dakota, low concentrations of PCB's also were found. It is possible that female terns and plovers may be exposed to PCB's on the wintering grounds or during migration.

* * *

One of the largest fall migrant concentrations of bald eagles in the Nation occurs at Hauser Lake near Helena, Montana. An estimated 200 to 300 bald eagles use the area at any one time during early winter. The first arrivals reach Hauser Lake in mid-October, and the last birds depart for southern wintering grounds around mid-December. Overall,

(continued on next page)

Final Listing Rules for 53 Species

Seven animals and 46 plants were classified as Endangered or Threatened species from January 1 through June 30, 1992. The following list gives the name, classification, and date of listing for each species. Details on the following listing actions are available in the *Federal Register* notices for those dates:

ANIMALS

- Snake River sockeye salmon (*Oncorhynchus nerka*)—Endangered (F.R. 1/3/92)
- Louisiana black bear (*Ursus americanus luteolus*)—Threatened (F.R. 1/7/92)
- Kanab ambersnail (*Oxyloma haydeni kanabensis*)—Endangered (F.R. 4/17/92)
- goldline darter (*Percina aurolineata*)—Threatened (F.R. 4/22/92)
- blue shiner (*Cyprinella caerulea*)—Threatened (F.R. 4/22/92)
- Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*)—Endangered (F.R. 5/20/92)
- Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)—Endangered (F.R. 6/22/92)

Regional News

(continued from previous page)

close to a thousand eagles may migrate through the area over the season. The birds feed on the kokanee salmon that spawn below Canyon Ferry Dam at Hauser Lake.

The eagle concentration attracts national attention. Over 10,000 visitors have visited the viewing site at Hauser Lake in the past several years. The visitors center had 2,500 visitors in 1991, including 1,000 school children. Visitors came from 29 States and 7 foreign countries. A cooperative management plan is being developed among the Service; Montana Department of Fish, Wildlife and Parks; U.S. Forest Service; Bureau of Reclamation; Lewis and Clark County; and various private landowners to outline strategies for managing the large number of visitors to minimize impacts on the

(continued on page 16)

PLANTS

- clay reed mustard (*Schoenocrambe argillaceae*)—Threatened (F.R. 1/14/92)
- Barneby reed mustard (*Schoenocrambe barnebyi*)—Endangered (F.R. 1/14/92)
- Ute ladies'-tresses (*Spiranthes diluvialis*)—Threatened (F.R. 1/17/92)
- Leedy's roseroot (*Sedum integrifolium* var. *leedyi*)—Threatened (F.R. 4/22/92)
- Morefield's leather flower (*Clenatis morefieldii*)—Endangered (F.R. 5/20/92)
- sensitive joint-vetch (*Aeschynomene virginica*)—Threatened (F.R. 5/20/92)
- Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*)—Endangered (F.R. 6/8/92)

Three Florida Plants — Threatened (F.R. 5/8/92)

- Telephus spurge (*Euphorbia telephioides*)
- white birds-in-a-nest (*Macbridea alba*)
- Florida skullcap (*Scutellaria floridana*)

Five Puerto Rico Plants — Endangered (F.R. 4/22/92)

- capa rosa (*Callicarpa ampla*)
- palo de jazmin (*Styrax portoricensis*)
- palo colorado (*Ternstroemia luquilensis*)
- *Ternstroemia subsessilis*
- *Ilex sintenisii*

Six California Plants — Endangered (F.R. 6/22/92)

- Howell's spineflower (*Chorizanthe howellii*)
- Sonoma spineflower (*Chorizanthe valida*)
- Menzies' wallflower (*Erysimum menziesii*)
- Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*)
- beach layia (*Layia carnosa*)
- clover lupine (*Lupinus tidestromii*)

Twenty-five Hawaiian Plants — all but one Endangered

- Hawaiian red-flowered geranium (*Geranium arboreum*)—F.R. 5/13/92
- liliwai (*Acaena exigua*)—F.R. 5/15/92
- mahoe (*Alectryon macrococcus*)—F.R. 5/15/92
- ko'oko'olau (*Bidens micrantha* ssp. *kalealaha*)—F.R. 5/15/92
- 'oha wai (*Clermoutia oblongifolia* ssp. *mauiensis*)—F.R. 5/15/92
- haha (*Cyanea lobata*)—F.R. 5/15/92
- haha (*Cyanea mceldowneyi*)—F.R. 5/15/92
- ha'iwale (*Cyrtandra munroi*)—F.R. 5/15/92
- nohoanu (*Geranium multiflorum*)—F.R. 5/15/92
- kio'ele (*Hedyotis coriacea*)—F.R. 5/15/92
- wawae'iole (*Huperzia mannii*)—F.R. 5/15/92
- nehe (*Lipochaeta kamolensis*)—F.R. 5/15/92
- *Lysimachia lydgatei*—F.R. 5/15/92
- alani (*Melicope mucronulata*)—F.R. 5/15/92
- *Schiedea haleakalensis*—F.R. 5/15/92
- dwarf iliau (*Wilkesia hobbeyi*)—F.R. 6/22/92
- Hawaiian bluegrass (*Poa sandwicensis*)—F.R. 5/13/92
- *Poa siphonoglossa*—F.R. 5/13/92
- *Chamaesyce halemannii*—F.R. 5/13/92
- *Dubautia latifolia*—F.R. 5/13/92
- *Stenogyne campanulata*—F.R. 5/13/92
- *Xylosma crenatum*—F.R. 5/13/92
- *Stenogyne kanehoana*—F.R. 5/13/92
- 'ihi'ihii (*Marsilea villosa*)—(F.R. 6/22/92)
- Haleakala silversword or 'ahinahina (*Argyroxiphium sandwicense* ssp. *macrocephalum*)—Threatened, F.R. 5/15/92

Regional News

(continued from page 15)

eagles and to provide information to the general public about the eagles.

* * *

Region 8 (Research) — During May, biologists with Region 8's Hawaii Field Station participated in a survey of forest bird populations on Maui. This project was conducted in cooperation with the Hawaii Department of Land and Water Resources, the National Park Service, and The Nature Conservancy of Hawaii. Preliminary results indicate that the populations of two Endangered birds, the crested honeycreeper (*Palmeria dolei*) and Maui parrotbill (*Pseudonestor xanthophrys*), are similar to what were observed in 1980. Two other species recorded previously, the nuku-pu'u (*Hemignathus lucidus*) and Maui 'akepa (*Loxops coccineus ochraceus*), were not located this spring.

* * *

An immature Mississippi sandhill crane (*Grus canadensis pulla*) that was released on the Mississippi Sandhill Crane National Wildlife Refuge in 1991 was discovered dead in February 1992. It was emaciated and had lesions indicative of lead poisoning. A flat, well-worn triangular object was recovered from the gizzard. The lead concentration in the liver was 69 parts per million (wet weight), confirming the preliminary diagnosis of lead poisoning as the cause of death. To

BOX SCORE LISTINGS AND RECOVERY PLANS						
Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	250	9	23	338	33
Birds	73	153	12	0	238	70
Reptiles	16	64	18	14	112	27
Amphibians	6	8	5	0	19	8
Fishes	55	11	36	0	102	53
Snails	7	1	6	0	14	8
Clams	40	2	2	0	44	37
Crustaceans	8	0	2	0	10	5
Insects	14	1	9	0	24	13
Arachnids	3	0	0	0	3	0
Plants	280	1	71	2	354	143
TOTAL	558	491	170	39	1258*	397**
Total U.S. Endangered	558	(278 animals, 280 plants)				
Total U.S. Threatened	170	(99 animals, 71 plants)				
Total U.S. Listed	728	(377 animals, 351 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, chimpanzee, 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.

** There are 325 approved recovery plans. Some recovery plans cover more than one species, 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: 53 fish & wildlife
39 plants

Number of CITES Party Nations: 112

August 31, 1992

our knowledge, this is the first documented lead poisoning death of a Mississippi sandhill crane.

March – August 1992

Vol. XVII Nos. 3–8

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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ENDANGERED SPECIES

Technical Bulletin

PUBLIC DOCUMENTS
DEPOSITORY ITEM

Department of the Interior
Fish and Wildlife Service

Experimental Release of Whooping Cranes in Florida is Proposed

APR 7 1993

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The last confirmed whooping crane (*Grus americana*) in Florida was shot in 1927 or 1928. But this magnificent bird may soon return to the State if a recent proposal by the Fish and Wildlife Service (FWS) is approved. Under the plan, captive-reared birds would be released within the Kissimmee Prairie in an effort to establish a non-migratory population of this Endangered species. Currently, the only self-sustaining wild population consists of about 145 whoopers that migrate some 2,500 miles (4,000 kilometers) between breeding grounds at Wood Buffalo National Park in northern Canada and wintering habitat at Aransas National Wildlife Refuge on the Texas coast.

The plan is to release 12 captive-reared birds in December 1992 or January 1993 after they are conditioned for wild release. Rearing and release techniques will be similar to those used to bolster the wild population of Mississippi sandhill cranes (*Grus canadensis pulla*), a related subspecies also listed as Endangered. The whooping cranes to be released in Florida will come from breeding flocks maintained at the FWS Patuxent Wildlife Research Center in Laurel, Maryland, and the International Crane Foundation in Baraboo, Wisconsin. Those initially released will be radio tagged and monitored for 2 years to document survival, movements, susceptibility to disease and parasites, and adaptation to the wild. If the initial results are favorable, the project will continue, with a goal of releasing 20 birds each year.

The Kissimmee Prairie is a large region in south-central Florida characterized by



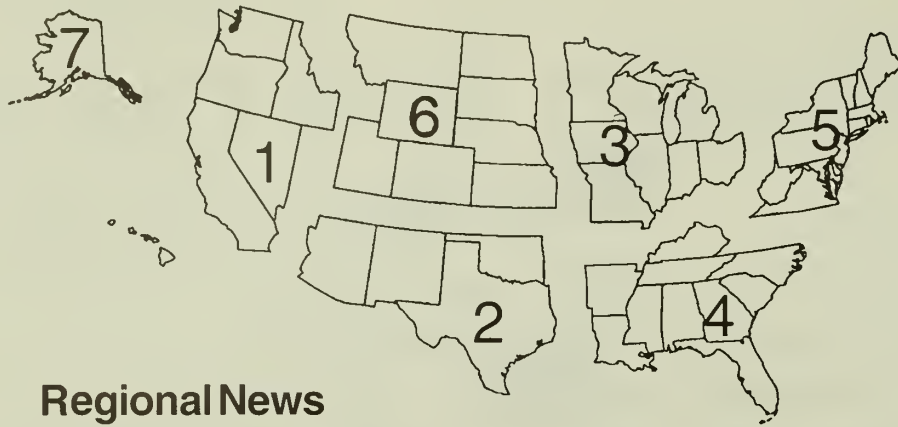
photo by W. Kubichek

flat, open expanses of broad saw palmetto prairie interspersed with shallow wetlands and lakes. Land ownership is a mixture of large private ranches and public property. All of the landowners support the proposal. The release site specified in the proposal is the 55,350-acre (22,400-ha) Three Lakes Wildlife Management Area.

Because the Aransas/Wood Buffalo population winters in only a small area of Texas along the intracoastal waterway, it is vulnerable to destruction from a contaminant spill or a natural catastrophe, such as a hurricane or red tide outbreak. The Gulf Intracoastal Waterway handles some of the heaviest barge traffic of pet-

rochemical products in the world, and a spill there could destroy the flock or its food supply. Creating additional self-sustaining wild flocks would help ensure the species' survival in the event of such a disaster and constitute a major step toward recovery. Establishing the Kissimmee Prairie flock as a non-migratory population also would protect it from the risks associated with traveling great distances between breeding and wintering grounds. Studies on cranes have shown that migration is a learned rather than innate behavior.

(continued on page 3)



Regional News

Regional endangered species staffers have provided the following news:

Region 1 — One of the two California condors (*Gymnogyps californianus*)

released into the wild in January 1992 (see *Bulletin* Vol. XVII, No. 1-2) was found dead on October 8 near the Pyramid Lake dam in southern California.

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

John Turner, Director
(202-208-4717)

Michael J. Spear,
Assistant Director for Fish
and Wildlife Enhancement
(202-208-4646)

Larry R. Shannon, Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN
Editor, Michael Bender
Editorial Assistance, Dianne Taylor
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S. 11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Acting Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Jamie Rappaport Clark, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *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); Ralph O. Morgenweck, *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; John D. Buffington, *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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According to toxicologists, the condor died of kidney failure caused by ingesting ethylene glycol, a chemical used as an antifreeze in heating and cooling systems. Biologists theorize that the bird landed to drink along one of the streams that feed Pyramid Lake and was attracted to a puddle of antifreeze leaked from the radiator of one of the many vehicles in the highly used recreation area. Antifreeze has a flavor that attracts animals, and has been implicated in the accidental deaths of dogs and other pets.

* * *

On August 3, the State Office of Emergency Services reported a spill of crude oil from a pipeline rupture at a Unocal tank farm in Avila Beach, California, near San Luis Obispo. The size of the spill was eventually estimated at 100 to 150 barrels (4,200 to 6,300 gallons).

Concern about the spill's impact was underlined by the presence of the Threatened southern sea otter (*Enhydra lutris nereis*) and the Endangered California brown pelican (*Pelecanus occidentalis*). Field observations placed more than 50 sea otters and about 8,000 pelicans within a 15-mile (24-kilometer) radius of the spill. Biologists with the Fish and Wildlife Service's (FWS) Carlsbad, California, Field Office are concentrating on environmental damage assessment. Studies are being coordinated with the California Department of Fish and Game and with Unocal's environmental consultant.

Known wildlife deaths potentially related to the spill number 75 birds (including 15 brown pelicans) and 4 sea otters. This loss comes at a particularly bad time for the pelican, which is already suffering the effects of a meteorological event known as "El Niño." The warm waters of El Niño have driven anchovies, the primary food of the California brown pelican, out of their normal habitat and into deeper, cooler waters. Consequently, pelicans are becoming emaciated and weak, and more deaths are being reported.

* * *

(continued on page 9)

Surface Mining Threatens Wildlife of the Buttahatchee River

Paul Hartfield¹

The Buttahatchee River, a major Tombigbee River tributary in Mississippi, is a diverse aquatic ecosystem with at least 94 fish species and 37 mussel species. Among the mussel fauna are two Endangered species, the southern combshell (*Epioblasma penita*) and heavy pigtoe (*Pleurobema taitianum*). This river also supports populations of four other mussel species that have been proposed for Federal protection: the orange-nacre mucket (*Lampsilis perovalis*), Alabama moccasinshell (*Medionidus acutissimus*), southern clubshell (*Pleurobema decisum*), and ovate clubshell (*Pleurobema perovatum*).

Recent studies indicate that the lower Buttahatchee River and its aquatic fauna have been adversely affected by gravel mines. These surface mines appear to have seriously altered stream hydraulics and channel configuration in the lower portion of the river, resulting in a loss of habitat stability. A comparison of 1977 and 1989 mussel surveys revealed that mussel abundance declined 95 percent, and the number of mussel species dropped 60 percent in the lowermost 6 kilometers (3.6 miles) of the river where the mines are located. There was no decline of overall diversity or abundance in the mussel community above the mining area.

Damage to the river and its fauna continues to accrue, even from abandoned mines. During the spring floods of 1991, a levee that separated the Buttahatchee



photo by Paul Hartfield

When a flood scoured out a new channel for the Buttahatchee River through an abandoned gravel mine, it left this section of the old channel without water. This site had been habitat for two Endangered mussels, *E. penita* and *P. taitianum*, along with several other mussels that are proposed for listing.

River from an extensively mined area gave way. This failure resulted in the formation of a new channel through the abandoned mines and left over 1 kilometer (0.6 mile) of former riverine habitat without flow. Extensive erosion is occurring in the new channel and above the new cutoff. Downstream from the new channel, a gravel bar that once supported the Endangered southern combshell and other species has been buried under approximately 1 meter (3.3 feet) of loose sand and gravel. Bank erosion is migrating upstream from the point of stream capture as the river channel attempts to

adjust to changes in gradient. This upstream headcutting has resulted in the destruction of at least two other gravel bar communities that supported rare mussels. One of these bars was the only location where the heavy pigtoe had been observed alive since its listing as an Endangered species.

The U.S. Fish and Wildlife Service is working with the Mississippi Office of Geology to develop appropriate controls on mining in sensitive areas of the Buttahatchee River drainage.

¹Jackson, Mississippi, Field Office

Whooping Cranes

(continued from page 1)

If the proposed release is approved, the Florida whoopers will be listed as a "non-essential experimental population." This designation is authorized under the Endangered Species Act to foster greater public support for reintroductions of En-

dangered or Threatened species. Members of experimental populations are protected under the Act, but additional flexibility in their management is allowed. The designation of "non-essential" means that a loss of the experimental population would not further jeopardize the species as a whole.

Details on the proposed release are available in the September 29, 1992, *Federal Register*.

Listing Proposals — July/October 1992

Twenty-nine species — 3 fishes and 26 plants — were proposed by the Fish and Wildlife Service (FWS) from July through October 1992 for listing as Endangered or Threatened. If these listing proposals are approved, Endangered Species Act protection will be extended to the following:

Three Southeastern Fishes

The Tennessee and Cumberland Rivers once supported one of the world's richest assemblages of temperate freshwater fishes, but these waters are now among our most severely altered river systems. As a result, the diversity and abundance of aquatic wildlife (including mussels as well as fishes) has declined significantly. Many of the species that do survive now exist only as isolated remnant populations. Three fish species from these river systems were proposed July 8 for listing as Endangered:

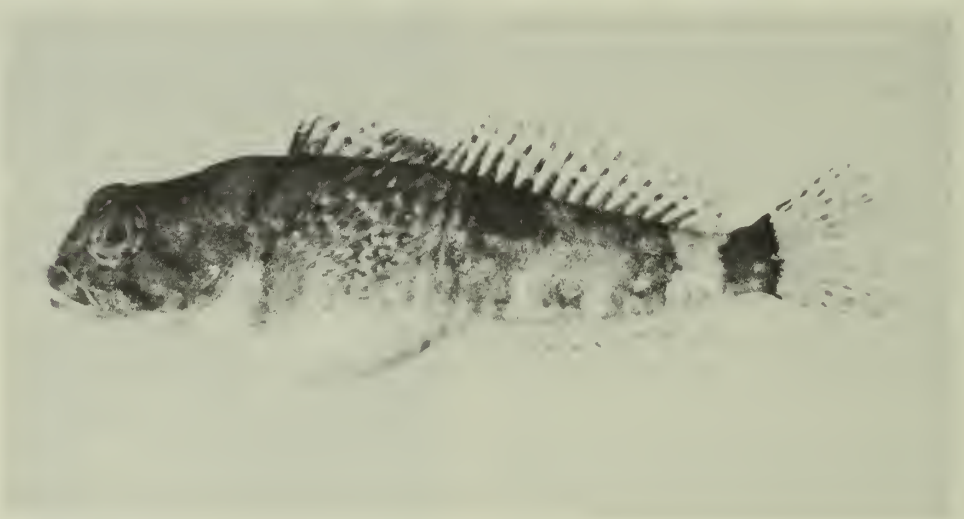
- **duskytail darter** (*Etheostoma* sp.) - This small (2-inch, or 5-centimeter) fish is straw to olive in color. It inhabits rocky areas in gently flowing, shallow pools and eddies. The duskytail darter is now found at only five short river reaches in Tennessee and Virginia, and it is presumed extirpated from Kentucky.

- **palezone shiner** (*Notropis* sp.) - A formal scientific description and species name for this taxon are now being prepared. The palezone shiner, another small fish (about 2 inches in length), is translucent with a straw-colored body and a dark mid-lateral stripe. Its habitat is flowing pools and runs with sand, gravel, and bedrock substrates. Two populations of the palezone shiner survive in Alabama and Kentucky, but the species apparently has disappeared from Tennessee.

- **pygmy madtom** (*Noturus stanauli*) - With a maximum length of only 1.5 inch (3.8 cm), this catfish is the smallest of the madtoms. It also has a distinctive pigmentation pattern — very dark above the body midline and light below. The pygmy madtom is found on shallow, pea-



duskytail darter



pygmy madtom

gravel shoals within rivers with a moderate to strong current. Historically, only two populations were known, both in Tennessee, and one of these already may have been lost.

Most of the clean, free-flowing habitat needed by these species has been damaged or destroyed. An extensive system of impoundments has not only directly eliminated riverine habitat but also altered certain characteristics (temperature, dissolved oxygen levels, etc.) of downstream waters. Pollution is another serious problem. Siltation and toxic runoff from coal mines and poorly managed farmlands have fouled many streams. As a result, 8 fishes and 24 mussels in the Tennessee and Cumberland River basins have already required Endangered Species

Act protection, and numerous other aquatic species in these systems are candidates for listing.

Seven Puerto Rican Plants

Puerto Rico supports a rich diversity of plants and animals that have adapted to its unique island habitats and occur nowhere else. However, widespread deforestation and unplanned development have led to the decline or even extinction of many endemic species. Currently, 57 plants and animals native to Puerto Rico and its outlying islands are listed by the FWS as Endangered or Threatened, or are proposed for listing.

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photo by Dick Biggins

photo by Noel Burkhead

Listing Proposals

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The FWS recently took action to protect seven plant species. Four of these are ferns that were proposed July 14 for listing as Endangered:

- *Adiantum vivesii* - a colonial fern in the maidenhair family (Sinopteridaceae) with erect, spreading fronds. A single population of about 1,000 plants grows in a deeply shaded hollow at the base of a limestone cliff. The site is privately owned.

- *Elaphoglossum serpens* - The sole known remaining population of this epiphytic fern (a member of the family Lomariopsidaceae) is found in a patch of dwarf montane forest. At present, 22 of the ferns grow on the mossy trunks of only 6 individual trees.

- *Polystichum calderonense* - Although this species also belongs to Lomariopsidaceae, it is a terrestrial fern, and is found on moist, shaded mountain ledges. Two populations are known, with a total of 57 individuals at last count. One of the sites is privately owned, and the other is within Monte Guilarte Commonwealth Forest.

- *Tectaria estremerana* - a woody, erect fern belonging to the wood-fern family (Dryopteridaceae). This plant grows in pockets of moist humus that accumulate among limestone boulders on a single hillside near the Arecibo Radio Telescope. Any expansion of this large facility that does not take the presence of *T. estremerana* into account could damage or even destroy the population.

On September 3, the FWS proposed to list another three Puerto Rican plants as Endangered:

- *Aristida chaseae* - A densely tufted perennial grass in the family Poaceae, *A. chaseae* grows on rocky, exposed upper slopes of the Sierra Bermeja and on the nearby Cabo Rojo National Wildlife Refuge.

- *Lyonia truncata* var. *proctorii* - an evergreen shrub belonging to the heath family (Ericaceae) that produces clusters of small, white, urn-shaped flowers. About 63 plants have been reported from

2 sites near the summit of Cerro Mariquita in the Sierra Bermeja.

- *Vernonia proctorii* - Another shrub, *V. proctorii* is a member of the aster family (Asteraceae). This plant is distinguished by its knobby, densely hairy trunk and stems and by its clusters of bright purple flowers. Approximately 950 individuals are scattered throughout a scrub woodland that covers several acres at the summit of Cerro Mariquita.

Except for one population of *A. chaseae*, all three of these species are restricted to the Sierra Bermeja, a range of hills that constitute the oldest geological formation on Puerto Rico. This area is known for its high number of endemic plants. The sites occupied by these species are privately owned and are subject to intense pressure for agricultural, tourist, and urban development. Although one population of *A. chaseae* is protected on Cabo Rojo NWR, this species faces the additional threat of competition from introduced grasses.

Seven Florida Plants

Seven species of plants that grow primarily in central Florida were proposed September 30 for listing as Endangered or Threatened:

- *Florida perforate cladonia* (*Cladonia perforata*) - This is the first lichen proposed for listing under the Endangered Species Act. It is a ground-dwelling species with intricate branches that form dense, pale grey-yellow tufts of "reindeer moss." (Endangered)

- *pigeon wings* (*Clitoria fragrans*) - a perennial herb in the pea family (Fabaceae). This species produces two types of flowers: chasmogamous (showy, insect pollinated) and cleistogamous (small, lacking petals, self-pollinating). The plant's common name, pigeon wings, refers to the appearance of the chasmogamous flowers, which contain one large, inverted petal, are borne in pairs, and are lilac in color. (Threatened)

- *Avon Park harebells* (*Crotalaria avonensis*) - Another perennial in the pea family, *C. avonensis* is a low-growing, somewhat succulent herb that arises from

a taproot and bears a profusion of small yellow flowers. This species is one of the most narrowly distributed of the central Florida endemics, and is known from only three sites. (Endangered)

- *scrub buckwheat* (*Eriogonum longifolium* var. *gnaphalifolium*) - a perennial herb in the family Polygonaceae. A basal rosette of leaves produces a single stem that reaches up to 3 feet (1 meter) in height, topped with clusters of small silvery flowers. (Threatened)

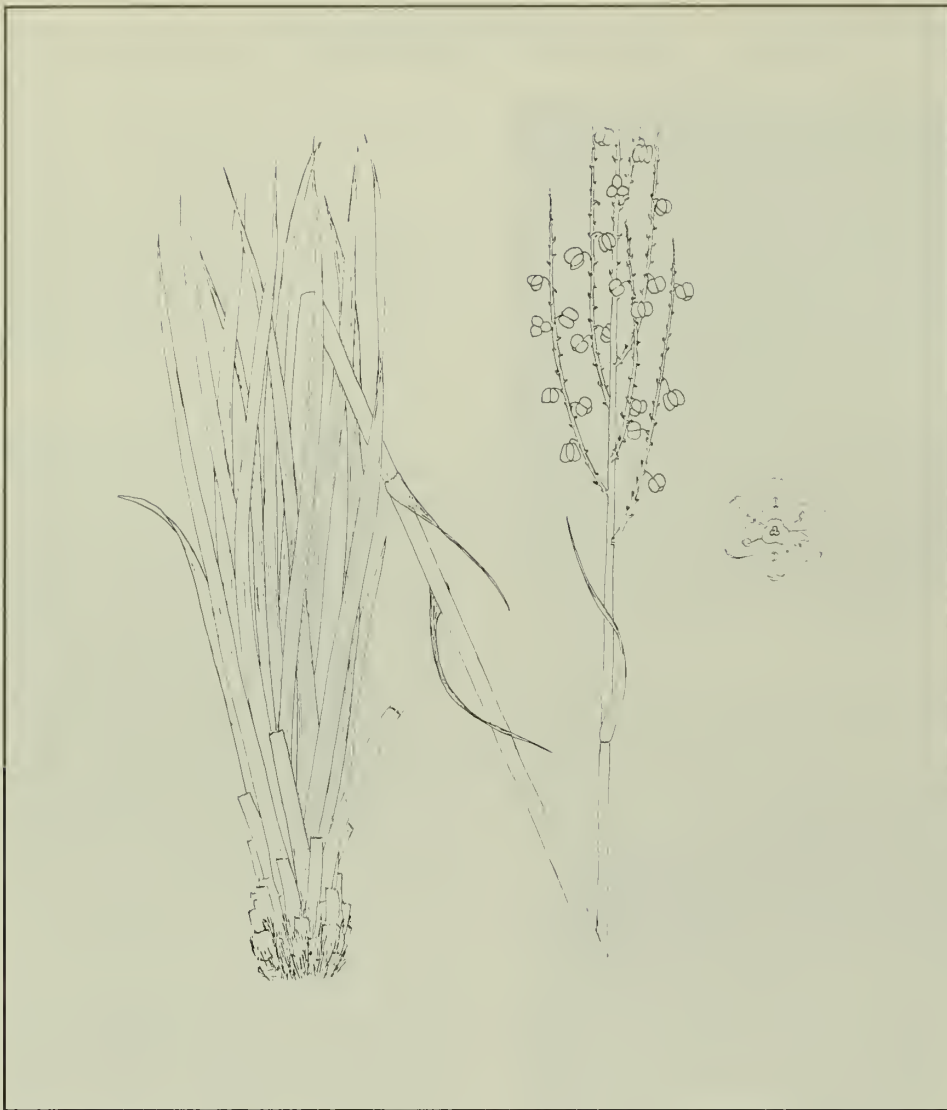
- *sandlace* (*Polygonella myriophylla*) - Although it belongs to the same family (Polygonaceae), this shrub is very different in appearance from the scrub buckwheat. With its needle-like leaves and mats of branches growing in zigzag patterns, *P. myriophylla* looks remarkably like a popular landscaping plant, the creeping juniper (*Juniperus horizontalis*). The flowers are small and usually white (sometimes yellow or pink). (Endangered)

- *Britton's beargrass* (*Nolina brittoniana*) - This perennial, a member of the family Agavaceae, is a relative of the yuccas and agaves, as indicated by its rosette of long, slender leaves and its tall, branched flower stalk. The inflorescence grows at least 6 feet (2 m) high and bears clusters of many small, white flowers, making this an attractive and very conspicuous plant. (Endangered)

- *Lewton's polygala* (*Polygala lewtonii*) - A small perennial herb in the milkwort family (Polygalaceae), *P. lewtonii* is distinguished by its small, bright pink or purplish-red flowers. (Endangered)

All seven of these plants are endemic to Florida and grow in dry upland habitats, primarily "scrub" and "high pine" vegetation. Scrub is an unusual shrub community dominated by a layer of evergreen (or nearly evergreen) oaks or Florida rosemary (*Ceratiola ericoides*), or both, with or without a pine overstory. High pine is a longleaf pine forest with an open understory of grasses, herbs, and deciduous oaks that tolerate frequent low-intensity wildfires. Most of the native scrub and high pine has been converted to citrus groves, cattle pastures, or housing subdivisions. Thirteen plant species and sev-

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Nolina brittoniana

Listing Proposals

(continued from previous page)

eral animals from these habitats are already listed by the FWS as Endangered or Threatened. Cooperative Federal/State/private efforts to conserve some of the remaining natural areas are under way. The two species proposed for listing as Threatened occur in the Ocala National Forest.

Eleven Hawaiian Plants

Eleven plant taxa native to the Hawaiian Islands were proposed October 14 for listing as Endangered. The following plants are endemic to, or have their largest or best known populations in, the Ko'olau Mountain Range on the island of O'ahu:

- 'akoko (*Chamaesyce deppeana*) - a small shrub in the spurge family (Euphorbiaceae) distinguished by its fuzzy branches and clusters of small, petalless flowers.

- haha (*Cyanea truncata*) - an unbranched or sparsely branched shrub in the bellflower family (Campanulaceae) covered by small, sharp prickles. This species has large oval leaves with hardened teeth along the edges, and it produces clusters of up to 40 white flowers with magenta stripes.

- ha'iwaie (*Cyrtandra crenata*) - a rather large, sparsely branched shrub in the African violet family (Gesneriaceae) with leaves arranged in whorls of three, tufted at the ends of the branches. Dense clusters of white flowers, covered by thick brown hair, arise from the leaf axils.

drawing by Anna-Lisa King



Cyanea truncata



Cyrtandra polyantha

- ha'iwaie (*Cyrtandra polyantha*) - a related shrub distinguished from *C. crenata* in part by its leathery leaves and sparsely haired flowers.

- nioi (*Eugenia koolauensis*) - a shrub or small tree in the myrtle family (Myrtaceae) with small white flowers, leathery leaves, and branch tips covered with dense brown hairs.

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drawings by Yevonn Wilson-Ramsey, reprinted from Manual of the Flowering Plants of Hawaii, courtesy of University of Hawaii Press

Listing Proposals

(continued from previous page)

- *wawae'iole* (*Lycopodium nutans*) - an erect or pendulous epiphyte in the clubmoss family (Lycopodiaceae) that grows on tree trunks. Its stiff, light green branches are covered with flat, leathery leaves and end in long fruiting spikes that contain spore capsules.

- *alani* (*Melicope lydgatei*) - a small shrub in the citrus family (Rutaceae) with glossy, papery leaves and aromatic, greenish-white flowers.

- *'ohe'ohe* (*Tetraplasandra gymnocarpa*) - a tree in the ginseng family (Araliaceae) with large, leathery leaves and clusters of small, maroon flowers.

- *Hesperomannia arborescens* - a small, shrubby tree in the aster family with thick, fuzzy flower head stalks bearing yellow to yellowish-brown flowers.

- *Lobelia oahuensis* - an unbranched shrub in the bellflower family with long, thin leaves forming a very dense rosette at the end of the stem. The inflorescence is an erect, branched spike up to 5 feet (1.5 m) tall bearing 50 to 200 pale blue flowers.

- *Rollandria crispa* - another unbranched shrub in the bellflower family. This species produces broad, oval leaves clustered at the ends of succulent stems and stalks bearing up to eight fuzzy, pale magenta flowers.

The Ko'olau Mountains are the steep, deeply eroded remnants of one of two large shield volcanoes that formed the island of O'ahu. Much of the range is covered with vegetation composed primarily of alien plant species. Most of the native plants that remain are restricted to steep valley headwalls and inaccessible, windswept summit ridges. Land ownership is a patchwork of City and County of Honolulu, State, Federal (primarily military), and private.

Many of the unique plants and animals that evolved over the ages on the geographically isolated Hawaiian archipelago have become extinct, or nearly so, since people arrived in the islands. These native species lacked adaptations to such new threats as: habitat degradation and/



Astrophytum asterias

or predation by introduced wild, feral, or domestic animals (e.g., pigs, goats, cattle, rats, slugs); competition from naturalized non-native species; habitat loss from fire; widespread agricultural and urban development; trampling during military training exercises; introduced diseases; and recreational impacts. As a result, 168 species of native Hawaiian plants and animals have been listed by the FWS as Endangered or Threatened, or have been proposed for listing.

All 11 of the recently proposed Ko'olau plants have been reduced in numbers and range by a variety of factors. The main threats facing them at this time are habitat degradation by feral pigs (*Sus scrofa*) and competition from alien plants. Feral pigs occur throughout the Ko'olau Mountains. They severely damage native vegetation by rooting and trampling the forest floor, encouraging the spread of non-native plants that are better able to exploit disturbed soils. Pigs also feed on exotic plants and spread their seeds. Competition from non-native vegetation for light, water, and nutrients directly threatens 7 of the 11 recently proposed species. Koster's curse (*Clidemia hirta*), a noxious shrub that escaped from cultivation, is considered the main alien plant threat in the Ko'olau range, but there are numerous others.

Star Cactus (*Astrophytum asterias*)

The unusual but attractive appearance of this spineless cactus makes it a favorite in the cactus and succulent trade. Its disk- or dome-shaped stem is up to 6 inches (15 cm) wide and 3 inches (7 cm) tall, brownish or dull green in color, and often speckled with a covering of tiny white scales. Vertical grooves divide the main body into eight roughly triangular sections, each marked with a central line of indentations filled with straw-colored to whitish wooly hairs. The flowers are yellow with orange centers and measure about 2 inches across.

Historically, the star cactus was found within the lower Rio Grande Valley in three Texas counties (Cameron, Hidalgo, and Starr) and two Mexican states (Tamaulipas and Nuevo Leon). This region was once a subtropical grassland dotted with shrubby plants, but much of the former habitat has been converted to improved cattle pastures — planted with aggressive, non-native grasses — or cropland. Now, the species is known to survive at only two sites, one in Starr County and one in Tamaulipas, with an estimated total population of about 2,100 plants. Both sites are privately owned and vulnerable to further habitat modification.

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Listing Proposals

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Because of its rarity and unusual appearance, the star cactus is highly prized by cactus enthusiasts. The species has been in cultivation since the 1930's, and propagated plants are available for sale, but specimens collected from the wild remain on the market. A recent survey of the cactus trade in Texas found 400 field-collected star cacti at one nursery alone. In addition, the star cactus is reportedly used as a hallucinogen and is actively sought in the wild for this purpose. Due to these threats, as well as the species' reduced numbers and distribution, the FWS proposed October 9 to list the star cactus as Endangered.

Western Lily (*Lilium occidentale*)

Like the star cactus, the western lily is rare and showy. Its nodding flowers are red to deep orange, with yellow to green centers in the shape of a star, and speckled with purple. This perennial grows up to 5 feet (1.8m) high from an unbranched, rhizomatous bulb. The western lily has an extremely limited distribution: a 2-mile (3.2 kilometer) wide strip of land along the coast in northern California and southern Oregon. Within this area, it grows in sphagnum bogs, coastal scrub and prairie, and other poorly drained soils. Only 30 small, widely separated populations with an estimated total population of 2,000 to 3,000 individuals are known at this time.

About half of the historical western lily sites no longer support the species. Road and residential construction, development of utility corridors, wetland drainage, grazing, and conversion of habitat to cattle pastures and cranberry farms have played a major part in the lily's decline. At other sites, the suppression of wildfires has allowed woody vegetation to encroach upon the lily's open habitat. Part of the largest remaining population known is on privately owned land in Crescent City, California, at a site planned for development as a housing subdivision.



photo by Stewart Schultz

Lilium occidentale

Collection of this attractive species by hobbyists and commercial plant dealers is another threat. One California population was decimated several times by bulb collectors, and bulbs continue to be dug from various sites in both California and Oregon. Western lilies have even been advertised for sale in seed and bulb catalogs.

Due to the limited distribution and continuing threats, the FWS proposed October 26 to list the western lily as Endangered. If the listing proposal is made final, Federal agencies will be required to ensure that their actions will not jeopardize the species. Because the western lily is a wetland plant, the Army Corps of Engineers — which, under Section 404 of the Clean Water Act, regulates the filling of wetlands — will be responsible for conserving its habitat when evaluating permit applications.

In 1991, an FWS biologist discovered that a site once supporting about 100 western lilies had been ditched and drained that summer for a housing development. Because the work had been done illegally, without a Section 404 permit, the Army Corps of Engineers required the landowner to fill in the ditch. Did that action save any western lilies or lily habitat? The answer appears to be a cautious "yes"; this year, there was bog vegetation on the site, including three healthy lilies. However, because the land

is up for sale, the fate of this lily habitat is uncertain.

Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*)

This unusually named plant, known only from a small area in the Sangre de Cristo Mountains of northern New Mexico, is a biennial to perennial species in the phlox family (Polemoniaceae). It has a solitary stem arising from a basal rosette, with divided leaves and attractive, pink, tubular flowers.

The entire known population of *I. sancti-spiritus* is found on public and private lands within the boundaries of the Santa Fe National Forest. Approximately 1,200 to 2,500 plants grow in openings on forested slopes and in disturbed areas along a Forest Service road. Because of the species' low numbers, restricted distribution, and vulnerable habitat, the FWS proposed September 22 to list the Holy Ghost ipomopsis as Endangered.

It is likely that fire may have played a role in the past in maintaining the open habitat this species needs. For at least the last 50 years, the area has been used heavily for recreation. Some habitat may have been lost to campgrounds and vacation homes, and fire suppression to protect developed sites may prevent the creation and maintenance of forest openings.

Other potential threats to the Holy Ghost ipomopsis include pesticides and road work. Biological control efforts to manage infestations of spruce budworm, a moth larva that can defoliate large areas of spruce and fir forests, involve widespread aerial broadcasts of a bacterium, *Bacillus thuringiensis*. However, this pesticide kills not only the spruce budworm moth but also other insects that serve as pollinators for *I. sancti-spiritus*. Because 80 percent of the ipomopsis population occurs along a road, maintenance or widening activities also pose a potential threat. In 1989, 111 plants that were transplanted because of a road straightening and paving project quickly died at their new site.

Final Listing Rules Approved for 21 Species During July/October 1992

Twenty-one species of plants and animals were listed by the Fish and Wildlife Service from July through October as Endangered or Threatened. Endangered Species Act protection will now be available to the following:

Sixteen Hawaiian Plants

Sixteen species of plants endemic to the Hawaiian Islands were listed October 8 as Endangered or Threatened. All 16 occur on the island of Moloka'i, although one also is found on the island of Lana'i and another on the island of Hawai'i (the "Big Island"):

- ko'oko'olau (*Bidens wiebkei*); Endangered
- pua 'ala (*Brighamia rockii*); Endangered
- 'awikiwiki (*Canavalia molokaiensis*); Endangered
- 'oha wai (*Clermontia oblongifolia* ssp. *brevipes*); Endangered
- haha (*Cyanea manii*); Endangered
- haha (*Cyanea procera*); Endangered
- pilo (*Hedyotis mannii*); Endangered
- koki'o ke'oke'o (*Hibiscus arnotianus* ssp. *immaculatus*); Endangered
- alani (*Melicope reflexa*); Endangered
- *Phyllostegia mannii*; Endangered
- loulu (*Pritchardia monroi*); Endangered
- *Schiedea lydgatei*; Endangered
- *Silene alexandri*; Endangered
- *Silene lanceolata*; Endangered
- *Stenogyne bifida*; Endangered
- *Tetramolopium rockii*; Threatened

Alabama Streak-sorus Fern (*Thelypteris pilosa* var. *alabamensis*)

This variety of fern, a small evergreen in the family Thelypteridaceae, was listed July 8

as Threatened. It occurs only along a short stretch of Sipsey Fork, a tributary of the Black Warrior River in Alabama, where it grows in moist crevices under rock overhangs or on exposed cliff faces. Threats to the fern include impoundments, bridge construction, logging of upslope forests, and vandalism and incidental damage from recreational use of the habitat.

American Chaffseed (*Schwalbea americana*)

A tall perennial herb in the snapdragon family (Scrophulariaceae), this plant is distinguished by its large, purplish-yellow, tubular flowers. It grows in habitat described as open, moist pine flatwoods, fire-maintained savannas, and other grass-sedge systems. Sixty historically known populations scattered across 15 eastern States have been reduced to only 20 populations in Mississippi, Florida, Georgia, North and South Carolina, and New Jersey. Because its open habitat is threatened by fire suppression (which promotes encroaching vegetation) and development, the American chaffseed was listed September 29 as Endangered.

Smooth Coneflower (*Echinaceae laevigata*)

This wildflower, a perennial herb in the family Asteraceae, was listed October 8 as Endangered. The smooth coneflower is restricted to open habitat, and grows mainly along roadsides, on rocky outcrops, within fire-created clearings, and in other disturbed areas. Its distribution has been reduced to 22 populations in Virginia, Georgia, and North and South Carolina, where it faces threats from development, vegetational succession, and collecting.

Louisiana Quillwort (*Isoetes louisianensis*)

A grasslike, semi-aquatic herb, the Louisiana quillwort grows along streams

in moist overflow channels and on sand and gravel bars. This member of the family Isoetaceae is known from only three sites in Louisiana. Threats to its habitat include logging and gravel mining activities if the State's recommended Best Management Practices are not followed.

Marbled Murrelet (*Brachyramphus marmoratus*)

The California/Oregon/Washington population of this robin-sized seabird, which occurs along the Pacific Northwest coast from Alaska to California, was listed October 1 as Threatened. Threats to the marbled murrelet include logging of nesting habitat (older forests), gill-net fishing, and oil spills.

Regional News

(continued from page 2)

Region 2 - During the past 2 years, the Arizona Nature Conservancy and the FWS, through the San Bernardino National Wildlife Refuge, have been cooperating to conserve an aquatic plant, the Huachuca water-umbel (*Lilaeopsis schaffneriana* ssp. *recurva*). This Category 1 listing candidate occurs on the refuge, which was established for the conservation of several Endangered fish species, and at a few other sites in the U.S./Mexico border region. In 1991, the refuge and Conservancy translocated plants from Black Draw into new ponds and other wetlands. The species is now expanding on its own into other areas. This year, without human assistance, the species colonized a pond created in the spring of 1991. These efforts, which are making important contributions to conserving the species, would not have been possible without the support of the refuge staff.

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South Dakota Research Unit Gains New Data on Rare Species of the Missouri River

Charles R. Berry, Jr.¹

The South Dakota Cooperative Fish and Wildlife Research Unit is studying a number of rare species associated with the Missouri River, including the pallid sturgeon (*Scaphirhynchus albus*), blue sucker (*Cyprinus elongatus*), piping plover (*Charadrius melodus*), sturgeon chub (*Hybopsis galida*), least tern (*Sterna antillarum*), sicklefin chub (*Hybopsis meeki*), and bald eagle (*Haliaeetus leucocephalus*), as well as several species of mussels. The chubs, sucker, and mussels are Category II listing candidates, and the others are already listed as Threatened or Endangered. Category II species are those for which there is some evidence of vulnerability, but for which there are not enough data available to support a listing proposal.

Pallid Sturgeon

So far, the greatest achievement of the South Dakota Unit's rare species studies has been identifying pallid sturgeon movements and habitat selection in the Missouri River. The pallid sturgeon is a bottom-dwelling fish that can reach a weight of 22 kilograms (50 pounds). This species has declined throughout its range, which includes the Missouri and Mississippi Rivers (see *Bulletin* Vol. XV No. 10).

The pallid sturgeon project started by serendipity. While netting other fish species in the Missouri River for a telemetry study, biologists with South Dakota's Division of Wildlife caught a pallid sturgeon 1.1 meters (3.5 feet) long. They inserted a sonic tag in the fish's abdominal cavity for tracking purposes and released it. Then, believing that these rare fish might congregate, the biologists placed nets near the tagged sturgeon and captured six more.

Graduate student Jon Erickson, supervised by South Dakota Unit Assistant Leader Walter Duffy, tagged the addi-

tional captures and was able to relocate one or more of the 7 tagged fish about 500 times in the riverine-like habitat at the upper end of Lake Sharpe, South Dakota. Wherever Erickson located a tagged sturgeon, he measured the associated habitat features (flow, depth, substrate, and turbidity). One of his discoveries was that although the fish have full access to Lake Sharpe, they prefer the riverine area and the transition zone between the Missouri River and the lake. It had been believed that the pallid sturgeon inhabits areas with strong water current, but Erickson found these fish in deep water with low current velocity. The information Erickson collected has been useful in developing a recovery plan for the pallid sturgeon.

Blue Sucker

While sampling for the pallid sturgeon in Lake Sharpe, Erickson also captured 23 adult blue suckers, from which he collected scale samples and length and weight measurements. The blue sucker, which can weigh as much as 9 kg (20 pounds), is a slender fish and has a uniquely flat body that offers minimal resistance to the strong currents of large rivers. While studying various fish species of the Vermillion River, a tributary of the Missouri River, graduate student Pat Braaten caught one yearling and two adult blue suckers. His chance finding is the first recent indication that the blue sucker reproduces in the area. The finding also indicates the importance of tributaries as possible refuges for rare fishes of the Missouri River.

Piping Plover and Least Tern

A 7-year study of piping plovers and least terns by the South Dakota Unit has gained valuable information now being used by the U.S. Fish and Wildlife Ser-

vice (FWS); the South Dakota Department of Game, Fish and Parks; and the Nebraska Game and Parks Commission. The least tern, smallest member of the tern family, is only 20 centimeters (8 inches) long at maturity. The piping plover, 15 cm long (6 inches) at maturity, is among the smallest of shore birds. Plovers are known for their melodic, "piping" mating call. Both of these rare birds nest on sand bars in the Missouri River, where their existence is jeopardized by predation, recreational use of the sand bars, and untimely releases of water from upstream dams.

Assistant Unit Leader Ken Higgins and graduate student Casey Kruse are working with the U.S. Army Corps of Engineers to plan water releases that will avoid damaging least tern and piping plover nests. Higgins also is evaluating the benefits of reducing vegetation on sand bars, because the number of nests on the bars appears to decrease as vegetation increases. In 1991, Kruse counted 222 piping plovers and 280 least terns in the South Dakota reach of the Missouri River. He received an award for his work from the South Dakota Ornithologists Union.

On February 4 and 5, 1992, the South Dakota Unit co-sponsored a symposium in Lincoln, Nebraska, where 50 researchers from throughout the Missouri basin reported on the status of piping plovers and least terns in their areas and on efforts to recover the populations. Ken Higgins was symposium coordinator and chairman.

Sturgeon Chub and Sicklefin Chub

Like the other six *Hybopsis* (round-face) chubs, the sturgeon chub and the sicklefin chub are rare in the central United States. These small minnows,

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Construction of International Wolf Center Begins

L. David Mech¹

Groundbreaking for a \$2 million International Wolf Center in Ely, Minnesota, took place in June 1992. The Center, scheduled for opening in May 1993, will become the focus for international education about the wolf, which is endangered in most of the U.S., Mexico, and parts of its original range in Europe and Asia.

About one-third of the Center's 17,000 square feet will permanently house the \$500,000 *Wolves and Humans* exhibit prepared by the Science Museum of Minnesota in 1983. This award-winning display has been on exhibit in major cities throughout the U.S. and Canada, and has been seen by more than 2 million people. The Science Museum of Minnesota is donating the exhibit to the Center.

The Center was founded by a non-profit committee of environmentalists, educators, biologists, naturalists, and other civic-minded volunteers. The Minnesota legislature appropriated \$1.2 million for the building in 1990, and Governor Arne Carlson released the funds in late 1991. The committee raised addi-

tional money from the private sector, and a Denver patron donated a life-size bronze sculpture of a pack of running wolves for display in front of the Center. A pack of captive live wolves will complete the display at the other end of the building. Major project cooperators include the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the Minnesota Department of Natural Resources.

The committee has already begun the various educational activities that will operate from the Center after its opening. In cooperation with the nearby environmental studies division of the Vermilion Community College, the committee offers several credit and non-credit courses for the general public. "Winter Wolf Weekends" allow the public to observe wolf tracks and kill remains, and even to see wolves from aircraft. During the summer, evening field trips to hear wolves howl are most popular. One and 2-week research expeditions allow the public to participate in wolf studies.

From 1989 through 1991, the committee operated a speakers' bureau that reached some 56,000 people in 7 States.

During the summer months of 1990 through 1992, the committee sponsored a temporary *Wolves and Wilderness* exhibit in the U.S. Forest Service's Voyageurs Visitor Center, which will be incorporated into the new building. Some 40,000 to 50,000 visitors viewed the display each summer.

The Center has begun a membership program. Each member receives the quarterly magazine, *International Wolf*, which is devoted exclusively to disseminating objective information about the wolf and wolf recovery. Current membership is about 3,000, including people from every State and 22 countries. (For further information, write: International Wolf Center, Ely, Minnesota 55731, or call toll free 1-800-657-3609.)

¹U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, Minnesota 55108.

South Dakota Research

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which are about 8 cm (3 inches) long at maturity, were once found throughout the Missouri River system, having adapted to the Missouri's turbid, swift waters. For example, the sturgeon chub has scales with small raised keels that reduce drag forces, and its fins and ventral head region are covered with thousands of taste buds, improving its ability to find food in the turbid waters. The sicklefin chub has large pectoral fins and an unusually large caudal fin that may improve its swimming ability.

Graduate student Selena Werdon, supervised by Unit Leader Charles Berry, revisited 178 sites in the Missouri Basin where both the sturgeon chub and the

sicklefin chub have been reported in the past. She found many sturgeon chubs in the Powder River in Wyoming and Montana and a few in the upper Yellowstone River, but no sicklefin chubs. Werdon is now a permanent employee of the FWS Fish and Wildlife Enhancement Office in Bismarck, North Dakota.

Bald Eagle and Riverine Wildlife

Ken Higgins and graduate student Bob Usgaard are beginning an inventory of possible sites in South Dakota where bald eagles could be released in the future. Also in the beginning stages is a survey of aquatic life in sections of the Missouri River. The study will be conducted by Cooperative Education student Janet Mizzi, who is supervised by Berry. She

will make special efforts to determine the status of various amphibians and reptiles about which little is known. The study also will be the first to evaluate the status of various mollusks thought to be declining in number, including the three ridge mussel (*Amblema plicata*), paper shell mussel (*Andodontoides ferussacianis*), floater mussel (*Anodonta grandis*), and scale shell mussel (*Leptodea leptodon*).

Data from research projects such as those mentioned above will be critical for managing the Missouri River and conserving its valuable wildlife resources.

¹Leader, South Dakota Cooperative Fish and Wildlife Research Unit

Two Western Plants Proposed for Delisting

Two species of plants in the western United States are no longer believed to be in danger of extinction and were proposed recently for removal from the Federal list of Endangered and Threatened species:

Tumamoc Globeberry (*Tumamoca macdougalii*)

A delicate, vining perennial in the gourd family (Cucurbitaceae), the Tumamoc globeberry grows from a large tuber. Populations are widely scattered throughout southern Arizona and adjacent parts of Sonora, Mexico. This plant

was listed in 1986 as Endangered on the basis of the best information available at the time. Extensive surveys conducted in recent years indicate that the species is more numerous than previously believed and that the threats to its habitat are not as great.

McKittrick Pennyroyal (*Hedeoma apiculatum*)

This perennial herb in the mint family (Lamiaceae) produces showy pink flowers from a woody rootstock. It is endemic to the Guadalupe Mountains of western Texas and southeastern New Mexico,

where it grows in canyons and on limestone outcrops. The McKittrick pennyroyal was listed in 1982 as Threatened. Management of recreational impacts on habitat within Guadalupe Mountains National Park and the discovery of additional populations lead the Fish and Wildlife Service to believe that the status of this species is secure.

If the above delisting proposals are approved, Federal agencies responsible for managing the habitat of these species will continue to monitor their status for at least 5 years.

Regional News

(continued from page 9)

The annual spring population survey for the Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) was held June 8-12, 1992. A poor 1991 crop of conifer cones, the primary food source, had raised concerns about red squirrel survival over the winter. Biologists from the Arizona Game and Fish Department, Coronado National Forest, and FWS visited 250 of the known 563 red squirrel territories. Using activity data gathered during those visits, the biologists made a spring 1992 population estimate of 354 to 399 squirrels, not significantly different from the fall 1991 estimate of 364 to 417 red squirrels. The lower than expected overwinter mortality rate probably can be attributed to several factors, including alternate food sources, pre-1991 cone storage, and a mild winter.

* * *

The 1992 breeding season was the best on record for the captive population of Mexican wolves (*Canis lupus baileyi*). Eleven healthy pups were added to the population, which now numbers 50 animals. A litter of six pups (three males and three females) were born at the Rio Grande Zoological Park in Albuquerque, New Mexico, and a litter of five (one male and four females) were born at the

Wild Canid Survival and Research Center in Eureka, Missouri. A third litter was born at the Arizona-Sonora Desert Museum in Tucson, Arizona, but it consisted of only one dead pup (apparently still-born). There are now 41 Mexican wolves maintained in 9 United States facilities, and another 9 animals are being kept at 3 facilities in Mexico. The status of this animal in the wild currently is unknown.

"Mexican wolf #2," known to his keepers as Don Diego, died in March 1992 at the Wild Canid Survival and Research Center in Eureka, Missouri, at the presumed age of 15. Don Diego was captured in 1977 in the state of Durango, Mexico. He made a significant contribution to the captive population by siring 32 pups from 1982 to 1989. Don Diego was the last of the wild-caught Mexican wolves that founded the captive population.

* * *

Last winter, the FWS and the National Wildlife Federation contributed to the funding and installation of a video monitoring system at the International Crane Foundation in Baraboo, Wisconsin. The Federation donated \$5,000 toward the purchase and installation of cameras. One of the important uses of the video system is to monitor whooping crane (*Grus americana*) pair formation to see if birds are compatible and breeding prop-

erly. In the past, despite the use of blinds, awareness of observers affected the birds' behavior.

The video system can also be used to monitor sick or injured birds, identify egg breakers, monitor egg laying, ensure that parents are caring for chicks, know when to retrieve eggs from egg breakers, and evaluate disturbance factors. This year, the system was used to identify a health problem which prevented a female whooping crane from incubating her eggs. It also alerted the staff to recover three fertile eggs from a pair of whooping cranes that had a history of egg breaking.

* * *

Whooping cranes experienced a record production year in both the wild and captive flocks. Twenty-nine chicks are being raised at the two captive breeding facilities from captive-produced and wild-produced eggs. These chicks are approximately double the record previously raised in captivity. At the FWS Patuxent Wildlife Research Center in Laurel, Maryland, 8 females produced 11 fertile eggs (2 died late in embryonic development and 9 hatched, although 2 chicks subsequently died). Six of the fertile eggs and five of the surviving chicks resulted from natural breeding. The other fertile eggs are the product of artificial insemination. At the International Crane

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Regional News

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Foundation, three pairs produced eight fertile eggs, six of which hatched, and all of the chicks survived. Three of those chicks are a consequence of natural breeding. The natural breeding is noteworthy because 1991 was the first year this method of reproduction was successful for captive whooping cranes.

Twenty-one eggs were transferred in May 1992 from the whooping crane nesting grounds at Wood Buffalo National Park in the Northwest Territories, Canada, to the two captive breeding facilities in the United States. Two of the eggs were infertile, 19 hatched, and 16 chicks survive.

Brian Johns, a biologist with the Canadian Wildlife Service, and FWS Region 2 pilot John Winship surveyed Wood Buffalo Park in June 1992 and located 35 chicks. Four pairs were raising two chicks each, and two late nesting pairs were still incubating the eggs. The survey identified three successful pairs not found during the May 1992 nest surveys. One nesting effort was by a pair that had re-nested after their first nest was destroyed by an unknown predator. The additional family groups located during the chick survey make a total of 40 nesting pairs and 41 nesting attempts. This is a record number of pairs and means that one recovery goal — to have 40 nesting pairs in Wood Buffalo National Park by the year 2000 — has already been achieved.

* * *

Grays Lake National Wildlife Refuge in Idaho, now in its sixth consecutive year of drought, is experiencing the worst water conditions of this century. Record low production of sandhill cranes (*Grus canadensis*) and waterfowl is expected in the area this year. Water levels were so low that the Bureau of Indian Affairs, which holds the water rights within the refuge, was unable to withdraw water for irrigation. Three whooping cranes summered at Grays Lake — a female at the north end and two territorial males along the east side.

There were single whooping cranes at Red Rock Lakes National Wildlife Refuge in the Teton Basin, and one or two birds were seen at Yellowstone National Park. The location of the other members of the cross-fostered whooping crane population is unknown. Some traditionally used wetland habitats dried up and the cranes apparently moved to other sites.

* * *

Erosion of the Texas shoreline along the Gulf Intracoastal Waterway continues to threaten whooping crane critical habitat. In some areas, only a narrow fringe of shore remains to prevent saltwater from entering freshwater ponds that are rich in crane foods. To combat this problem, volunteers gathered in June for the fourth year of a shoreline erosion control project at Aransas National Wildlife Refuge. Four hundred and fifty volunteers placed 23,000 50-pound (23-kilogram) bags of cement along the Waterway to protect approximately a 0.5-mile (0.8-km) stretch of important marsh habitat. Tom Serota, an FWS biologist stationed in Corpus Christi, Texas, was project coordinator. Project participants included personnel of the FWS, U.S. Army Corps of Engineers, U.S. Coast Guard, and Texas resource agencies; conservation groups; private citizens; and businesses.

This may be the last year such temporary erosion protection measures are necessary. The Corps plans to protect 2,000 feet (610 meters) of shoreline through the installation of cement mats, and such efforts are expected to continue in future years.

* * *

Productivity of the small desert population of bald eagles (*Haliaeetus leucocephalus*) nesting principally in Arizona was again monitored this year by volunteers and State and Federal employees. Although the observers discovered two new nesting areas and record numbers of eggs, 1992 turned out to be a poor production season. Twenty-eight breeding areas were occupied, yet only 36 percent of the pairs were successful, producing a mean brood size of 1.4 eaglets and a total of 14 fledglings.

Bald eagle productivity may have been reduced by the weather. Frequent rain caused unusually fast and turbid river flows, which apparently affected the eagles' ability to find fish, their principal food. Some clutches were abandoned and young eagles died. The upper Verde River remained clearer, and two broods successfully fledged there.

* * *

A single, unbanded aplomado falcon (*Falco femoralis septentrionalis*) spent the summers of 1991 and 1992 on White Sands Missile Range in New Mexico. Another unbanded individual of this endangered subspecies wintered in western Texas in 1991-1992. Because these birds were unbanded, it appears unlikely that they originated from the aplomado falcon hacking project at Laguna Atascosa National Wildlife Refuge in southeastern Texas. These events, along with other probable sightings over the past decade in southeastern Arizona and southern New Mexico, indicated the possibility of a remnant population in northern Mexico. In response, the FWS funded a project to survey northern Mexico for aplomados. A population containing a minimum of 30 birds was discovered on private ranchland in Mexico. The location is being withheld in order to protect the birds and maintain landowner cooperation.

* * *

Based on the best information then available, the FWS proposed in 1990 to list the prairie mole cricket (*Gryllotalpa major*) as a Threatened species. (See *Bulletin* Vol. XV, No. 5.) Under a multi-regional agreement, the proposed rule was extended for 6 months to allow for additional surveys, primarily in Oklahoma and Kansas. Surveys in Oklahoma were conducted by personnel of the FWS Tulsa Ecological Services Field Office, Oklahoma Natural Heritage Inventory staff, volunteers from cooperating Federal agencies and universities, and other interested individuals. Prior to 1991, only 33 prairie mole cricket sites were known in Oklahoma. During the 1991 survey season, however, an additional 87 sites were identified, including sites in 6 new counties in Oklahoma.

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Originally, prairie mole crickets were thought to inhabit only undisturbed tall grass prairie with no history of grazing. In 1991, however, crickets were found in Oklahoma in a variety of habitat types, including some areas altered by development.

Because of the increased number of known prairie mole cricket sites and the significant areas of potentially suitable habitat, the proposed listing rule was withdrawn January 21, 1992. The FWS will continue to monitor the status of this species.

* * *

Region 4 - The U.S. Forest Service conducted an experimental burn in the late winter of 1992 at Sumter National Forest in South Carolina to improve habitat for the smooth coneflower (*Echinacea laevigata*), a perennial herb recently listed as Endangered. This declining species cannot tolerate dense shade, and its open glade habitat is being overtaken by shrubs and trees.

Four months after the controlled burn, the coneflowers were in full bloom and the number of flowering stems had quadrupled over last year's count. In addition, a previously unknown colony of coneflowers was found at a site where another winter burn was conducted for wildlife management purposes. The FWS Asheville, North Carolina, Field Office is working with the Forest Service in South Carolina and Georgia, and with the Department of Energy at the Savannah River Site in South Carolina, to develop and refine management plans for this species.

* * *

The Asheville Field Office cooperated with the Atlanta Botanical Garden and the North Carolina Plant Conservation Program in a rescue of mountain sweet pitcher plants (*Sarracenia rubra* ssp. *jonesii*) from a sphagnum bog in North Carolina. Habitat alteration was causing the area to become drier, which threatened the pitcher plant and other wetland-dependent species. By the time the res-

cue was launched, the site's population of pitcher plants had declined to nine individuals. Cuttings were taken from eight of the remaining clones, and one seed capsule was collected. This material is now being propagated at the Atlanta Botanical Garden for eventual return to the site. The Asheville office is working with the landowners to restore the bog's original hydrological regime.

Only 10 populations of this Endangered plant remain, all in North and South Carolina.

* * *

St. Francis' satyr (*Neonympha mitchellii francisci*), a butterfly thought to be extinct, was rediscovered in North Carolina by North Carolina Natural Heritage Program entomologist Steve Hall during an FWS-funded status survey. The butterfly's habitat is now better known and additional surveys are planned for North and South Carolina.

* * *

The Arkansas Game and Fish Commission has completed a survey on the status of a salamander, the Ozark hellbender (*Cryptobranchus bishopi*), in the Spring River, Arkansas. This survey was funded by the FWS under section 6 of the Endangered Species Act. In an area where 370 hellbenders were marked 10 years ago, only 20 were observed during the recent survey. The primary cause for this decline appears to be collecting.

The remainder of this species' range is in Missouri, and the FWS is working with the Missouri Department of Conservation to determine the status of the Ozark hellbender there. Once the survey is complete, a decision on whether or not the species needs Endangered Species Act protection will be made.

* * *

Stern's medlar (*Mespilus canescens*), a newly described shrub in the rose family, was surveyed by the Arkansas Natural Heritage Commission under a section 6 grant from the FWS. Despite an extensive search involving aerial reconnaissance and ground-checking, no new sites were located. Currently, the species is only known from the type locality in Prairie County, Arkansas.

This showy plant is one of only two species in its genus and is the only one native to North America. An estimated 25 plants are restricted to a 22-acre (9-hectare) grove, a remnant of a once extensive woodland in the Grand Prairie region of Arkansas. The site is protected through an easement with the Arkansas Natural Heritage Commission. Although the species is not immediately threatened, there are some potential threats that bear monitoring, including accidental damage of plants by agricultural herbicides and habitat changes resulting from a lowered water table or vegetational succession.

* * *

The FWS Jackson, Mississippi, Field Office has conducted a status review of the crystal darter (*Crystallaria asprella*) and concluded that it does not warrant listing at this time. This decision was based on the stability of populations in Alabama, Mississippi, and Arkansas. Populations also occur in Oklahoma, Missouri, Minnesota, Wisconsin, and West Virginia.

Crystal darters avoid danger by hiding under sand and rocks. This behavior makes it a difficult fish to collect by such standard methods as seining. Biologists also have demonstrated that collecting crystal darters in daylight is considerably less effective than nocturnal collecting. These difficulties indicate that we may still have an incomplete knowledge of the species' population. The FWS remains interested in this species, and any threats to the remaining habitat could result in another status review.

* * *

The Arkansas Natural Heritage Commission has completed a status survey for Ouachita goldenrod (*Solidago ouachitensis*), a Category 2 listing candidate. This perennial herb in the sunflower family grows to 2 to 4 feet (0.6 to 1.2 m) tall and occurs in cool, mesic hardwood forests on north-facing slopes in the Ouachita Mountains of Arkansas and Oklahoma. In 1986, when the plant was described, it had been collected only four times from three locations. However, the

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recent survey has located populations at 14 sites in 5 counties over 3 different physiographic regions. There appear to be no significant threats to the species or its habitat at this time. Some sites are reported to support hundreds or even thousands of plants over large acreages. Almost all of the populations are located in the Ouachita National Forest. The steep hardwood slopes they inhabit currently are managed for soil protection and wildlife purposes, not for timber production.

Region 5 - The bald eagle population in the northeast continued its slow but steady climb toward recovery in 1992. Maine's nesting eagle population increased from 123 pairs in 1991 to 140 pairs this year. Two new pairs in Massachusetts bring that State's current total to seven pairs, and after an absence of four decades, bald eagles successfully nested in Connecticut. The single active nest in New Hampshire was the focus of considerable media attention again in 1992, when a 30-day-old, captive-reared chick (born of permanently injured parents) was successfully fostered into a nest containing one natural chick of about the same age. A record 19 young (more than double last year's total) were fledged from 11 successful nests in Pennsylvania this year.

A total of 27 territorial pairs of peregrine falcons (*Falco peregrinus*) nested in New England in 1992 — up 5 pairs from 1991. Vermont supported a record 12 pairs, from which 7 successful pairs fledged 17 young. In total, 35 nestlings are believed to have fledged from 2 eyries and 2 buildings in New England.

In Maine, six young falcons will be hacked into the wilds of northern New England. Two young falcons were successfully hacked in Pennsylvania following the successfully double-clutching of a bridge-nesting pair in Philadelphia. The eggs were removed and artificially incubated, then raised by a captive (falconer's) peregrine for 2 to 3 weeks. The young

falcons were then hacked from a site in Harrisburg, Pennsylvania.

Region 6 - A large canid was shot by a member of a hunting party in the Bridger-Teton National Forest south of Yellowstone National Park on September 30. According to the hunter, it was one of a group of animals he assumed were coyotes. After examining the carcass, however, he felt that it could be a gray wolf (*Canis lupus*) or wolf/dog hybrid. At that point, he reported the incident to Yellowstone National Park rangers at a backcountry patrol cabin. The animal's remains were sent to the FWS National Forensics Laboratory in Ashland, Oregon, for DNA analyses and other tests to determine whether the animal is a wolf or wolf/dog hybrid.

There have been reports lately, so far unconfirmed, of other wolf sightings in and around Yellowstone National Park. The FWS has been encouraging hunters and others to use caution when shooting coyotes in this area. "With these sightings," said FWS Deputy Regional Director John Spinks, "everyone needs to take a second look before they pull the trigger."

Gray wolves in the Rocky Mountains are protected under the Endangered Species Act, and violators face penalties of up to one year in prison and a \$100,000 fine.

Region 7 - From June 8 to 18, FWS biologists surveyed Alaska's Semidi Islands for nesting Aleutian Canada geese (*Branta canadensis leucopareia*). Located southwest of the Alaska Peninsula, the Semidi Islands group consists of nine islands, all of which are part of the Alaska Maritime National Wildlife Refuge. They support one of the three remnant nesting populations of the insular Aleutian Canada goose. The 28 nests found on Kiliktagik and Anowik Islands are the most ever counted for the Semidi Islands population, which now numbers approximately 126 birds (based on counts at the wintering grounds in coastal Oregon).

The Semidi Islands population of Aleutian Canada geese had been known to nest only on Kiliktagik Island until 1991, when biologists discovered broods on nearby Anowik Island. This year, six nests were found on Anowik, confirming the first successful pioneering by Aleutian Canada geese from one island to another. Because natural pioneering in this subspecies is thought to occur very slowly, biologists have been helping the goose expand its range in the western Aleutian Islands through translocation, as called for in the bird's recovery plan.

Region 8 (Research) - Lead poisoning continued to be a substantial cause of bald eagle deaths from May 1991 to May 1992. Twenty-four bald eagles (21 adults and 3 immatures) were collected from 12 States between May 9, 1991, and May 17, 1992. Necropsies at the National Wildlife Health Research Center in Madison, Wisconsin, yielded diagnoses of lead poisoning. Most (79 percent) of the eagles came from the Northern States and Pacific populations, and 88 percent were found during winter months (November through March). Fourteen were found sick and died shortly after capture.

Remains of ingested shot were recovered from five of the stomachs, and metal fragments believed to be lead were taken from another. Lead is infrequently found in stomachs of lead poisoned eagles because it casts with bones, hair, feathers, etc., and passes through the system. Lead concentrations in the livers of these eagles ranged from 7.3 to 78.6 parts per million, wet weight. Lead pellets embedded in prey mammals or birds that were shot but either crippled or not retrieved by hunters is the most likely source of this toxic metal.

Biologists with the FWS National Ecology Research Center (NERC) in Gainesville, Florida, recently completed the only study of the population biology of the striped newt (*Notophthalmus pers-triatus*) ever conducted. This amphibian, a candidate for listing under the Endangered Species Act, is restricted to

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sandy, upland pine-dominated habitats in south Georgia and northern and central Florida.

This species breeds in upland temporary ponds, which are disappearing rapidly due to landscape alteration. In the Florida study, more than 2,000 newts were marked for studies on size, activity, and demography. The numbers of newts visiting the temporary pond study site declined dramatically during a prolonged drought, and successful reproduction occurred only once between 1985 and 1990. At the same time, the population shifted toward larger and presumably older individuals. The results of the newt study suggest that a program of long-term monitoring should be combined with a study of historical distribution and habitat assessment to conserve the remaining breeding ponds. This study is part of NERC's program on declining amphibians.

BOX SCORE LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	249	9	23	337	33
Birds	73	153	13	0	239	71
Reptiles	16	64	18	14	112	27
Amphibians	6	8	5	0	19	8
Fishes	55	11	36	0	102	55
Snails	7	1	6	0	14	8
Clams	40	2	2	0	44	37
Crustaceans	9	0	2	0	11	5
Insects	14	1	9	0	24	13
Arachnids	3	0	0	0	3	0
Plants	298	1	72	2	373	150
TOTAL	577	490	172	39	1278*	407**
Total U.S. Endangered	577	(279 animals, 298 plants)				
Total U.S. Threatened	172	(100 animals, 72 plants)				
Total U.S. Listed	749	(379 animals, 370 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, chimpanzee, 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.

** There are 335 approved recovery plans. Some recovery plans cover more than one species, 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: 53 fish & wildlife
39 plants
Number of CITES Party Nations: 117

November 30, 1992

September – November 1992

Vol. XVII Nos. 9–11

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Landmark U.S. Legislation Will Conserve Exotic Wild Birds

by Susan S. Lieberman

On October 23, 1992, landmark legislation to conserve exotic wild birds was signed into law. The Wild Bird Conservation Act of 1992 (WBCA) directs the world's largest importer of birds and other wildlife—the United States—to ensure that its bird imports do not jeopardize wild populations, and it reinforces the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This important new law also authorizes a fund to help countries of origin conduct status research on wild birds and set up conservation plans.

The international wild bird trade is a serious conservation problem. It accounts for a number of the species included in the CITES Appendices and the U.S. list of Threatened and Endangered wildlife. Importation into the U.S. alone has contributed to the decline of many species in the wild. In a recent 3-year period, for example, more than 1.9 million wild birds were imported legally into this country. Approximately 850,000 of these were parrots and other species on Appendix II of CITES.

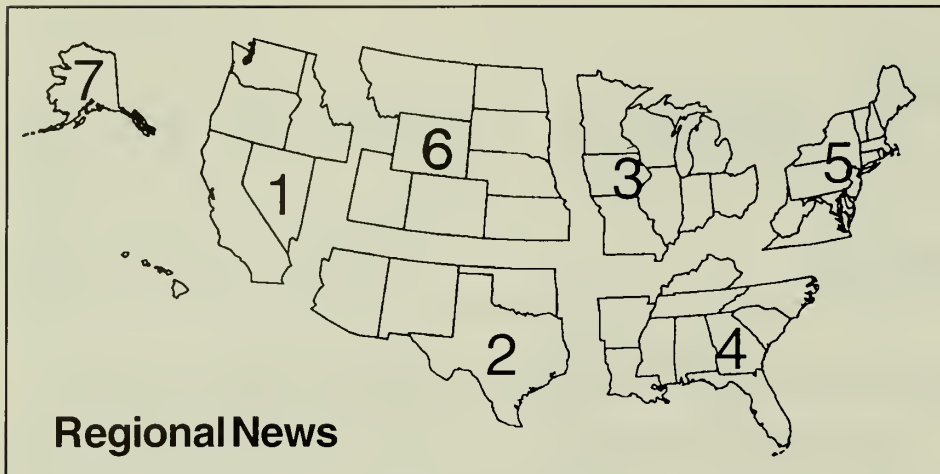
Under CITES rules, the importation of species listed on Appendix II has been allowed under permits issued by the exporting countries. Unfortunately, many of these countries are unable to implement the scientific and management programs needed to ensure that exports are not harming wild populations. By the time a species is transferred to CITES Appendix I, which prohibits imports and exports for primarily commercial purposes, it is often too late.

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*The blue and gold macaw (*Ara ararauna*), a species that has been traded heavily, is now subject to the stronger conservation measures of the Wild Bird Conservation Act.*

photo courtesy of New York Zoological Society/Charles Munn



Regional News

Regional endangered species staffers have reported the following news:

Region 1 — On September 17, near Eureka, California, Director Turner and

Regional Director Plenert participated in a ceremony to sign the region's first Habitat Conservation Plan for the Threatened northern spotted owl (*Strix occidentalis*

caurina). It is the largest single-owner conservation plan ever completed. The plan calls for balancing timber harvest and owl protection on approximately 380,000 acres (153,790 hectares) of private land near Arcata, California, owned by the Simpson Timber Company's Redwood Division. The plan and implementing agreement permit incidental take of up to 50 pairs of northern spotted owls over the next 10 years, require set-asides and special management areas totalling over 40,000 acres (16,200 ha), and require an extensive research and monitoring program.

* * *

On November 6, the Fish and Wildlife Service (FWS) announced that a facility being built by The Peregrine Fund, Inc., in Boise, Idaho, has been selected as the third captive breeding site for the Endangered California condor (*Gymnogyps californianus*).

A relic of the ice age, the California condor once soared over a large part of North America. By 1987, however, when the last free-flying condor was captured and placed in the captive breeding program, loss of habitat, indiscriminate shooting, and poisoning had reduced the population to only 27. Now, the number of California condors has risen to 63. Two were released to the wild in January 1992, a male and a female. The male, from the San Diego Wild Animal Park flock, died in October 1992 from poisoning that laboratory scientists attribute to ingesting fluid from an antifreeze leak. The female, produced at the Los Angeles Zoo, remains in the wild. This bird had a brush with death in July 1992, when three gunshots were fired at her. That incident is still under investigation by the FWS and the U.S. Attorney in Los Angeles.

Six more California condors, two males and four females hatched at the Los Angeles Zoo in 1992, were released to the wild in Los Padres National Forest in southern California on December 1. These condors had been housed in a holding pen at the release site since October. They were fitted with battery- and solar-powered radio transmitters on November

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

John Turner, Director
(202-208-4717)

Michael J. Spear,
Assistant Director for
Ecological Services
(202-208-4646)

Larry R. Shannon, Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN
Editor, Michael Bender
Editorial Assistance, Dianne Taylor
and Ann Haas
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S. 11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Acting Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Jamie Rappaport Clark, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *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); Ralph O. Morgenweck, *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; John D. Buffington, *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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Listing Proposals — November 1992

Eleven plants and one animal were proposed by the Fish and Wildlife Service (FWS) in November 1992 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will apply to the following:

Six Southern California Plants

Six plant taxa found in mountains surrounding the Los Angeles basin in southern California were proposed November 30 for listing as Endangered or Threatened:

- **Braunton's milkvetch** (*Astragalus brauntonii*) - a robust, short-lived perennial in the pea family (Fabaceae) distinguished by its height (up to 60 inches, or 150 centimeters), covering of wooly

hairs, and clusters of light purple flowers. This species, proposed for listing as Endangered, apparently is endemic to limestone outcrops.

- **Lyon's pentachaeta** (*Pentachaeta lyonii*) - an annual in the aster family (Asteraceae) with reddish upper branches and yellow flowers. It grows in pockets of grassland with sparse vegetative cover, and is proposed for listing as Endangered.

- **Dudleya spp.** - Four taxa in the dudleya or live-forever genus were proposed for listing as Threatened. *Dudleya* is comprised of succulent, rosette-forming perennials in the stonecrop family (Crassulaceae) that inhabit rocky soils or rock outcrops along southern California's coast and interior mountain ranges. Due in part to the limited, patchy distribution of such sites in the Santa Monica Mountains, protection was recommended for these plants:

- Conejo dudleya (*Dudleya abramsii* ssp. *parva*),
- Verity's dudleya (*Dudleya verityi*),
- Santa Monica dudleya (*Dudleya cymosa* ssp. *ovatifolia*), and
- marcescent dudleya (*Dudleya cymosa* ssp. *marcescens*).

All six recently proposed Los Angeles basin plants are limited in distribution and numbers. Their already reduced habitat faces one or more of the following threats: urban development, recreation impacts, alteration of natural fire cycles, and flood control projects. Although some populations of these plants occur on public land, such as the Santa Monica Mountains National Recreation Area, their survival is not ensured.

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Corrections

A photograph identified on page 4 of *Bulletin* Vol. XVII, Nos. 9-11, as a pygmy madtom (*Noturus stanauli*) was actually a pygmy sculpin (*Cottus pygmaeus*). The cactus illustrated on page 8 of *Bulletin* Vol. XVII, Nos. 3-8, was a Siler pincushion (*Pediocactus sileri*).



drawing from *Illustrated Flora of the Pacific States*, Vols. I-IV, by Abrams and Ferris, courtesy of Stanford University Press

Agreement Sets Timeframe for Protecting Listing Candidates

An out-of-court settlement of a suit filed to reduce the backlog of plants and animals awaiting listing action under the Endangered Species Act was announced December 15. The agreement involves the Fish and Wildlife Service (FWS) and a number of organizations and individuals, including the Fund for Animals, Defenders of Wildlife, and In Defense of Endangered Species. Under the agreement, the Service will decide by September 1996 whether or not to publish formal listing proposals for about 400 "category 1" listing candidates.

Category 1 candidates are those for which the FWS has enough scientific

data on hand to support proposing to list but, due to other demands, has been unable to publish the necessary proposals. In effect, the agreement commits the FWS to publish listing proposals for 400 species, which is equal to the number of category 1 candidates as of October 1, 1992. If new information becomes available by September 1996 indicating that some of these candidates do not warrant listing, the FWS will substitute species that have been added to category 1 in the meantime.

The current listing priority system, which ranks species according to degree of threat and taxonomic distinctiveness,

will be used to determine which species to propose first. Approximately 100 category 1 listing candidates will be considered for listing each year under the agreement. The FWS will report annually on its progress through 1997.

The agreement also formalizes an FWS commitment to emphasize, where possible, multiple species listings or proposals that address entire ecosystems (a strategy the FWS had already been implementing) instead of a species-by-species approach. In addition to being more timely and cost-effective, these methods allow the FWS to focus on the needs of plant and animal communities as a whole.

The Duck Stamp: Making a Spectacle of a Threatened Species?

by Ann Haas

For the first time in history, a bird proposed for protection under the Endangered Species Act is featured on the Federal Migratory Bird Hunting and Conservation Stamp, popularly known as the "duck stamp." New Jersey physicist Joe Hautman's award-winning painting of a spectacled eider (*Somateria fischeri*) in flight graces the 1992-93 stamp. But there's a special message inherent in this particular stamp: to quote the Fish and Wildlife Service's (FWS) Public Affairs Officer in Anchorage, Alaska, "Don't shoot this duck!"

Waterfowl hunters aged 16 years and older are required to carry a Federal duck stamp signed across its face. The stamp indicates that they have a legal right to hunt migratory waterfowl, while the money from sale of the stamps goes into an account set aside to purchase and protect waterfowl habitat. The irony is that the duck stamp, which each year depicts a different game species of North American waterfowl, now shows one that may not be hunted. The hunting season for spectacled eiders was closed last year because of their plummeting numbers.

Although this may have concerned some hunters, it also has biologists puzzled. Routine aerial surveys of breeding pairs at the species' nesting grounds along the Arctic coast documented a dramatic decline in numbers of this large marine duck, which is native to the Arctic and northern Pacific Oceans. As a result, the Service proposed May 8, 1992, to classify the species as Threatened. (See *Bulletin* Vol. XVII, Nos. 3-9.) Biologists do not yet know the cause of the decline. "This may be an early alert for managing sea ducks," said Jean Cochrane, FWS endangered species specialist in Anchorage. "It could be 'the canary in the coal mine,' warning us of problems, and, if so, we need to act now."

Cochrane observed that the listing proposal shows management for endangered species and game species overlaps. "We need to look at the whole picture—the

spectacled eider decline may have implications for other wildlife. Is the ecosystem stressed by environmental contaminants or food web changes that can affect other species?"

Biologists are developing a plan to gather information about the spectacled eider, including analyzing its eggs and tissues for heavy metals and other contaminants, and implementing a satellite telemetry project to delineate the species' migration patterns and winter habitat. The spectacled eider is unique in that it flies west for the winter, presumably to stay near pack ice—possibly in Russia. The FWS has contacted Russian biologists to learn more about this elusive species, not yet studied away from its breeding grounds.

Stamps for Conservation

The spectacled eider is the latest bird to benefit from a process that started years ago, when the Migratory Bird Hunting Stamp Act was passed in 1934. Years of drought, drainage of marshland



Jay Norwood ("Ding") Darling in 1942 at his drawing board. He used the contraction "D'ing" in signing his cartoons.

for agriculture, and overshooting had combined to reduce waterfowl populations to all-time lows. Jay Norwood "Ding" Darling, a political cartoonist

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The 1992-93 Federal "duck stamp" depicts a spectacled eider, proposed in 1992 for protection under the Endangered Species Act. Sales of duck stamps generate revenue for acquisition of waterfowl habitat.

"The Best Friend Ducks Ever Had"

by Ann Haas

In January 1934, Jay N. "Ding" Darling was a member of the Iowa Fish and Game Commission and a Pulitzer prize-winning cartoonist, satirizing New Deal programs as well as natural resource exploitation, when President Franklin Roosevelt appointed him to a committee charged with recommending ways to restore waterfowl, which had been devastated by the effects of prolonged drought and agricultural

drainage of potholes, lakes, and streams.

Within a matter of weeks, the committee produced its report, recommending Federal purchase of 12 million acres of submarginal land for wildlife and the expenditure of \$50 million to restore duck nesting grounds. The committee chairman was Tom Beck, editor of Collier's magazine and president of More Game Birds—later, Ducks Unlim-

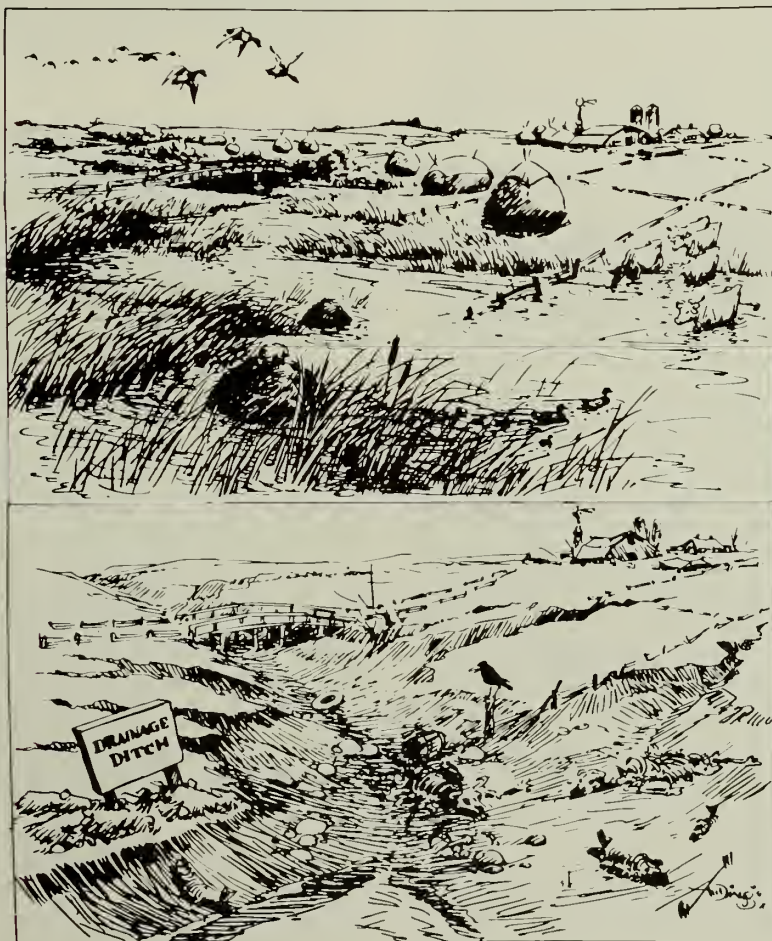
ited; the other member was Aldo Leopold, a professor at the University of Wisconsin and the father of wildlife management.

After receiving the committee's report, President Roosevelt signed the Duck Stamp Act and appointed one of its key advocates, Ding Darling, to be Chief of the Bureau of Biological Survey, the predecessor of the Fish and Wildlife Service. Darling accepted the position as a temporary assignment, on the condition that he be free of intervention of "the hunting clubs crowd and be given funds for the Refuge program."

Decisive and outspoken, colorful and honest, Ding Darling was a complex figure. A critic of big government, he was committed to a union of Federal resources with conservation groups in a cooperative approach to wildlife management. Darling rejuvenated the agency in just 20 months as its Chief. The stimulus he gave to the national wildlife refuge program may be his greatest achievement. The investment in wetlands acquisition and restoration benefits a wide variety of wildlife, including many Endangered species. Because of his success in protecting waterfowl habitat in the difficult Dust Bowl days, Ding Darling has been called "the best friend ducks ever had."

Prior to his time in Washington, Ding Darling established the first Cooperative Wildlife Research Unit at Iowa State College, uniting the private sector, the college, and the State fish and game department in research and training programs in 1932. Under the leadership of Professor Aldo Leopold, the Unit devel-

"How Man Does Improve on Nature"



cartoon courtesy of the Jay N. Ding Darling Conservation Foundation

Habitat destruction, particularly the drainage of wetlands, is a concern today, as it was in the 1930's when Ding Darling drew this cartoon. Ding used cartoons to elevate natural resources conservation to the national agenda, from which land stewardship programs such as the Farm Bill and the Water Bank evolved.

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Duck Stamp

(continued from page 4)

whose art promoted awareness of the plight of wildlife, used his influence to help enact the legislation. Passage of the Act established one of the first land stewardship programs to conserve soil and water for wildlife.

Proceeds from the sale of duck stamps are deposited into the Migratory Bird Conservation Fund, providing a continuous source of money for acquiring and restoring habitat located strategically along bird flyways. This habitat becomes part of the National Wildlife Refuge System, which now encompasses more than 90 million acres for waterfowl and other wildlife.

"Hunters historically have paid for National Wildlife Refuges," said Barbara Wyman, Acting Chief of the FWS Duck Stamp Office, "by buying duck stamps that have helped acquire 4 million acres of land benefitting waterfowl and a whole range of wildlife, including endangered species. In recent years, though, the number of hunters declined, and if we are not to depend on appropriations, we'll have to continue to broaden the duck stamp's constituencies, by expanding our partnerships with stamp collectors and the conservation community. Congress recognized this when it passed a 1976 law officially naming the stamp the Migratory Bird Hunting and Conservation Stamp."

Sales of duck stamps declined during most of the 1980's, partly because low waterfowl population levels attracted fewer hunters. "Improved weather patterns—that is, more snow and rain—in parts of the important prairie breeding grounds of the northern United States and southern Canada give us hope for better habitat conditions and more birds," says Bill Vogel of the FWS Migratory Bird Management Office. "In general, breeding populations of ducks have increased in the past two years, but are still 8 percent below the long-term average. We support the duck stamp program as a means of protecting habitat to ensure that the trend of increasing waterfowl populations continues."

Art for Conservation

In 1934, Ding Darling sketched the first duck stamp, initiating the use of art to benefit conservation. From 1934 to 1949, the government commissioned an artist to create a new duck stamp each year. After that time, thanks in large part to FWS artist Bob Hines, an annual contest determined the art work. The duck stamp contest is the only federally sponsored art competition.

In 1991, when Joe Hautman chose to enter the contest, he selected one of the five species eligible for depiction in that year's competition. But when his painting of the spectacled eider was judged the best of 585 entries, he received no money. His "prize" was a sheet of duck stamps and the recognition that comes with winning the prestigious contest. Hautman's renown as a wildlife artist will enable him to sell signed and numbered prints of his design. Joe's brother, Jim, won the duck stamp contest in 1989

with his painting of black-bellied whistling ducks (*Dendrocygna autumnalis*). By 2002, all North American waterfowl species will have been depicted on Federal duck stamps.

Buying a duck stamp is an easy way for everyone — hunters and non-hunters alike — to actively support wildlife habitat protection. The spectacled eider duck stamp has been on sale since July 1, 1992, for \$15 at post offices, national wildlife refuges, and FWS offices throughout the country. Stamps not sold within 3 years will be recalled by the Treasury Department to limit the number in circulation and enhance their value. A complete collection of the 59 annual duck stamps, with a face value of \$242, is now worth more than \$4,000.

Ann Haas is a member of the *Bulletin* staff.

A Duck's Best Friend

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oped a 25-year conservation plan for Iowa that has served as a model of long-term planning for other States.

In 1935, Darling instituted the strictest waterfowl hunting regulations that had ever been seen. They prohibited baiting, banned the use of live decoys and shotguns holding more than 3 shells, and reduced waterfowl seasons and bag limits. In response to complaints, Darling said, "The regulations will stay as long as they are needed to bring back the ducks; and if tougher restrictions will help the cause, we'll find some tougher restrictions."

In addition to drawing the art work of two mallards that graced the first Duck Stamp, Ding Darling designed the flying goose emblem for the National Wildlife Refuge System.

During 49 years as an artist, Darling drew 15,000 cartoons, using what Rube Goldberg called "gentle ridicule" on political subjects and environmental

issues such as soil erosion, habitat destruction, water pollution, the importance of hunter ethics, and world population growth. A syndicated cartoonist whose work was published in 100 newspapers, Ding Darling was nationally known to readers who eagerly turned to see what he said each day. He was awarded Pulitzer prizes in 1924 and 1942 for cartoons that depicted the American Dream and satirized government paperwork. In a 1930 cartoon about the threatened extinction of the Florida key deer (*Odocoileus virginianus clavium*), Darling identified the need for protecting endangered species.

Ding Darling's grandson, Christopher Koss, is President of the Darling Conservation Foundation, established shortly after Ding's death in 1962 to continue his work. It sponsors scholarships in conservation and communication, two fields that Ding Darling regarded as complementary.

Report to Congress Lists Fiscal Year 1991 Expenditures for Endangered Species

The Fish and Wildlife Service (FWS) has published its third annual report to Congress summarizing "reasonably identifiable" species-by-species expenditures by Federal and State agencies to conserve Endangered and Threatened animals and plants.

Expenditures of approximately \$176.8 million in fiscal year (FY) 1991 were reported by Federal and State agencies specifically for the conservation of 570 species, which comprise 89 percent of the listed animals and plants in the United States. The amounts spent ranged from a high of over \$24 million for the bald eagle (*Haliaeetus leucocephalus*) to a low of about \$100 for a Florida cactus, the fragrant prickly apple (*Cereus eriophorus* var. *fragrans*).

Seven species (about 1 percent of the total) account for just over one-half of the

reported FY 1991 expenditures, and the top 55 species received about 90 percent of reasonably identifiable funding. The 10 species with the highest totals are the bald eagle (\$24.6 million); Florida scrub jay (*Aphelocoma coerulescens coerulescens*; \$19.7 million); West Indian (Florida) manatee (*Trichechus manatus*; \$15.3 million); northern spotted owl (*Strix occidentalis caurina*; \$12.8 million); red-cockaded woodpecker (*Picoides borealis*; \$7.0 million); American peregrine falcon (*Falco peregrinus anatum*; \$5.9 million); chinook salmon (*Oncorhynchus tshawytscha*; \$5.4 million); Florida panther (*Felis concolor coryi*; \$4.6 million); grizzly or brown bear (*Ursus arctos*; \$3.8 million); and Colorado squawfish (*Ptychocheilus lucius*; \$3.7 million). The Schaus swallowtail butterfly (*Heracles aristodemus ponceanus*) is the highest ranked

invertebrate in reported expenditures (#29 at \$1.3 million) and the scrub plum (*Prunus geniculata*) is the highest ranked plant (#42 at \$0.7 million).

Refinements in accounting and reporting procedures limit the comparability of the FY 1991 report to earlier versions. For example, the increase from FY 1990 is attributable mostly to more complete data furnished by State agencies and to increased habitat acquisition. Large annual variations in the amounts reported for individual species may reflect high-cost expenditures, such as habitat acquisitions, that are not part of normal, ongoing conservation efforts.

Copies of the FY 1991 expenditures report are available from the Publications Unit, U.S. Fish and Wildlife Service, 130 WEBB, Washington, D.C. 20240.

Listing Proposals

(continued from page 3)

Two Central California Plants

In a separate November 30 action, two plant species native to central California were proposed for listing as Endangered:

- **Hartweg's golden sunburst** (*Pseudobahia bahiifolia*) - a small, sparsely branched annual in the aster family covered with white, wooly hairs. The bright yellow flower heads are solitary at the ends of the branches. This species is strongly associated with shallow, well-drained, medium-textured soils containing short, wide mounds interspersed with shallow basins that collect water during the rainy season. Its current range is within Stanislaus, Madera, and Fresno Counties in the eastern San Joaquin Valley.

- **San Joaquin adobe sunburst** (*Pseudobahia peirsonii*) - a related, somewhat taller plant that also has yellow flower heads and a covering of white hairs. It

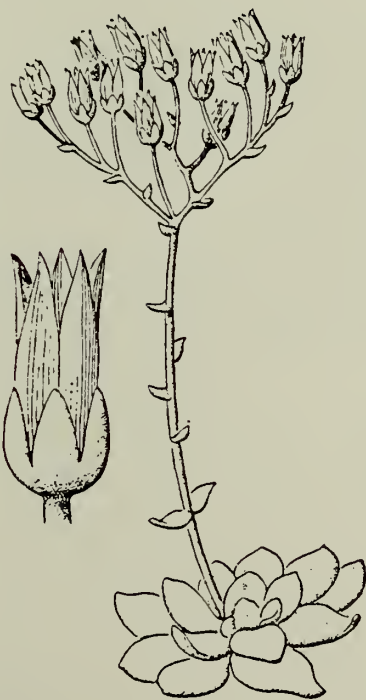
occurs only in grasslands on deposits of heavy adobe clay soils in Madera, Fresno, and Kern Counties in the eastern San Joaquin Valley.

The rare plants of this region are vulnerable to a wide variety of threats, including conversion of habitat to agricultural uses, overgrazing, urbanization, water projects, recreational developments (e.g., golf courses), mining, off-road vehicle use, maintenance of electricity transmission lines, and competition from non-native plants. Most of the sites occupied by *P. bahiifolia* and *P. peirsonii* are privately owned.

Three Puerto Rican Ferns

Three species of terrestrial (ground-dwelling) ferns endemic to the island of Puerto Rico were proposed November 9 for listing as Endangered. All three are in the genus *Thelypteris* and are members of the marsh fern family (Thelypteridaceae):

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Santa Monica dudleya



Kodachrome bladderpod



Kodachrome pepper-grass

Listing Proposals

(continued from page 7)

- *T. inabonensis* - 46 individual plants are known from 2 locations, including a site in Toro Negro Commonwealth Forest.
- *T. verecunda* - only 22 individuals are known to occur at 3 locations.
- *T. yaucoensis* - about 65 plants exist at the 3 known sites.

Because of their very low numbers and limited distribution, these ferns are vulnerable to extinction from any further habitat destruction or modification. Two of the species (*T. verecunda* and *T. yaucoensis*) are known only from privately owned lands. Although *T. inabonensis* occurs within Toro Negro Commonwealth Forest, the small populations could be affected by forest management practices and collection.

Two Utah Plants

Two plant taxa endemic to a small area of desert shrubland in southern Utah were proposed November 3 for listing as Endangered. Both are perennial herbs in the mustard family (Brassicaceae):

- Kodachrome bladderpod (*Lesquerella tumulosa*) - a low-growing, densely-branched plant forming hemispheric clumps or cushions that are covered with small yellow flowers during the blooming season.

- Kodachrome pepper-grass (*Lepidium montanum* var. *stellae*) - a variety with short stems arising from woody caudex, and topped by clusters of tiny white flowers.

Both species are restricted to adjacent tracts of land in northern Kane County administered by the State of Utah and the Bureau of Land Management. Only a single population of each plant is known. The area is subject to leasing for oil and gas, and habitat disturbance during energy development is one threat to the proposed plants. Portions of the habitat already have been damaged by prospecting and excavating for gravel and clay. The site also is highly vulnerable to degradation from off-road vehicle use. Sheep and cattle grazing may have had an impact on these species historically, but it is not considered a significant threat at current levels.

Arizona Willow (*Salix arizonica*)

A shrub in the family Salicaceae, the Arizona willow grows in forms ranging from prostrate mats to large thickets or hedges. Among the plant's distinguishing characteristics are its fine-toothed, shiny leaves and its bright red stems that turn olive-gray with age. This species is found only on the slopes of Mount Baldy, the highest peak in the White Mountains of east-central Arizona.

Arizona willows grow at elevations of 8,500 feet (2,500 meters) and above in riparian habitats, specifically wet meadows, stream edges, and cienegas (a southwestern term for a permanently wet marsh or meadow-like wetland). Extensive surveys have found the species in only 15 stream drainages. Its range is within the Apache-Sitgreaves National Forest and the White Mountain Fort Apache Indian Reservation.

Threats to the Arizona willow include habitat damage from livestock grazing in riparian meadows. Cattle in this sensitive habitat affect soil compaction, hydrology,

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photo by Susan Rutman

Arizona willow

Listing Proposals

(continued from previous page)

stream bank stabilization, and siltation. Repeated overuse results in reduced plant vigor and reproductive success. In addition, the Arizona willow is affected by the spread and perpetuation of non-native grasses introduced for livestock forage. Another possible cause of erosion and siltation in the species' limited habitat is timber harvesting and related activities, such as road construction. In addition, a naturally occurring plant disease identified as a rust (*Melampsora* spp.) has attacked some of the remaining willows, weakening them and making them more susceptible to other threats.

Because of the Arizona willow's restricted distribution, low numbers, and vulnerability, the FWS proposed November 20 to list the species as Endangered. A proposed designation of Critical Habitat would incorporate 16 areas of high-altitude riparian habitat along streams or cienegas on the slopes of Mount Baldy. Maps of the areas are available in the November 20 *Federal Register*. If the Critical Habitat designations are adopted, Federal agencies will be responsible for avoiding any adverse modifications to these areas.



photo by Greg Ballmer

The Delhi Sands flower-loving fly uses its long proboscis to feed on wildflower nectar.

Delhi Sands Flower-loving Fly (*Rhaphiomidas terminatus abdominalis*)

Like a butterfly, the Delhi Sands flower-loving fly pollinates phlox and other wildflowers while it feeds on their nectar by means of a long, thin tubular proboscis. Its ability for hovering flight is similar to that of a hummingbird. On November 19, this large, orange-and-black-striped insect became the first fly proposed formally for Endangered Species Act protection. Although it would be listed as a subspecies, this fly is believed to be the only surviving member of its species; the last El Segundo flower-loving fly (*R. t. terminatus*), the only other subspecies, was sighted in the 1960's.

Known only from sparsely vegetated habitat in areas of the Delhi Sands geological formation in southern California, *R. t. abdominalis* has been eliminated from all but a tiny portion of its former range. Five colonies remain on a total of 350 to 700 acres (140 to 280 hectares) of private land in southwestern San Bernardino and northwestern Riverside Counties. Most of the species' habitat has been converted to vineyards and citrus groves since the 1800's. Less than 3 percent remains, and it is vulnerable to sand mining, off-road vehicle use, encroachment by non-native plants, and residential, commercial, and industrial development.

The Endangered Species Act applies to insects and other invertebrates as well as

to more charismatic animals. Although Section 3(6) of the Act excludes insects that "...constitute an overwhelming and overriding risk to man...", the Delhi Sands flower-loving fly is not a pest species and poses no such risk. It can survive only in its natural habitat.

* * *

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from adverse effects of Federal activities, restrictions on take and trafficking, a requirement that the Service develop and carry out recovery plans, authorization to seek land purchases or exchanges for important habitat, and Federal aid to State and Commonwealth conservation departments that have approved cooperative agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages other 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

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Listing Proposals

(continued from page 9)

dize the survival of an Endangered or Threatened species or to adversely modify its designated Critical Habitat (if any). If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service to identify ways to avoid jeopardy and minimize adverse impacts on Critical Habitat. 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.

Additional protection is authorized by Section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to possess, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant 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 more restrictive laws specifically addressing the take of State or federally listed plants and animals.

Publications

Virginia's Endangered Species, a book produced in cooperation with the Virginia Departments of Game and Inland Fisheries, Agricultural and Consumer Services, and Conservation and Recreation, along with the Virginia Museum of Natural History, is an up-to-date (summer 1991) reference on the State's rare and vulnerable plants and animals. The 672-page volume includes the following for each species covered: a description of the taxon; a written summary and a map of its distribution; an overview of its natural history; a synopsis of its legal and recommended statuses; a discussion of threats to its survival in Virginia; and conservation recommendations. Most taxa are illustrated with color plates. The book is available for \$59.95 (clothbound) or \$32.95 (paper), plus \$2.50 for shipping and handling and 4.5 percent sales tax for Virginia residents, from The McDonald & Woodward Publishing Company, P.O. Box 10308, Blacksburg, Virginia 24062-0308 telephone 703/951-9465. Royalties go to the Virginia Non-game and Endangered Species Fund to support future conservation efforts.

Nature Reserves: Island Theory and Conservation Practice, by Craig L. Shafer, an ecologist with the National Park Service, reviews the literature on island biogeography and synthesizes some guidelines from controversial theories. It addresses the current status of nature reserves, informa-

tion from field surveys, and results of conservation trials. The scope of the analysis includes ecology, biogeography, evolutionary biology, genetics, and paleobiology, as well as relevant legal, social, and economic issues. This 208-page, illustrated book is available for \$39.95 in cloth or \$15.95 in paper from the Smithsonian Institution Press, Department 900, Blue Ridge Summit, Pennsylvania 17294-0900 (telephone 800/782-4612 or 717/794-2148).

Please include \$2.25 postage and handling for the first book and \$1.00 for each additional copy.

The Expendable Future: U.S. Politics and the Protection of Biological Diversity, by Richard Tobin, is an evaluation of the politics of biological diversity and of State and Federal endangered species policies from the early 1960's to the present. The 336-page volume includes discussions of the listing process, the way resources are allocated in relation to priority, and current recovery programs. It is available from the Duke University Press, Dept. HLW, 6697 College Station, Durham, North Carolina 27708, for \$18.95 in paperback or \$45.00 in cloth, plus \$2.00 for U.S. shipping and handling (or \$3.00 for international orders).

Notices in the New Publications column are presented for information purposes only. The mention of non-Federal publications does not imply concurrence with their contents or with the philosophies of the authors.

Cave Invertebrate is Listed as Endangered

The Lee County cave isopod (*Lirceus usdagahum*), a small aquatic crustacean endemic to a single cave system in southwestern Virginia, was listed November 20, 1992, as an Endangered species. This eyeless, unpigmented animal is vulner-

able to extinction because of its very restricted range and potential threats to water quality within the cave recharge area. It has already been eliminated from one other cave system due to pollution from a nearby sawmill.

The Nature Conservancy has negotiated a conservation agreement with one of the landowners, and the Fish and Wildlife Service (in conjunction with the Virginia Department of Game and Inland Fisheries) is working with the same individual to protect the species.

Tyronia alamosae and Geronimo

by Jerry Burton



photo by Dana B. Chase, courtesy of Museum of New Mexico

Apache family at Ojo Caliente, New Mexico, around 1890

In 1991, the Alamosa springsnail (*Tyronia alamosae*), a tiny mollusk endemic to a few interconnected springs in an isolated area of New Mexico, was listed by the Fish and Wildlife Service as an Endangered species. Although some people may find it difficult to get excited about a snail the size of a poppy seed, there is an interesting story that relates to the springs in which it lives.

The year was 1909, when the U.S. Government asked leaders of a small band of western Apaches, held as prisoners of war since 1886, where they wanted to be set free. These people were remnants of a band of Apaches that in 1877, under the leadership of Victorio and later Geronimo, went to war when the continuing invasion of "white-eyes" into their homeland became too much to bear. In 1886, they surrendered to the U.S. Army at Skeleton Canyon, Arizona, and for the next 27 years were prisoners of war at various military posts in the southeastern U.S. By 1909, few who remembered their homeland in the mountains of New Mexico remained. Most of

the survivors were descendants that had been born into captivity. But they had been told by their elders about the place where they once lived. To those who had never seen it, and only knew the south-east, the homeland must have sounded like a strange place, with mountains, deserts, and vast forests of ponderosa pine.

One area the survivors had often been told about, a sacred place where they had always known peace and happiness, was the canyon and warm springs of the Rio Alamosa, or Ojo Caliente. This was the homeland of the Tcihene, or "Red Paint," band of Apaches. Such famous Apache leaders as Victorio, Nana, Mangas Coloradas, and Geronimo had been born in this region. Countless generations of Apaches had drunk from the springs and bathed in the warm waters.

These thermal springs also are the sole habitat of the Alamosa springsnail. Although broken bits of pottery, arrowhead chips, and pithouse foundations provide evidence that various tribes have occupied the area over time, no doubt the snails were there first.

In 1911, a delegation of five Apaches from Fort Sill, Oklahoma, accompanied by Colonel Hugh L. Scott, traveled to New Mexico to inspect the springs and determine if the Apaches wanted to return to their homeland. After their visit, the scouting party reported back to the rest of the band that the springs were dry and the land barren. To a present day biologist, this seems impossible because of the presence of the snails, fish, and other aquatic life found at the springs. Also, the flow of water from the springs has never been less than 6 cubic feet per second during the 23 years they have been monitored by the U.S. Geological Survey.

What happened on that October day in 1911 when the survivors of Geronimo's band were taken to Ojo Caliente? No one knows. The answer may be lost to history. However, this much seems clear: the springs were not dry.

Today, the springs are probably much the same as they were in Geronimo's day. The outflows have been dammed to create pools where occasional visitors soak in the warm water. Ruins of Fort Harmony, located on a slight rise across the dry river bed from the springs, are slowly eroding into oblivion, and there are cattle where Indian and U.S. Cavalry horses once grazed. The springs continue to supply water to the Monticello Irrigation District, much the same as they have done for the past 127 years. The water provides life for acres of chilies that turn bright red under the New Mexico sun.

In the past, men have killed to keep the water flowing. In the future, people may (if plans by the National Park Service materialize) visit a national monument at Ojo Caliente to learn of its rich history. Perhaps they will also learn something about the unique wildlife found there, including tiny *Tyronia alamosae*.

Jerry Burton is a biologist in the Fish and Wildlife Service's Albuquerque, New Mexico, Regional Office

Landmark Legislation

(continued from page 1)

Immediate Moratorium

International trade in birds listed on Appendix I of CITES is already restricted. The new law supplements this protection with an immediate moratorium on U.S. importation of 10 heavily traded species of wild psittacines that have been on CITES Appendix II (2 of which were moved to the more restrictive Appendix I at the March 1992 CITES meeting). Among the birds protected under this importation ban are such well-known species as Fischer's lovebird (*Agapornis fischeri*).

Phased Moratorium and "Approved Imports" List

Under the WBCA, U.S. imports of *all* CITES-listed birds will be prohibited on October 22, 1993, except for any species included on an "approved" list published by the U.S. Fish and Wildlife Service (FWS) in the *Federal Register*. This list may approve wild-caught birds on a species-by-species basis according to their country of origin; for captive-bred birds, the list may approve specific breeding facilities.

For *wild-caught* CITES-listed birds to be on an approved list, the FWS must determine that: 1) CITES is being effectively implemented for the species in each country of origin; 2) measures recommended by CITES committees are implemented; 3) there is a scientifically-based management plan that provides for the conservation of the species and its habitat; and 4) the methods of capture, transport, and maintenance minimize risks to the birds' health and welfare. For *captive-bred* birds, the FWS is required to determine that either: 1) *only* captive-bred birds are in trade for that species or 2) the birds were bred in an FWS-approved facility.

Until October 22, 1993, one year from the law's signature, there is a maximum number of birds of any CITES-listed species that can be imported (except for those included in the immediate moratorium). That quota is equal to the

number imported during the last year for which the FWS has complete data (1991).

Emergency Authority

In emergency situations, the FWS now has authority to suspend imports of any CITES-listed bird species immediately, based on a series of criteria specified in the WBCA.

Trade Reviews

The FWS is required to review trade in all non-CITES birds and establish an import moratorium on any species, by country of origin, if the country is found not to have a management program that ensures their conservation and humane treatment. In order to make these assessments, the FWS has published a call for information on the management plans of all countries that export their birds.

Humane Treatment

CITES requires that before an export permit is issued, a country must be satisfied that animals are prepared and transported humanely, but this requirement is all too often ignored. Experts estimate that for every imported bird offered for sale in a pet store, up to five died along the way.

In a recent 5-year period, 193,733 birds died while in transit to the U.S., and another 584,364 died while in quarantine or were refused entry because of Newcastle Disease, which is fatal to poultry. In other words, in 5 years more than 3/4 of a million birds either were dead on arrival in the U.S. or died within the first 30 days of quarantine. Mortality between capture and export is reported to be even higher, due to the initial shock of capture and caging, although good data are lacking on pre-transport deaths. When birds die due to improper capture and handling, additional birds are taken from the wild to meet the trade demand, thus posing an even greater threat to the conservation of these species.

Many countries, including Australia, Bolivia, Brazil, Honduras, India, Mexico, and Zimbabwe — as well as the U.S. —

do not allow the export of their native wild birds for the pet market. Unfortunately, many countries in the developing world that choose to export their birds lack the means to design and implement effective, scientifically based management plans.

The countries exporting the most wild birds to the U.S. have been (in order of export volumes) Argentina, Senegal, Tanzania, and Indonesia. Each has exported more than 25,000 CITES-listed birds to the U.S. every year. In passing the WBCA, the U.S. is making a commitment to assist these countries in bringing their wildlife trade to sustainable levels and in scientifically managing their wild bird populations.

Conservation Fund

A critical feature of the WBCA is the authorization of an Exotic Bird Conservation Fund, money for which will come from penalties, fines, forfeitures, donations, and appropriations. The fund is designed to support wild bird research and management programs where they are most needed — in the countries of origin. Such a fund, modeled after the highly successful African Elephant Conservation Fund, has excellent potential to benefit conservation efforts in developing countries. The WBCA also authorizes the appropriation of up to \$5,000,000 for fiscal years 1993-1995 to implement the act and support the Exotic Bird Conservation Fund.

Enforcement

The WBCA establishes significant penalties for violators, including civil penalties up to \$12,000 for some infractions and up to \$25,000 for others, as well as misdemeanor and felony criminal penalties. It authorizes various enforcement activities, including issuance of warrants, injunctions, and search and seizure of contraband, guns, traps, nets, vessels, and vehicles.

Petition Process

The WBCA establishes a petition process whereby any person or organization

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Landmark Legislation

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may submit a petition to the FWS to establish, modify, or terminate any prohibition or suspension under the Act.

* * *

Background

The WBCA represents a consensus across a broad range of interests. In addition to the strong support of the FWS, this law received the support of a coalition of conservation, scientific, animal welfare, zoological, and trade organizations. It applies to the importation of all bird species not indigenous to the 50 United States and the District of Columbia, while exempting from its provisions game bird families and orders (Phasianidae, Anatidae, Struthionidae, Rheidae, Gruidae, etc.).

The WBCA in no way restricts the right of people to keep exotic birds as pets; these animals can provide companionship for many years when cared for properly. But the WBCA, and FWS support for it, recognize the harm caused by uncontrolled trade and high mortality in transport.

Support for WBCA has been strong in part because the Endangered Species Act, which implements CITES, does not provide a mechanism to guarantee the conservation of wild birds imported commercially. The Endangered Species Act comes into play only after a species' population status has been seriously harmed. But it is best to avoid such harm rather than try to remedy the situation after it may be too late.

Our goal is to manage the trade appropriately *before* species become threatened.

Prior to passage of the WBCA, there was no authority to restrict imports of a species, even when it was known that the trade is detrimental to the species' survival or that there are not enough scientific data on whether trade is sustainable or not. With the WBCA, we now have the authority to control imports, albeit only for birds.

A copy of the WBCA text, a brief fact sheet, and a *Federal Register* notice announcing the import quotas for CITES species are available from the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Rm. 432, Arlington, VA 22203.

Dr. Lieberman is the CITES Policy Specialist in the Office of Management Authority, U.S. Fish and Wildlife Service, Washington, D.C.

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25 and given final health examinations by zoo veterinarians. The female condor already in the wild was observed to spend time with the six birds while they were being held at the release site, and biologists believe its behavior will serve as an excellent role model for the second-year condors.

The remaining 56 birds are in captive breeding programs at the San Diego Wild Animal Park and the Los Angeles Zoo, which are both expected to reach capacity in 1993. The new captive breeding facility in Idaho, expected to be completed by late July 1993, will be suitable for 10 pairs of condors. It will be the first breeding facility for condors outside California and the first to be built in a decade.

The Peregrine Fund is a non-profit conservation organization created in 1970 to save the peregrine falcon (*Falco peregrinus*). Peregrine Fund personnel will use captive breeding techniques that have proved successful with the peregrine falcon to breed the California condor.

These techniques also have been applied successfully to the northern aplomado falcon (*Falco femoralis septentrionalis*), harpy eagle (*Harpia harpyja*), and Mauritius kestrel (*Falco punctatus*).

* * *

Midwater trawl sampling, conducted annually during the months of September through December by the California Department of Fish and Game, provides an abundance index for the adult delta smelt (*Hypomesus transpacificus*) population of the Sacramento-San Joaquin River Estuary. The delta smelt has been proposed for listing as Threatened. Preliminary results of midwater trawls for delta smelt in September and October 1992 indicate that the current year class of this species is considerably smaller than the 1991 class. As a comparison, the index for September 1991 was 126; in September 1992 it was 71.5. The October 1991 index was 249.2; in October 1992 it was 3.5, the second lowest index in the 26-year history of this population survey. The 80 midwater trawls conducted during October 1992 collected only two delta smelt.

* * *

Region 2 — The 1992 least tern (*Sterna antillarum*) census counted about 1,000 interior least terns along 700 miles (1,125 kilometers) of Oklahoma rivers. Personnel from the FWS, Oklahoma Department of Wildlife Conservation, Army Corps of Engineers, and Oklahoma State University counted approximately 985 of these Endangered birds from airboats and helicopters, and by walking specific routes.

Historically, this species was distributed over the entire Mississippi River drainage basin, but the birds now occur only in parts of their former range. The terns breed and nest on river sand bars and islands in Oklahoma from May to August. However, in recent years, reservoir construction, stream channelization, and agricultural demands on water have significantly reduced the quantity and quality of the species' nesting habitat.

Although degradation of prime nesting habitat appears to be causing these birds to concentrate in certain locations, the number counted in the annual census has remained relatively stable for the past 3 years. The highest number of least terns

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1992 CITES Amendments Strengthen Protection for Endangered and Threatened Wildlife and Plants

by Susan S. Lieberman

(Part 1 of 2)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty designed to control international trade in certain animal and plant species that are, or may become, threatened with extinction. CITES members, or Parties, meet at least every 2 years to review the treaty's implementation and make any necessary changes. The Eighth Conference of Parties (COP8) was held in Kyoto, Japan, on March 2-13, 1992.

The meeting attracted a large amount of press and world attention because of dominant issues relating to the African elephant, bluefin tuna, mahogany, and the wild bird trade. COP8 attendees included 101 of the 112 countries that were Parties at the time of the meeting, along with observers from 5 nonparty countries, the United Nations Environment Programme, the European Economic Community, and 155 other national and international organizations. This was the largest number of countries and non-governmental organizations (NGOs) to ever attend a CITES conference.

Background

CITES regulates international trade in plants and animals in varying degrees, depending on their biological status and vulnerability to commercial exploitation. Three appendices to CITES identify how much protection is provided to each species. Appendix I contains species threatened with extinction that are, or may be, affected by international trade. Commercial trade in these species is prohibited. Appendix II includes species that may become threatened if their trade is not brought under control. Commercial trade in Appendix II species is subject to regulation, and is allowed only if export permits are issued based on scientific findings that trade will not be detrimental to the species. Appendix III includes species that individual CITES Parties

identify as subject to domestic regulations for the purpose of restricting or preventing exploitation. Permits or certificates of origin are required for trade in Appendix III species.

The U.S. Fish and Wildlife Service (Service) undertook an extensive public involvement process, with calls for public comment published in the *Federal Register* along the way, to establish the United States' negotiating positions for COP8. The Service's regulations governing this public process are found in Title 50 of the Code of Federal Regulations §§23.31-23.39. All of the *Federal Register* notices are available from the Service's Office of Management Authority (OMA) upon request.

General Outcome of COP8

Altogether, 153 species proposals and 35 resolutions were submitted by the Parties for consideration at COP8, more than at any other CITES meeting. The CITES Parties adopted 23 different resolutions dealing with a broad range of CITES implementation and enforcement issues (see below). For animal species, 14 taxa were removed from the Appendices, 24 were either added to Appendix II or moved from Appendix I to II, and 12 were added to or moved to Appendix I. For plant species, 5 taxa were removed from the Appendices, 13 were either added to Appendix II or moved from Appendix I to II, and 9 were added to or moved to Appendix I.

A list of those resolutions adopted by COP8, a summary of species proposals adopted, and a list of attendees are available from OMA on request. In a few months, OMA will also have available its official Delegation Report on COP8.

CONFERENCE RESOLUTIONS ADOPTED:

The CITES Parties adopted 23 different resolutions, based on detailed and of-

ten intense discussions of a broad range of enforcement, implementation, and interpretation issues. Resolutions of particular interest include those directly related to enforcement, commerce in heavily traded wild-caught animals, trade in birds experiencing high mortality in transport, and a universal tagging system for crocodilian skins in trade.

Enforcement: Review of Alleged Infractions

For every CITES meeting, the CITES Secretariat prepares an Infractions Report, which details instances that the Convention is not being effectively implemented or enforced. The Infractions Report presented at COP8 included 138 alleged infractions and 54 recommendations with detailed information. This report was the product of the first term of a full-time Enforcement Officer in the Secretariat, who was made available by the Service's Division of Law Enforcement.

Several resolutions were developed as a result of the Infractions Report. One involved national legislation implementing CITES. Because they lack adequate national legislation, many countries cannot fully implement CITES, which requires them to take appropriate measures to enforce regulations on trade. Some Parties have been members for many years and still cannot fully implement CITES, resulting in a serious threat to many species. This resolution directs the Secretariat to identify Parties that do not have adequate legislation.

A second enforcement resolution involved annual report submission, which is a basic CITES requirement. Annual reports provide valuable information on trade, and it is very important that all Parties submit accurate reports to help in the identification of any illegal trade. There are 13 Parties that did not submit any annual reports for the last 3 years and

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18 other Parties that did not submit annual reports for 1 or 2 years. This resolution requires CITES to take appropriate action against Parties that do not submit their annual reports by October 31 following the year for which the report was due.

Trade in Birds: Significant Trade Species

The trade in live wild-caught birds is an issue of great concern to the U.S. and other CITES Parties because the trade in many bird species listed in Appendix II may be detrimental to their survival. The U.S. asked that this issue be placed on the COP8 agenda. It submitted two related resolutions in order to discuss trade in species that were identified by previous COPs as subject to significant trade and possibly at risk. The U.S. supports the sustainable use of wildlife, including wild-caught birds, but is opposed to use that is not known to be sustainable. The issue of wild bird trade is particularly critical since trade is continuing at high levels in many species that have been identified as potential problems for over 5 years.

The U.S. resolution called for a suspension of commercial trade in wild bird species listed in Appendix II that are identified as "significant trade" species for which either there is insufficient information on which to base a nondetriment finding or for which remedial measures have been recommended but not implemented. This proposed resolution also would have authorized the CITES Standing Committee to recommend the removal of species from the list of those suspended from trade.

The U.S. urged COP8 to recognize that the first phase of "significant trade" had been going on for 6 years; the species were identified and the Parties had agreed on more than 45 bird species for which the treaty is not being implemented. It asked that the second phase begin; that is, if trade is not in compliance with CITES, it should *not* be allowed. The World Conservation Union (IUCN) led the discussion opposing the draft resolution,

and was joined by several exporting countries. Several range states that do not export wild birds supported the U.S. resolution, notably Brazil, Uruguay, Zambia, and Gambia. A vote was taken and the resolution was rejected, with the understanding that the broader issue of trade in all wild-caught significant trade Appendix II species, including birds, would be addressed later in the COP (see the discussion of the resolution on trade in wild-caught animals).

Trade in Birds: Species Sensitive to High Mortality

The U.S. and Israel each submitted similar resolutions calling for a suspension in trade for commercial purposes in bird species that experience high mortality in transport, based on criteria adopted by the CITES Transport Working Group (TWG). They also called for reduced shipment sizes for species that warrant further study of their sensitivity to transport.

CITES requires that prior to the issuance of an Appendix II export permit, a Party's Management Authority must be "satisfied that any living specimen will be so prepared and shipped as to minimize the risk of injury, damage to health, or cruel treatment." Many Management Authorities in exporting countries are unable to, or do not, make such findings, yet continue to export shipments. The transport of live specimens has been an issue at every COP. The TWG found that for many bird species, mortality in transport remains unacceptably high and compliance with CITES is inadequate.

An amended resolution was adopted. It recommends that: 1) Parties maintain, publish, and submit to the TWG records of numbers of bird per shipment and transport mortalities; 2) Parties take measures, including suspension of trade when appropriate, for species of birds with significant high transport mortality rates; and 3) the TWG seek information from Parties and experts in the field for recommendations designed to minimize mortality.

Trade in Wild-caught Animals

CITES requires the Scientific Authority from the country of origin to advise

that an export will not be detrimental to the survival of the species prior to issuing any export permit for Appendix II species. Many Parties have not been able to conduct the properly designed surveys and biological studies necessary to issue such scientifically-based advice. As a result, there is serious concern that the international commercial trade in wild-caught specimens is contributing to the decline in the wild of many Appendix II species.

At the request of the CITES Animals Committee, the U.S. submitted a resolution dealing with wild-caught significant trade animal species. According to the resolution, the Animals Committee would: identify problems with implementing CITES Article IV that may be to the detriment of species; recommend appropriate remedial measures; recommend a consultative process with the exporting Party; and recommend the suspension of trade from countries not implementing the recommended remedial measures.

The Parties agreed to address the wild bird trade in the broader context of all wild-caught animals. Discussions on this issue were extensive and lengthy. Parties passed a resolution that provided for a consultative process with range states, and two levels of priority for action regarding species whose trade has been identified by the Animals Committee as not being in compliance with the treaty.

The key elements of this very important resolution are for the Animals Committee to continue its systematic review of biological trade information of Appendix II species with implementation problems and make recommendations for all species listed in the CITES Significant Trade Review. Parties are required to implement primary recommendations (administrative procedures, quotas, zero quotas, or other trade restrictions) within 90 days of their receipt. They are given 12 months to implement secondary recommendations (such as administrative procedures, field studies, and evaluations of threats to populations). This resolution

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tion calls for the Secretariat to recommend to the CITES Standing Committee that Parties take stricter domestic measures, including the suspension of trade in a given species, when recommendations are not implemented.

The sense of the CITES Parties was that the treaty is not being effectively implemented in many cases, Appendix II species are being depleted due to trade, and that something *must* happen between COP8 and COP9 in 1994 regarding the significant trade species. The U.S. intends to remain very active in Animals Committee efforts on this issue.

Trade in Crocodilian Products

The U.S., along with Australia, Germany, and Italy, submitted a resolution calling for a universal tagging system for the identification of all crocodilian skins in international trade. All members of the Order Crocodylia are on either Appendix I or Appendix II of CITES. Several resolutions of the Parties have established management programs for some species of crocodilians (such as the Nile crocodile) that required tagging of ranched species and captive bred species. The U.S. already requires such tagging for its alligator exports. This resolution simply extends that tagging requirement to all species of crocodilians, whether taken from the wild, bred in captivity, or produced in a ranching program.

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counted during the 1992 census was about 240 birds along a 140-mile (225-km) stretch of the Canadian River. Other areas with high numbers of birds included a 58-mile (93-km) stretch of the Arkansas River where 237 birds were counted, and a 140-mile (225-km) stretch of the Cimarron River with 230 birds. The river survey is a primary tool wildlife managers use to determine tern populations and to identify quality nesting habitat.

* * *

The status of the Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*), listed as Endangered in 1987, is currently uncertain. Grazing, mining, road construction, and recreation have contributed to changes in vole habitat. This subspecies is associated with sites supporting pinyon/juniper and pine/oak vegetation.

In 1991, the Arizona Game and Fish Department (AGFD) conducted surveys (funded by the FWS under Section 6 of the Endangered Species Act) to locate voles in Mohave and Coconino Counties, Arizona. The surveys focused on the Hualapai and Music Mountains and the Hualapai Indian Reservation. Twenty-eight voles were found during the surveys—20 in the Hualapai Mountains, 4 in the Music Mountains, and 4 on the Hualapai Indian Reservation.

The 1992 AGFD spring surveys found 5 voles in 2 new locations in the Hualapai Mountains, and summer surveys found 17 individuals located in 2 old and 2 new sites in the Hualapai Mountains.

* * *

A whooping crane (*Grus americana*) sandhill crane (*Grus canadensis*) hybrid chick was observed in the San Luis Valley of Colorado in October, and later in the Rio Grande Valley of New Mexico, where the family group is wintering. The chick, the male whooping crane, and the female sandhill crane are being observed by FWS biologists. The male is part of an experimental flock started in 1975 in the Rocky Mountains by placing whooping crane eggs in sandhill crane nests. The egg transfers were discontinued in 1989 because none of the cross-fostered whooping cranes had paired and mortality rates were excessive in the flock.

On November 5, another male whooping crane from the Rocky Mountain cross-fostered population was captured in the San Luis Valley after it was observed to be ill or injured. The bird is currently being treated for avian tuberculosis at the Rio Grande Zoological Park in Albuquerque, New Mexico. If the treatment is successful, the crane will be the first bird saved from this historically terminal disease.

A pair of whooping cranes was shipped from the International Crane Foundation in Baraboo, Wisconsin, to the Calgary Zoo, in Calgary, Alberta, Canada, on November 13. Another pair was shipped December 9 from the FWS Patuxent Wildlife Research Center in Laurel, Maryland, to the Calgary Zoo. All are reported to be doing well. These birds will be the first complement to stock the Canadian Wildlife Service's captive breeding site at Calgary. Another 10 to 12 birds will be shipped in the spring, and a further shipment in the fall should almost fully stock the new Calgary facility. The Calgary site will have a role in providing captive-produced cranes for release to the wild late this decade, as the Canadian Wildlife Service endeavors to establish a second migratory flock in Canada.

* * *

Region 3 — State agencies, recovery teams, and six FWS Regional Offices are reviewing the status of the bald eagle (*Haliaeetus leucocephalus*) in the conterminous United States to determine if, and where, the bird's classification as Endangered should be changed. The status review is comprised of three parts: (1) review and analysis of bald eagle winter population and breeding territories in each of the five recovery regions, (2) review and possible revision of eagle recovery plans to ensure that they reflect the best data available, and (3) review and analysis of threats still facing the eagle in each of the recovery regions. This effort will be accompanied by an education and outreach program to ensure that the public is informed and involved throughout the review process.

The State of Wisconsin, under contract with FWS Region 3, completed management guidelines for wintering bald eagles. The guidelines provide suggestions for protecting, maintaining, and enhancing feeding, perching, and roosting habitat for eagles during the winter. Additionally, the guidelines outline recommendations for buffer zones and management restrictions.

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FWS Field Offices in Bloomington, Indiana, and Green Bay, Wisconsin, are engaged in interagency conferences to protect the Karner blue butterfly (*Lycaeides melissa samuelis*), which has been proposed for listing as Endangered. The Bloomington Office is conferring with the National Park Service on a proposed fire management plan for the Indiana Dunes National Lakeshore. Indiana Dunes includes Inland Marsh, a 40-acre (16-ha), high quality complex of wetlands and prairie savannah, along with some disturbed areas that currently contain the largest population of Karner blue butterflies on the lakeshore. Dr. Dale Schweitzer of the National Park Service has characterized the Karner blue population at Inland Marsh as globally significant and probably the third largest in the world.

Inland Marsh experienced an extensive wildfire in 1986, followed by a controlled burn in 1987. Portions of the area are now experiencing rapid succession of woody growth. It is generally believed that if fire suppression continues, the area will eventually become unsuitable or only marginally suitable for the Karner blue butterfly, which needs open habitat. The fire management plan is intended to counter the effects of vegetational succession and help maintain suitable habitat for the butterfly.

The Bloomington Field Office is also conferring with the Environmental Protection Agency on a permit application from Midwest Steel Company that may affect Karner blue butterfly habitat along the southern shore of Lake Michigan. Both EPA and Midwest Steel are interested in conserving and enhancing Karner blue habitat, and are preparing a biological assessment to evaluate the effects of alternative actions on butterfly habitat on the company's property.

The FWS Green Bay Office has been working with the Department of Defense and several private landowners to help conserve Karner blue butterfly habitat in Wisconsin. Fort McCoy, a Department of Defense installation in central Wisconsin,

is preparing a biological assessment on winter training activity and a proposed habitat management plan. The Defense Department has been concerned about Karner blue butterfly habitat on Fort McCoy and is working to maximize protection for the butterfly while maintaining operations.

* * *

Region 3 is continuing to formulate a plan to protect Threatened and Endangered mussels from an invasion by the zebra mussel (*Dreissena polymorpha*). The zebra mussel, a species native to Europe, was first discovered in North America in Lake St. Clair in 1986 and has since spread to all five Great Lakes and several major river systems, including the St. Lawrence, Hudson, Ohio, Tennessee, and Mississippi. In the past few years, the very prolific zebra mussel has extirpated all native unionid mussels in Lake St. Clair and on the Canadian side of the Detroit River.

In October 1992, police divers from the City of Detroit, Michigan, and community volunteers conducted an operation to salvage northern riffleshell mussels (*Epioblasma torulosa rangiana*) from the American side of the Detroit River. The northern riffleshell has been proposed for listing as Endangered. The volunteers removed all zebra mussels from the riffleshell mussels, packed the riffleshells in holding cages, and placed the cages in two holding areas for the winter. One group was placed in the St. Clair River, which is still uncontaminated by the zebra mussel. The other group was placed in the boat basin of the Consumer's Power Company's Monroe Power Plant. Both groups will be monitored to ensure that no zebra mussel larvae survived the transfers. The mussels will be held in the two basins throughout the winter and relocated to suitable inland sites during the spring of 1993.

During the summer of 1992, zebra mussels were found in the St. Croix River, which forms part of the boundary between Minnesota and Wisconsin and is the last stronghold for the Endangered winged mapleleaf pearly mussel (*Quadrula fragosa*). Region 3 is trying to

(1) determine the extent of zebra mussel invasion into this river system and (2) develop a strategy to protect both the winged mapleleaf pearly mussel and the Higgins' eye pearly mussel (*Lampsilis higginsii*), an Endangered species that also occurs in the St. Croix River.

This fall, zebra mussels were also found in the East Channel of the Mississippi River near Prairie du Chien, Wisconsin. This area of the Mississippi River currently supports the largest known colony of the Higgins' eye pearly mussel. Region 3 will work with the Fisheries Laboratory in LaCrosse, Wisconsin, to develop a response to the zebra mussel invasion at this site.

* * *

Region 5 — The FWS New England Field Office held an awards ceremony on August 30 to recognize citizens' work in environmental conservation. Awards were presented to three landowners, the Board of Selectmen for Alton, New Hampshire, and the Alton Land Conservation Initiative Program Task Force. Over 300 acres (121 ha) of the world's largest population of the Endangered small whorled pogonia (*Isotria medeoloides*) will be protected as a result of their substantial donations and conservation easements. Additionally, FWS recognized the outstanding contribution of time and personal resources by a volunteer who has monitored over 1,300 small whorled pogonia plants for the past 10 years.

* * *

In May, a controlled burn was conducted on habitat of the Endangered Peters Mountain mallow (*Iliamna corei*), a rare relative of the hibiscus whose entire range consists of only one site, Peters Mountain, in Giles County, Virginia. The burn followed laboratory investigations showing that this species will not germinate unless its hard seedcoats have been broken, and that this can be accomplished through careful burning. A series of 10-by-10-meter (33-by-33-foot) plots were burned or left unburned in a carefully controlled design. To date, nine Peters Mountain mallow seedlings have ap-

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peared in the burned plots. If all survive, the wild population, which previously consisted of only three individuals, will have been increased by 300 percent. Increasing the number of plants should also improve seed set in the natural population, because the species requires cross-fertilization for reproduction.

* * *

In early 1992, West Virginia Division of Natural Resources (WVDNR) personnel conducted censuses at the nine known Virginia big-eared bat (*Plecotus townsendii virginianus*) maternity colonies in West Virginia. These colonies contained 4,429 adults, a level within 1 percent of their 1991 census. In May, the largest known maternity colony of this Endangered subspecies was discovered. It contained over 1,300 individuals.

As part of another WVDNR study, 10 Virginia big-eared bats were fitted with radio transmitters and tracked in Pendleton County, West Virginia, for a 2-week period in late July. The bats traveled up to 7 kilometers (4.3 miles) from the cave each night and foraged in both wooded areas and fields. This study received funding from FWS and the Monongahela National Forest.

* * *

During November, the FWS West Virginia Field Office learned of four bald eagle shootings in the State. One eagle, tagged by the State of New York, was killed. One eagle was wounded but could not be captured and is still in the wild. The remaining two eagles, both wounded, were taken to rehabilitation centers. One is recovering well and may be released to the wild soon, but the other will probably never be able to be returned. None of these eagles were among those nesting in the State. This number of bald eagle shootings is the highest for a single month in West Virginia since 1984.

Four bald eagle nests were observed in West Virginia in 1992, from which eight eaglets were fledged. Only three nests were found in the State in 1991.

* * *

Dr. Thomas Pauley, under a contract with the WVDNR, located two new populations of the Cheat Mountain salamander (*Plethodon nettingi*), a Threatened species. In addition, Dr. Pauley delineated the extent of two known populations. One of these populations was found to extend below an elevation of 2,400 feet (730 meters), the lowest recorded elevation for this salamander.

* * *

One nesting pair of peregrine falcons was located and monitored in Grant County, West Virginia, in 1992. The pair produced three young. Another pair, monitored at Summersville Lake, West Virginia, did not attempt to nest. The female of this pair was a subadult.

* * *

Region 6 — Two bald eagles and three peregrine falcons fledged in Nebraska in 1992, the first known successful fledging of these two Endangered species in the State in the past century. The eagles fledged from a nest on the Middle Loup River (a tributary to the Platte River) in central Nebraska. This nest, the only known bald eagle nest in Nebraska in 1992, was monitored throughout the breeding season by the Nebraska Game and Parks Commission. In 1991, the only known bald eagle nest in Nebraska was found on the Platte River; unfortunately, the hatchling failed to fledge.

The three peregrine falcons fledged from the Woodman Tower Office Building in downtown Omaha, Nebraska, in 1992. One of the adult birds had been previously hacked from Woodman Tower, and this year it returned to the building to successfully raise the three offspring.

* * *

A breeding site used by the Endangered piping plover (*Charadrius melodus*) in 1992 at Alkali Lake in northwestern Pondera County, Montana, represents an extension of the species' previously known western range in Montana by approximately 200 miles (320 km). In Colorado, piping plovers were found nesting at Adobe Creek Reservoir in the southeastern part of the State in 1992. Only four piping plover nests were docu-

mented in Colorado this year, three at Adobe Creek and one at Nee Noshe Reservoir, also in southeastern Colorado. Nesting at Nee Noshe was discovered in 1989, the first discovery of piping plovers in Colorado in almost 50 years.

* * *

Six American burying beetles (*Nicrophorus americanus*), the largest carrion beetle in the United States, were discovered on the Valentine National Wildlife Refuge in Nebraska in the summer of 1992. These findings indicate that a viable population of the beetles may exist on the refuge. Valentine National Wildlife Refuge is completely outside the previously known Nebraska range of American burying beetles, and this is only the third collection of these rare beetles in Nebraska since 1970. Only 11 beetles have been collected in Nebraska since the 1880's.

* * *

Region 8 — Staff and cooperators of the FWS Southeast Research Group operated 238 nets in 4 Michigan study areas between July 16 and September 30, 1992. During a total 11,997 net hours, they captured and banded 160 Kirtland's warblers (*Dendroica kirtlandii*) and recaptured 16 birds banded in previous years. The recaptured birds included 2 individuals first banded in 1988, one of which had not been seen since that time. In spite of a cool, wet summer, reproductive success was high for the warbler, with a ratio of 2.3 young for every adult captured.

* * *

Three Mississippi sandhill crane (*Grus canadensis pulla*) cohorts have been formed in preparation for their release at the Mississippi Sandhill Crane National Wildlife Refuge. The cranes, drawn from captive breeding flocks, were reared in two different ways: by their parents or by human attendants dressed in costumes designed to prevent the cranes from imprinting on humans. The cohorts consist of 12 costume-reared young-of-the-year, 14 parent-reared young-of-the-year, and a mixture of 7 costume-reared and 7 parent-reared young-of-the-year.

* * *

(continued on next page)

Regional News

(continued from previous page)

In August 1992, Siberian white cranes (*Grus leucogeranus*) were instrumented with "satellite backpacks" in both north-eastern and northwestern Siberia. As of September 28, one northeastern bird had already flown 2,000 miles (3,200 km) to Zhalong Marsh in northwestern Manchuria. At that time, one northwestern bird was about 800 miles (1,290 km) into its journey and appeared to be headed for India. From monitoring these birds, we should learn which summering

and wintering populations are linked. If the northwestern bird is headed for India, as its current flight suggests, it is likely that the other population, which is wintering in Iran, breeds at an unknown location in European Russia.

* * *

Preliminary assessments of damage to the native rainforests on the island of Kaua'i following Typhoon Iniki indicate much of the 'ohi'a and koa forests in the Alaka'i Swamp region sustained significant defoliation and tree fall. These forests harbor several Endangered forest bird species, including the Kaua'i 'o'o (*Moho*

braccatus), Kaua'i 'akialoa (*Hemignathus procerus*), nuku-pu'u (*Hemignathus lucidus*), and 'o'u (*Psittirostra psittacea*). The status of these birds is unknown. Plans are under way to send State and Federal biologists to Kaua'i to evaluate the damage to the biological resources. Damage to inhabited sections of the island was severe, and many of the buildings on the Kilauea Point National Wildlife Refuge were either destroyed or severely damaged.

* * *

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The first in a new series of posters under the theme "Endangered Means There's Still Time" depicts six animals and plants native to coastal areas of the United States: the San Francisco garter snake, California clapper rail, mission blue butterfly, Menzies' wallflower, brown pelican, and leatherback sea turtle. Future editions of the series will feature endangered species from a variety of habitats. These posters are designed to raise public awareness of lesser-known types of rare wildlife.

The 16 1/2-by-22-inch poster can be purchased by writing the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, or by calling 202/783-3238. The price is \$4.95; ask for product number 024-010-00693-5.

Regional News

(continued from previous page)

FWS biologists continue to monitor the 'alala or Hawaiian crow (*Corvus hawaiiensis*) population in the Kona section of the island of Hawai'i (the "Big Island"). Particular attention has been placed on following the maturation of a chick fledged this year from one of three active nests. Weekly checks of the bird indicate it is feeding successfully on its own, but it remains with its parents in the general vicinity of the nesting area.

* * *

Fewer palilas (*Loxioides bailleui*) nested on the island of Hawai'i in the 1992 season than in any season since 1988, possibly as the result of a severe drought. Only 5 active nests were found, compared to 85, 84, 52, and 71 during the prior 4 years, respectively. Two of the 1992 nests successfully fledged young, and one of the pairs renested unsuccessfully. Apparently, the low breeding effort resulted from a drought brought on by an El Niño event. Also, counts of mamane pods, the bird's main food, were below average before the drought began and became progressively lower throughout the year. Insects, another food of the palila, especially chicks, were captured at low rates during the drought.

A mamane forest on the east slope of Mauna Kea has been selected as the site for a proposed experimental translocation of palilas. Factors considered during the

BOX SCORE						
LISTINGS AND RECOVERY PLANS						
Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	249	9	23	337	33
Birds	73	153	13	0	239	67
Reptiles	16	64	18	14	112	26
Amphibians	6	8	5	0	19	8
Fishes	55	11	36	0	102	54
Snails	12	1	7	0	20	8
Clams	42	2	2	0	46	38
Crustaceans	9	0	2	0	11	5
Insects	15	4	9	0	28	13
Arachnids	3	0	0	0	3	0
Plants	298	1	72	2	373	149
TOTAL	585	493	173	39	1290*	401**
Total U.S. Endangered	585	(287 animals, 298 plants)				
Total U.S. Threatened	173	(101 animals, 72 plants)				
Total U.S. Listed	758	(388 animals, 370 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, chimpanzee, 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.

** There are 334 approved recovery plans. Some recovery plans cover more than one species, 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: 53 fish & wildlife
39 plants

Number of CITES Party Nations: 117

January 31, 1993

selection process included available food supply, elevation of the site, relative abundance of predators, and logistics.

December 1992

Vol. XVII No. 12

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

FIRST CLASS
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
PERMIT NO. G-77



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Vol. XVII

ENDANGERED SPECIES

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Department of the Interior, U.S. Fish and Wildlife
Service, Washington, D.C. 20240

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49.77: 17/992/ IND.

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Vol. XVII

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

PUBLIC DOCUMENTS
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Positive Effects of Hurricane Hugo: Record Years for Puerto Rican Parrots Nesting in the Wild

by J. Michael Meyers, Francisco J. Vilella, and Wylie C. Barrow, Jr.

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Editor's note: When Hurricane Hugo struck in 1989, it had serious impacts on some species of wildlife as well as on people. Red-cockaded woodpeckers (Picoides borealis) in South Carolina, for example, were hit particularly hard. (See Bulletin Vol. XIV, No. 9-10.) But the following account shows that, for at least one species, the storm may have had a silver lining:

In September 1989, Hurricane Hugo passed over the Luquillo Mountains of Puerto Rico. The rain forest in these mountains is the last refuge of the critically endangered Puerto Rican parrot (*Amazona vittata*). As expected, fewer parrots were counted in this part of the Caribbean National Forest in 1990, but over the next 2 years the wild flock produced a record number of young. Environmental changes caused by Hurricane Hugo may have played a part in these increases.

Since the arrival of Europeans in the Caribbean 500 years ago, many of the unique wildlife species of these islands have declined or become extinct. The Puerto Rican parrot was once abundant and widespread, but by the early 1970's deforestation, hunting, and nest robbing had reduced its population to 13 individuals. Fortunately, a cooperative effort of the U.S. Fish and Wildlife Service (FWS), U.S. Forest Service (FS), and Puerto Rico Department of Natural Resources has prevented the extinction of this bird, the only endemic parrot species remaining in Puerto Rico and the Virgin Islands. From 1971 to 1989, the number of Puerto Rican parrots grew from fewer than 20 to more than 88.



Puerto Rican parrots

Post-hurricane Population Increases

In August 1989, one month before Hurricane Hugo, 47 Puerto Rican parrots were counted in the wild. Three months after the storm, only 20-22 parrots were seen, and only 3 breeding pairs were known to have survived. Traditional foraging areas may have been devoid of food after the hurricane, which

struck before the parrot's winter breeding season. In 1990, breeding activity was low; three pairs nested, but only one pair successfully fledged young.

In both 1991 and 1992, however, the wild flock of Puerto Rican parrots produced a record six successful nests each year, the highest number since the 1950's¹. In 1991, 6 pairs nested in the

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Regional News

Regional endangered species staffers have provided the following news:

Region 2 - Four of the young whooping cranes (*Grus americana*) re-

leased in February in central Florida as members of the first attempted nonmigratory flock have been killed by bobcats (*Felis rufus*), confirming biolo-

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

John Turner, Director
(202-208-4717)

Michael J. Spear,
Assistant Director for
Ecological Services
(202-208-4646)

Paul Gertler, Acting Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Editor, Michael Bender
Assistant Editor, Ann Haas
Additional Editorial, Dianne Taylor
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S.11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Jamie Rappaport Clark, *Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *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); Ralph O. Morgenweck, *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; John D. Buffington, *Regional Director*; Al Sherk, *Endangered Species Specialist* (703-358-1710).

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gists' concerns that the inexperience of the captive-bred birds with wild predators would contribute to early losses.

"We anticipated the threat of bobcats and removed several of the animals from the site before the whooping cranes were released. We also removed bobcats after the birds were on their own," commented Dr. Jim Lewis, Fish and Wildlife Service (FWS) National Whooping Crane Coordinator. "We had conditioned the cranes raised at the International Crane Foundation to flee from predators using humans and dogs," he added. "Next time, we may create a robot bobcat or enlist a real tomcat—decawed and defanged, of course—to develop the wariness essential for self-preservation. Releasing these birds into the wild is a bit like taking teenagers who have only known a protected atmosphere and turning them loose in the center of a crime-ridden city, with the expectation that they'll prosper. However, the longer the cranes survive in their new environment, the better their chances will be for successful acclimation."

For several weeks, the whooping cranes ate commercial feed along with natural prey—crayfish, aquatic insects, snails, and freshwater shrimp—stocked in two small ponds in the 3/4-acre (0.3 hectare) pen where they were quarantined. The release of the first six cranes into their temporary enclosure attracted national television and newspaper reporters to a press conference in Kissimmee Prairie on January 7. The birds had been shipped the day before from the International Crane Foundation (ICF) in Baraboo, Wisconsin.

At the press conference, FWS Director John Turner, Assistant Executive Director of the Florida Game and Fresh Water Fish Commission Al Egbert, Whooping Crane Coordinator Jim Lewis, and Florida biologist Steve Nesbitt spoke about partnership efforts to restore this Endangered species to its historic range. Using telephoto lenses, the media filmed and photographed the cranes from a blind outside their enclosure.

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Eastern Timber Wolf Recovery Progresses in the Lake Superior Region

by L. David Mech

A milestone on the way to recovery of the eastern timber wolf (*Canis lupus lycaon*) in the United States was reached in 1991 with the first documented reproduction of wolves in mainland Michigan since 1956. A newly-formed mated pair produced a minimum of six pups in the central Upper Peninsula, according to James Hammill of the Michigan Department of Natural Resources. At least five of the pups survived into the winter of 1991, and three more in 1992. At least 20 wolves are now known to inhabit northern Michigan; some of their ranges straddle the border with Wisconsin.

Wisconsin's wolf population also has had another banner year, reaching its highest level since wolves began recolonizing the State in about 1975. Adrian Wydeven of the Wisconsin Department of Natural Resources estimates that 40 to 50 wolves in 14 packs now inhabit Wisconsin. These increases represent one of

the great successes of the Endangered Species Act, which protects wolves in the 48 conterminous States.

Neighboring Minnesota's wolf population has also increased. The population of 600-700 wolves in the early 1970's has grown to 1,550 to 1,750, according to the Minnesota Department of Natural Resources. This buildup promoted the dispersal of wolves from Minnesota to Wisconsin, which began the long, slow recolonization process. However, a stretch of highly developed area south of Duluth and Lake Superior, including a four-lane interstate highway, effectively separates all but one or two Minnesota packs from Wisconsin and allows only the most determined dispersers to reach Wisconsin.

A goal of the Eastern Timber Wolf Recovery Plan is a combined Wisconsin/Michigan population (outside of Isle Royale, Michigan) of 100 wolves during

winter for at least 5 consecutive years. The population is well on its way to reaching that goal.

From about 1975 to 1985, the wolf population in Wisconsin and Michigan seemed unable to gather enough momentum to increase. Although incidental, accidental, and deliberate illegal taking of wolves accounted for some of the lack of population growth, new diseases such as canine parvovirus, Lyme disease, and heartworm probably contributed. Although these problems continue to plague the wolf in the Lake Superior region, and may yet slow or prevent recovery, there is considerable reason for optimism as the wolf population appears to be increasing.

Dr. Mech is a wolf specialist with the U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center (mailing address: North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, Minnesota 55108).

Forensics Lab Identifies Animals Killed in Wyoming and North Dakota as Wolves

Two large canids killed in Wyoming and North Dakota in late 1992 have been identified by the Fish and Wildlife Service's (FWS) National Forensics Laboratory in Ashland, Oregon, as gray wolves (*Canis lupus*), which are listed in all 48 conterminous States under the Endangered Species Act.

One of the wolves was shot and killed last September (see *Bulletin* Vol. XVII, No. 9-11) in Bridger-Teton National Forest, just south of Yellowstone National Park, by a hunter who said he thought it was a coyote (*Canis latrans*). After closer examination, the hunter notified authorities because of the animal's size and resemblance to a wolf. Up to that time, wolves were not confirmed to occur in Wyoming since they were exterminated from the State earlier this century. Au-

thorities declined in this case to prosecute the man for violating the Act. However, the incident puts hunters on notice that wolves may be present in the Yellowstone area and emphasizes the importance of positively identifying one's target when hunting.

The animal was sent to the National Forensics Laboratory for genetic analyses to confirm its identity. Scientists at the lab compared DNA from the animal to DNA from 11 wolves from Montana, 11 from Alaska, 9 from Minnesota, and individual samples of Mexican wolf (*Canis lupus baileyi*), coyote, and domestic dog (including elkhound, German shepherd, Labrador retriever, Rottweiler, collie, and husky/wolf hybrid). Two different analyses — nuclear DNA and mitochondrial DNA — were used. According to lab

reports, mitochondrial DNA of the animal killed in Wyoming was similar to four gray wolf reference standards and identical to the lineage found in gray wolves in western Montana.

"It is not unusual for lone wolves to disperse from a pack and travel hundreds of miles in search of a mate or another pack, or to establish a new territory," said Ralph Morgenweck, FWS Denver Regional Director. "Identification of this animal as a wolf does not affect the Environmental Impact Statement presently being drafted on reintroduction of wolves into Yellowstone National Park."

The other animal identified as a gray wolf by the National Forensics Laboratory was shot in November near Watford City, North Dakota. "The black color

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Listing Proposals — December 1992

Forty-one species — 38 plants and 3 fishes — were proposed by the Fish and Wildlife Service (FWS) during December 1992 for listing as Endangered or Threatened. If the listing actions are approved, Endangered Species Act protection will apply to the following:

26 Hawaiian Plants

A total of 26 plants endemic to the Hawaiian Islands were recommended in 3 separate proposals for listing as Endangered. The first notice, published in the December 17 *Federal Register*, called for listing the following 22 taxa, which are found primarily on the island of Hawai'i, or the "Big Island." The Hawaiian names for these plants (when available) are given first:

- 'oha wai (*Clermontia lindseyana*) - a shrub or tree in the bellflower family (Campanulaceae) with greenish white or purplish, tubular flowers
- 'oha wai (*Clermontia peleana*) - a related shrub or tree with blackish-purple or greenish-white flowers that grows epiphytically (not rooted in soil); named after the Hawaiian volcano goddess Pele

- 'oha wai (*Clermontia pyrularia*) - a tree with white or greenish-white, curved, tubular flowers

- kauila (*Colubrina oppositifolia*) - a tree in the buckthorn family (Rhamnaceae) bearing clusters of greenish-yellow or white flowers

- haha (*Cyanea copelandii* ssp. *copelandii*) - a shrub in the bellflower family that produces clusters of yellowish flowers covered by dark red hairs

- haha (*Cyanea hamatiflora* ssp. *carlsonii*) - a palm-like tree with clusters of tube-shaped magenta flowers

- haha (*Cyanea shipmanii*) - an unbranched or sparsely branched shrub bearing greenish-white flowers and armed with small, sharp projections

- haha (*Cyanea stictophylla*) - a shrub or tree with narrowly lobed, toothed leaves and clusters of greenish-white or purplish flowers

- ha'iwale (*Cyrtandra giffardii*) - a shrubby tree in the African violet family (Gesneriaceae) producing small clusters of white flowers with brown hairs

- ha'iwale (*Cyrtandra tintinnabula*) - a similar shrub with larger leaves and white flowers densely covered by long, soft hairs

- *Hesperocnide sandwicensis* - an annual herb in the nettle family (Urticaceae) with a dense covering of coarse, stinging hairs

- Hilo ischaemum (*Ischaemum byrhone*) - a perennial in the grass family (Poaceae) with creeping or tall, erect stems

- wahine noho kula (*Isodendron pyrifolium*) - a shrub in the violet family (Violaceae) producing solitary, fragrant, greenish-yellow flowers

- *Mariscus fauriei* - a perennial in the sedge family (Cyperaceae) with somewhat enlarged underground stems and three-angled aerial stems

- 'aiea (*Nothocestrum breviflorum*) - a stout tree in the nightshade family (Solanaceae) with thick, toothless leaves and clusters of greenish-yellow flowers

- holei (*Ochrosia kilaueaensis*) - a tree in the dogbane family that produces a

milky sap and bears clusters of small, greenish-white, trumpet-shaped flowers

- laukahi kuahiwi (*Plantago hawaiiensis*) - a perennial herb in the plantain family (Plantaginaceae) that grows from a stout, short stem and has thick, leathery leaves

- po'e (*Portulaca sclerocarpa*) - a perennial herb in the purslane family (Portulacaceae) rising from a fleshy, tuberous root and bearing clusters of tiny white and/or pink flowers

- loulou (*Pritchardia affinis*) - a fan-leaved tree in the palm family (Arecaceae) that can reach about 82 feet (25 meters) in height

- *Silene hawaiiensis* - a sprawling shrub in the pink family (Caryophyllaceae) covered with short, often sticky hairs and producing flowers that are greenish-white above and maroon below

- *Tetramolopium arenarium* - a shrub in the aster family (Asteraceae) that bears complex, bell-shaped flowering heads containing up to 34 bracts, 45 white, male ray florets, and 9 bisexual disk florets with maroon petals

- a'e (*Zanthoxylum hawaiiense*) - a tree in the rue family (Rutaceae) with leathery, lemon-scented leaves

In a separate December 17 notice, the FWS proposed to list a species of palm endemic to the privately owned island of Ni'ihau, which is managed as a cattle and sheep ranch:

- wahane (*Pritchardia aylmer-robinsonii*) - a fan-leaved tree named in honor of Aylmer F. Robinson, a member of the family that owns the island, who provided much information on the plants of Ni'ihau. Only two trees of this species are known to survive in the wild, although there are some in cultivation.

On December 14, the FWS proposed to list three plant species that occur only in the Wai'anae Mountains on the island of O'ahu:

- haha (*Cyanea grimesiana* ssp. *obatae*) - a usually unbranched shrub in the bellflower family with long, deeply

(continued on next page)



Clermontia peleana

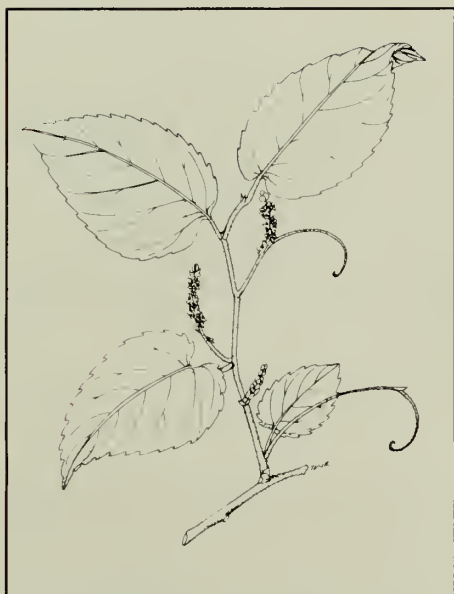
Listing Proposals

(continued from previous page)

lobed leaves and clusters of purplish or greenish to yellow-white flowers

- *Diellia unisora* - a fern in the family Polypodiaceae producing fronds up to about 12 inches (30 centimeters) in length, with up to 35 pinnae (leaflets) per side

- *Gouania vitifolia* - a climbing shrub or woody vine in the buckthorn family with small white flowers



Gouania vitifolia

All 26 of these Hawaiian plants have been severely reduced in range and population size due to widespread habitat modification and the effects of exotic animals and plants. Specific causes included one or more of the following: competition from introduced plants; habitat degradation by wild, feral, or domestic animals (deer, cattle, goats, pigs, and sheep); agricultural, military, and recreational activities; human-caused fires; and predation by non-native animals (rats, insects, goats, cattle). Some of these factors continue to threaten the remaining plants.

Twelve California Plants

Twelve plants restricted to serpentine soil outcrops in the San Francisco Bay region were proposed December 14 for listing as Endangered or Threatened.

The classification of Endangered was recommended for the following 10:

- Pennell's bird's beak (*Cordylanthus tenuis* ssp. *capillaris*) - an herbaceous annual in the snapdragon family (Scrophulariaceae) bearing three-lobed floral bracts and tubular, garnet-brown flowers

- Tiburon paintbrush (*Castilleja neglecta*) - a semi-woody perennial in the snapdragon family producing yellowish, sometimes red-tipped floral bracts and small yellow to red flowers

- Tiburon jewelflower (*Streptanthus niger*) - an annual herb in the mustard family (Brassicaceae). Its flowers have dark purple sepals, and the petals include a purple claw, white blade, and purple midvein

- Presidio clarkia (*Clarkia franciscana*) - a slender, herbaceous annual in the evening-primrose family (Onagraceae) bearing lavender-pink flowers with reddish-purple basal spots

- fountain thistle (*Cirsium fontinale* var. *fontinale*) - an herbaceous perennial in the aster family (Asteraceae) with several stout, reddish stems and white to pinkish flowers

- San Mateo wooly sunflower (*Eriophyllum latilobum*) - a bushy perennial in the aster family that bears clusters of golden flower heads; currently known from only one site

- white-rayed pentachaeta (*Pentachaeta bellidiflora*) - a small, sparsely branched annual in the aster family with flower heads containing yellow disk florets and white to purplish ray florets; currently known from only one site

- coyote ceanothus (*Ceanothus ferri-sae*) - an erect evergreen shrub in the buckthorn family with long, stiff branches, round leaves, and clusters of small white flowers

- Santa Clara Valley dudleya (*Dudleya setchellii*) - a low-growing perennial in the stonecrop family (Crassulaceae) with fleshy leaves and flowering stems that bear pale yellow flowers

- Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albidus*) - an annual herb in the mustard family with white to yellow to whitish-green sepals and whitish flowers with light purple veins

Because two of the serpentine plants, while vulnerable, are not believed to be in as much danger as the others, they were proposed for listing in the less critical category of Threatened:

- Tiburon mariposa lily (*Calochortus tiburonensis*) - a bulbous perennial in the lily family (Liliaceae) with a branched inflorescence bearing small clusters of light yellow-green flowers containing reddish or purplish-brown marks. Although only one population is known, it is on land owned by The Nature Conservancy.

- Marin dwarf-flax (*Hesperolinon congestum*) - an herbaceous annual in the flax family (Linaceae) with slender, threadlike stems, narrow leaves, and clusters of rose to whitish flowers

These 12 taxa are endemic to outcrops of serpentine soils, which are shallow, rocky, and highly erodible, with high concentrations of some minerals (magnesium, chromium, nickel) but low concentrations of others (nitrogen, phosphorus, potassium, calcium). Although such unusual characteristics make serpentine soils inhospitable for most plants, some species have adapted to the rigors of life under these conditions. In fact, serpentine outcrops often support a high diversity of rare plants.

Development in the rapidly urbanizing San Francisco Bay region has claimed nearly 20 percent of serpentine habitats in the past 20 years, and has fragmented some of what remains. The pressure to build more houses, roads, and other facilities continues. Increasing numbers of people also place an ever greater strain on undeveloped wildlands through activities like off-road vehicle use, unauthorized garbage dumping, recreational development, and changes in natural fire regimes. Such disturbances also promote the spread of competing non-native grasses and other plants.

Two Southeastern Fishes

Two species of fishes native to small areas of the southeastern U.S. were proposed December 11 for listing as Endangered:

(continued on page 6)



relict darter

Listing Proposals

(continued from page 5)

• relict darter (*Etheostoma chienense*) -

This small fish is restricted to the Bayou du Chien watershed in extreme western Kentucky. Only one spawning site is known. Adult relict darters are associated with gravel, sand, and leaf litter substrates near fallen tree branches, undercut banks, or overhanging streambank vegetation. Much of the Bayou du Chien system has been channelized, destroying the habitat characteristics needed by this species. The surrounding region also is extensively farmed, and much of the watershed has been deforested, resulting in a fairly high silt load and further degradation of aquatic habitat.

• bluemask darter (*Etheostoma* sp.) -

A formal description of the bluemask darter is expected this year, but biologists already recognize the distinctiveness of this fish. One of its distinguishing characteristics is the bright blue color of breeding males. This species is endemic to the Caney Fork River system in central Tennessee, inhabiting areas of slow to moderate current over sand and fine gravel substrate. Once known from five rivers within the Caney Fork system, the bluemask darter apparently has been reduced in range to isolated sections of four rivers. Its loss of habitat has resulted from impoundments, water withdrawals, and a general deterioration of water quality.

No specific Federal projects that might further jeopardize either of these species have been identified. Their restricted ranges, however, make them very vulnerable to toxic chemical spills.

Tidewater Goby (*Eucyclogobius newberryi*)

A small, slender fish native to tidal streams associated with coastal wetlands in California, the tidewater goby also was proposed December 11 for listing as Endangered. It is the only species in its genus. This fish is restricted during all life stages to low-salinity waters in the upper portions of coastal lagoons from the Smith River in Del Norte

County southward to Agua Hedionda in San Diego County.

The tidewater goby has rather specific habitat needs and can tolerate only a narrow range of salinity. Since 1900, this fish has disappeared from nearly 50 percent of the coastal lagoons within its historic range, including about 75 percent of the lagoons south of Morro Bay. The extensive decline had a multitude of causes: draining of coastal marshes for development, dredging of waterways for navigation and harbors, stream channelization, upstream water diversions, groundwater overpumping, siltation and other impacts from livestock and feral pigs, agricultural runoff, sewage discharges, and possibly predation by non-native fishes. Even when habitat was not destroyed directly, water quality and salinity were often altered beyond the goby's ability to tolerate. Many of these factors continue to threaten the species' remaining habitat.

Under section 10 of the River and Harbors Act and section 404 of the Clean Water Act, the U.S. Army Corps of Engineers is responsible for regulating the placement of fill material into wetlands, including coastal lagoons. Listing the tidewater goby under the Endangered Species Act would ensure that the habitat of this unique fish receives greater consideration as the Corps evaluates permit applications.



tidewater goby

1992 CITES Amendments Strengthen Protection for Wildlife and Plants

by Susan S. Lieberman

Part 2 of 2

(Editor's note: In the last Bulletin (Vol. XVII, No. 12), Susan Lieberman summarized the resolutions passed at the Eighth Conference of Parties (COP8) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), held in 1992 at Kyoto, Japan. In this second half of the article, she discusses other issues such as the sea turtle trade, humane transport, and changes in the CITES appendices.

At COP8, one important issue placed on the agenda by the United States was the detrimental international trade in sea turtles. On March 20, 1991, under the Pelly Amendment to the Fishermen's Protective Act of 1967, the U.S. Departments of Interior and Commerce certified Japan for diminishing the effectiveness of CITES by continued trade in endangered sea turtles (see *Bulletin* Vol. XVI, Nos. 7-8). A Pelly Amendment certification authorizes the President to prohibit importation into the U.S. of wildlife products originating from an offending country.

In response to the certification, Japan announced June 19, 1991, that it would sharply limit hawksbill sea turtle (*Eretmochelys imbricata*) imports between then and December 1992, at which time it would cease all sea turtle imports. Although this ban is now in effect, Japan has delayed withdrawing its CITES reservation on hawksbill trade restrictions until 1994; therefore, its Pelly certification remains in effect. At COP8, Mexico described its sea turtle protection efforts, noting that they had been undermined by the imports into Japan. Several governments and observers endorsed Mexico's remarks, and urged Japan to withdraw its reservation on the species, but the Japanese position was that it "needs time to reorganize the hawksbill shell industry."

Another major issue at COP8 was the humane transport of live wild animals. CITES requires that "any living specimen will be so prepared and shipped as to minimize the risk of injury, damage to health, or cruel treatment." Humane transport remains a significant concern of the U.S. and has been an issue at every COP. The U.S. has been very actively involved with the CITES Transport Working Group (TWG), and I was chosen to serve as the TWG Chair until the next COP. The TWG focus is on improving the implementation of CITES and relevant resolutions, training, improvement of international wildlife transport standards, coordination with the International Air Transport Association (IATA) Live Animals Board, and the transport of live wild birds. The first meeting of the TWG since COP8 was held April 29-30, 1993, in Dakar, Sénégal. It was the first time a meeting focusing specifically on the transport of live CITES wildlife was held in Africa. Sénégal is one of the world's largest suppliers of birds for the pet trade.

Changes in CITES Appendices

CITES regulates international trade in plants and animals to varying degrees — depending on the biological status and vulnerability of individual species, genera,

or families to commercial exploitation — by placing them on one of three CITES appendices. Commercial trade in Appendix I species (those threatened with extinction) is prohibited, trade in Appendix II species is regulated by CITES export permits, and trade in Appendix III species is controlled by permits or certificates from the country of origin. The Parties at COP8 considered more than 150 proposals to amend the CITES appendices, most of which passed and became effective June 11, 1992. A list of species transferred onto, within, or off Appendices I, II, or III is available from the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Rm. 420, Arlington, VA 22203.

Many species were removed from the Appendices as part of the CITES 10-year review process, whereby species that are in no way affected by trade are removed from the Appendices or transferred to a less restrictive Appendix if their biological status warrants such a change. (See table.)

Some amendments of particular interest in the U.S. include:

- **Bears:** After much debate, the CITES Parties added the American black bear (*Ursus americanus*) to Appendix II. This action, based on so-called "look

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The following numbers of taxa were afforded increased protection at COP8:

	Moved to Appendix I	Moved to Appendix II
Mammals	4 species	3 species
Birds	5 species	8 species and 6 genera
Reptiles	1 species	4 species
Fish	—	1 species
Invertebrates		1 species
Plants	5 species and 4 genera	11 species
TOTALS	15 species and 4 genera	28 species and 6 genera

1992 CITES Amendments

(continued from page 7)

alike" reasons, was taken to protect endangered Asian bears. There is a growing use of bear gall bladders and other parts in traditional medicines, particularly in eastern Asia, because of alleged curative powers. Parts from endangered Asian bears that are on Appendix I have been traded under the guise of being from the American black bear. With the inclusion of the American black bear, along with bear species in the Baltic States and the former Soviet Republics, all bears (Ursidae) are now listed on either Appendix I or II of CITES. It is hoped this will enable improved tracking of the trade in bear parts and help protect those bears on Appendix I. For the American black bear, any commercial exports of bear gall bladders, paws, or other parts now require an Appendix II permit from the U.S. Office of Management Authority. Individual hunters may take their legally acquired sport-hunted trophies with them out of the U.S. under the personal effects exemption in 50 CFR Part 23.

• **Psittacine birds:** The U.S. submitted proposals at COP8 to transfer three psittacine bird species from Appendix II to I: the blue-fronted Amazon (*Amazona aestiva*) from Argentina, the blue-streaked lory (*Eos reticulata*) from Indonesia, and Goffin's cockatoo (*Cacatua goffini*), also from Indonesia. Just prior to COP8, the government of Argentina imposed a minimum 2-year moratorium on exports of blue-fronted Amazons to conduct studies of the species, including field work on population biology, and to determine what levels of trade would be sustainable. In response to this positive commitment from Argentina, the only country exporting the species, the U.S. withdrew its proposal. Indonesia made a commitment to do the same for the blue-streaked lory, and the U.S. withdrew that proposal as well. The Fish and Wildlife Service is funding two field studies of *Amazona aestiva* in Argentina, and a project in Indonesia on a number of psittacines, as part of our commitment to the CITES "significant trade" project. (See "Landmark Legislation Will Conserve

Exotic Wild Birds" in *Bulletin* Vol. XVII, No. 12.) Because Goffin's cockatoo is an insular species with a very restricted range, whose population has been decimated by unregulated trade and a lack of proper CITES implementation, the Parties adopted its transfer to Appendix I. These actions, taken in no small part because of high volume exports to the U.S., were part of the Service's effort to control the bird trade that culminated in a strong law, the Wild Bird Conservation Act of 1992 (see *Bulletin* Vol. XVII, No. 12).

• **Paddlefish:** The U.S. originally proposed adding the paddlefish (*Polyodon spathula*) to Appendix I, due to its extirpation from the majority of its range and the possibility that heavy demand for premium paddlefish roe could affect the remaining populations. This once-abundant species is known from 22 States, primarily in the Mississippi River basin and some Gulf Coast rivers, but in most cases only remnant populations remain. After consultation with the States, and based on the existence of regulated programs in some States for export of roe from fish taken for sport fishing or raised in aquaculture, the Service amended its proposal and recommended listing the paddlefish on Appendix II. The Parties adopted the proposal. Any exports of paddlefish or their roe now require U.S. Office of Management Authority export permits, which may be issued on the basis of several factors, including a finding from the Office of Scientific Authority that the export is not detrimental to the species' survival.

• **Turtles:** Based on U.S. proposals, the wood turtle (*Clemmys insculpta*) has been added to Appendix II and the bog turtle (*Clemmys muhlenbergii*) has been moved from Appendix II to Appendix I. The wood turtle occurs primarily in parts of eastern North America from southern Canada south to Virginia. Over-collecting has contributed to the decline of this species, which is popular in the pet trade. The bog turtle has a fragmented range from New York to Georgia and is already considered endangered by most of these States. Although it is uncertain how extensive the international trade in bog turtles is, this extremely rare species is in danger of extinction due to over-collecting and loss of wetland habitat. The Parties adopted both of the U.S. proposals.

• **Tropical timber:** Proposals were submitted by several countries, including the U.S., to list several species of tropical trees on Appendix I or II. This is an important move for CITES, as it recognizes the need to regulate international trade in some species of tropical hardwoods to prevent the threat of extinction. The tropical timber proposals adopted at COP8 were: Brazilian rosewood (*Dalbergia nigra*) to Appendix I; and African teak (*Pericopsis elata*) and Caribbean mahogany (*Sivietenia mahagoni*) to Appendix II. In the case of Brazilian rosewood (as for all Appendix I species), no trade for primarily commercial purposes is allowed, but products made with Brazilian rosewood removed from the wild

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paddlefish

photo by Galen Buterbaugh



photo by E. LaVerne Smith

Venus fly-trap

1992 CITES Amendments

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before June 11, 1992, can be traded with a pre-convention certificate. Thousands of guitars and other musical instruments contain Brazilian rosewood.

• **Other plants:** Several other plant species were moved to Appendix I or II, depending on their status in the wild and the threat posed by trade. Some examples include: the Venus fly-trap (*Dionaea muscipula*) has been added to Appendix II; 7 species of bromeliads in the genus *Tillandsia*, popular as ornamentals, were added to Appendix II; and 36 species of cacti were added to Appendix I (including all those in the genera *Ariocarpus*, *Discocactus*, *Melocactus*, *Uebelmannia* and *Turbinicarpus*). Illegal trade in wild-collected specimens continues to be a problem for many species of cacti; all cacti are listed on either Appendix I or Appendix II.

Proposals Not Adopted

Many proposals were not adopted but generated extensive and often lively debate. Notable examples of such species, whose listing status did not change

but for which the discussion was valuable, include:

• **Bluefin tuna:** Sweden submitted a proposal to list bluefin tuna (*Thunnus thynnus*) in the Western Atlantic on Appendix I and bluefin tuna in the Eastern Atlantic on Appendix II. The Service responded in the March 4, 1992, *Federal Register* that reductions in tuna fishing quotas by the International Commission for the Conservation of Atlantic Tunas (ICCAT) would speed the bluefin's recovery. The Service also noted that ICCAT has pledged to improve its documentation of trade. Accordingly, the U.S. opposed adding the bluefin tuna to the CITES Appendices. After extensive negotiations, Sweden withdrew its proposal.

• **African elephant:** All African elephant (*Loxodonta africana*) populations were placed on Appendix I at the previous CITES meeting in Switzerland in 1989 (COP7; see *Bulletin* Vol. XV, No. 5) due to the threat posed by poaching for the uncontrolled international ivory trade. Botswana, Malawi, Namibia, South Africa, and Zimbabwe submitted proposals at COP8 to transfer their elephant populations back to Appendix II,

based on several criteria established at COP7. Discussion on these proposals was animated and extensive. In the face of overwhelming opposition, the proposals were withdrawn. All African elephant populations remain on Appendix I, but all of the proponent countries have taken reservations on the listing. Under CITES rules, they can trade commercially in elephant parts and products only with other countries having reservations (there are none outside of Africa) or with non-CITES countries.

* * *

COP8 involved more individuals, countries, and non-governmental observers than any previous conferences, and involved deliberations on more resolutions and proposals than ever before. This is a testament to the increasing international attention to biodiversity, conservation, endangered species, and the international wildlife trade.

The U.S. has been chosen to host the ninth meeting of the CITES Conference of the Parties (COP9), which will take place at a yet undecided location in late 1994. As the opening sentence of the CITES treaty states, "...wild fauna and flora in their many beautiful and varied forms are an irreplaceable part of the natural systems of the earth which must be protected for this and the generations to come." The Fish and Wildlife Service is committed to bringing the international conservation community together here in the United States to rededicate it to this important goal.

Dr. Lieberman is the CITES Policy Specialist for the Office of Management Authority, U.S. Fish and Wildlife Service, Washington, D.C.

Puerto Rican Parrots

(continued from page 1)

wild and produced 20 eggs, 10 of which hatched. Of the 10 nestlings, 2 were poorly developed and died. All but one of the eight surviving nestlings fledged successfully in 1991. The one unsuccessful fledging occurred at a PVC nest; after falling from the nest twice in premature fledging attempts, the nestling was placed in the FWS aviary at Luquillo. Production of seven fledged parrots in 1991, however, was above the average for fledging prior to the hurricane. From 1987 through 1989, an average of five parrots fledged in the wild each year.

In 1992, 6 pairs of parrots in the wild produced 18 eggs. The 15 eggs that hatched and the 10 nestlings that fledged were records. The average number of wild parrots fledged in 1991 and 1992 was 8.5, about 33 percent more than the average 1975-1989 fledging rate.

Expansion of the parrot's breeding range also occurred after Hurricane Hugo. For the first time in recent record, a nest was found in the lower transitional forest of the Luquillo Mountains. All previously recorded parrot nest sites had been in the palo colorado (*Cyrilla racemiflora*) life zone, a forest of higher elevation². Moreover, also for the first time in recent record, a natural cavity nest was discovered in a large tabonuco tree (*Dacryodes excelsa*). The tabonuco tree was once an abundant, dominant overstory tree of lower Cordillera and moist limestone forests of northern Puerto Rico.

Possible Benefits of Habitat Disturbance

Why did these increases occur during the past two nesting seasons? A decline in parrot reproduction would be expected in years following a major hurricane. Such storms, however, may have positive long-range effects on the rain forest. The forests of the Caribbean have evolved with hurricanes, and their habitat characteristics have been shaped in part by the disturbances resulting from violent storms every 25 to 50 years.

In the Luquillo Mountains, most of the rain forests where the Puerto Rican parrot currently nests and forages have been rela-

tively undisturbed for 50 years. But this mountainous habitat may not be best for the parrots. Soil fertility is low on the steep mountain slopes, and the area is probably too wet for good parrot nesting. The rich coastal plain forests, destroyed by agriculture earlier this century, may have been better nesting habitat.

Older, undisturbed forests, such as those that provide the last refuge for the Puerto Rican parrot, are not highly productive. Ecologically, these forests are approaching a maintenance stage—less energy is put into reproduction and growth than is put into maintenance of the plants. Consequently, fruit, seeds, and buds, which are necessary food resources for the parrots, may not be abundant throughout the year. When forests are disturbed by storms, however, more energy flows into reproduction and growth. Hurricane Hugo may have stimulated such activity in the parrot's current forest habitat. Thus, increases in clutch sizes and numbers of nests may result from the parrots' feeding on new growth that is high in the nutrients necessary for breeding—new growth stimulated by the hurricane's disturbance. Another possible reason for the increase in parrot productivity is that the hurricane forced parrots to disperse into the lowlands in search of food, which ultimately may have led them to discover new nesting sites.

Important Management Efforts

Because of its seriously reduced numbers and range, intensive management of the Puerto Rican parrot is necessary to prevent its extinction. Since 1968, biologists have worked cooperatively to solve problems at nesting sites. Predation on nestlings or adult parrots by rats, raptors, and snakes; nest parasitism by pearly-eyed thrashers (*Margarops fuscatus*); and parasitism of parrot nestlings by warble flies and soldier flies have been monitored and reduced. In cooperation with the National Audubon Society, the FWS initiated a nest guarding program to monitor breeding pair behavior, chick development, and nest cavity conditions. (See *Bulletin* Vol. XII, No. 7.) The program also fostered and transferred chicks as a means of increasing productivity. In addition, FS personnel, in cooperation with

FWS biologists, expanded their management efforts by creating nesting cavities at locations adjacent to traditional nesting areas. Although these measures increased productivity, recovery has still been slow. Before Hurricane Hugo, the wild population was increasing by only slightly more than two birds per year.

Captive Propagation

Another tool in the parrot's recovery has been the establishment of a captive breeding flock at the FWS Luquillo Aviary in the rain forest. The captive flock suffered no losses during the hurricane. Although facilities were severely damaged, production the year following the hurricane was normal; 37 eggs were produced and 5 young fledged. In 1992, 38 eggs were produced and 2 hatched. One of the 1992 hatchlings was taken from the aviary and successfully fledged in the wild, the first such event since the mid-1980's. Unfortunately, the other 1992 hatchling died.

* * *

Management and research will continue to improve the situation for the Puerto Rican parrot. However, on densely populated islands such as Puerto Rico, the key to the survival of an endangered species may be in its ability to adapt to human-dominated habitats (e.g., suburban habitat or second-growth forests). Restoration of other birds, such as the peregrine falcon (*Falco peregrinus*), has been successful in habitats modified by people. Indications are that this may also be the case for parrots.

J.M. Meyers and W.C. Barrow, Jr., are with the FWS Patuxent Wildlife Research Center, Puerto Rico Research Group, P.O. Box N, Palmer, PR 00721. F.J. Vilella is with the FWS Puerto Rican Parrot Field Office, P.O. Box 488, Palmer, PR 00721.

¹ Rodriguez-Vidal, J.A. 1959. Puerto Rican parrot study. Monograph. Department of Agriculture, Commonwealth of Puerto Rico. No. 1.

² Snyder, N.F.R., Wiley, J.W., and Kepler, C.B. 1987. The parrots of Luquillo: Natural history and conservation of the Puerto Rican parrot. Western Foundation of Vertebrate Zoology. Los Angeles, California. 384 pp.

Regional News

(continued from page 2)

On January 14, 6 captive-bred birds from the FWS Patuxent Wildlife Research Center in Laurel, Maryland, joined the first 6 in the holding facility. They were followed by two more from the ICF the next day. The eight males and six females socialized quickly as a compatible flock. Released to the wild on February 10, they soon began flying to and from the pen and gradually expanding their use area. Some birds roosted at night in a neighboring wetland.

A radio-telemetry device led biologists to the first dead crane on February 17. The three other birds were found between February 18 and 23. Because some mortality is still expected, the remaining members of the flock—6 males and 4 females—will be radio-tracked for about 2 years. If they adjust well to their new environment, more cranes will be released annually to help ensure the survival of the species by maintaining the group as a separate entity from the 136 birds that migrate between Aransas National Wildlife Refuge on the Texas coast and Wood Buffalo National Park in northern Canada—the world's only self-sustaining, wild population of whooping cranes. The Florida release was part of a joint recovery effort among FWS Regions 2, 4, and 8; the Florida Game and Freshwater Fish Commission; and the Canadian Wildlife Service.

* * *

In September 1992, Region 2 completed recovery plans for the golden-cheeked warbler (*Dendroica chrysoparia*), Hinckley's oak (*Quercus hinckleyi*), large-fruited sand-verbena (*Abronia macrocarpa*), Pecos bluntnose shiner (*Notropis sinuatus pecosensis*), and Sonora chub (*Gila ditaenia*):

A migratory species, the golden-cheeked warbler faces danger throughout its range, from the United States to Central America. The continuing loss of nesting habitat in central Texas is a major threat to the survival of this bird. Recovery will be achieved when the following criteria have been met for 10 consecutive years: enough breeding habitat has been protected to ensure the survival of at least

one viable, self-sustaining population in each of eight areas outlined in the recovery plan, there is potential for gene flow among demographically self-sustaining populations, enough sustainable habitat exists away from nesting grounds to support breeding populations, and all golden-cheeked warbler populations on public lands are protected and managed.

Recovery efforts will require researching the golden-cheeked warbler's ecology and assessing threats to its breeding, wintering, and migratory habitats. Sharing information and providing technical assistance to land owners and managers is essential if scarce habitat is to be preserved and enhanced. These actions complement ongoing initiatives, such as the 1992 establishment of the Balcones Canyonlands National Wildlife Refuge in central Texas and efforts to develop a Balcones Canyonlands Conservation Plan in the Austin, Texas, area. (See *Bulletin*, Vol. XVI, No. 1 and No. 3, and Vol. XV, No. 1.)

* * *

Hinckley's oak is a rare evergreen tree endemic to west Texas, where it grows on dry limestone slopes in the Chihuahuan desert. The decline of the species coincides with changing climatic conditions during the past 10,000 years. Its current distribution is believed to be fragmented among 10 locations, most of which are less than 5 acres (2 ha) in size and contain fewer than 100 trees. Low population numbers, wildlife and insect predation, disease, possible hybridization with other oak species, apparent poor regeneration from seed, and human impacts (such as collecting and road-widening) appear to be the major threats to Hinckley's oak in the wild.

Recommended recovery tasks include protecting existing populations, establishing a reserve seed bank, propagating trees in cultivation, conducting studies to establish management needs, searching for populations not yet discovered, and developing plans for reintroduction. (See *Bulletin*, Vol. XII, No. 10 and Vol. XIII, Nos. 9-10.) Projections are that establishing a minimum of 20 populations totalling 10,000 or more trees will be needed in at least 4 distinct geographical

areas in southwestern Texas. Delisting criteria will be refined as more information is assembled.

* * *

The large-fruited sand-verbena is known to occur at only 3 sites in east-central Texas, where fewer than 3,000 individuals are known to survive. This plant grows in deep sandy soils within openings and disturbed areas of post oak woodlands. Housing development, habitat modification from small-scale clearing, fire suppression, the introduction of non-native plants, and recreational activities (such as horseback riding and off-road vehicle driving) threaten the species' survival.

The large-fruited sand-verbena will be considered recovered when at least 20 demographically stable, genetically viable populations—each comprised of at least 600 plants and covering at least 25 acres (10 ha)—have flourished for 10 years or more. Actions required to achieve recovery objectives for the verbena are similar to those needed for Hinckley's oak. (See *Bulletin*, Vol. XI, No. 6; Vol. XII, No. 7; and Vol. XIII, No. 9.)

* * *

The Pecos bluntnose shiner occurs only in permanently flowing waters of the Pecos River. Historically, this fish occurred throughout the Pecos River system in New Mexico and Texas, but it has decreased drastically in abundance and range, and is now restricted to two short segments of the Pecos River in New Mexico. Loss of permanent stream flows and habitat degradation of river reaches that have permanent flows are the primary threats to this fish. Predation by, and competition with, non-native introduced fishes are also threats.

Maintaining viable populations of the Pecos bluntnose shiner throughout the 100-mile (160-kilometer) reach of the Pecos River where the fish still occurs is essential to recovery. Impoundments and dam operations at several locations in the Pecos River contribute to this species' decline. Recognizing a need to improve the riverine habitat, the Carlsbad Irrigation District, New Mexico Department of

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Regional News

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Game and Fish, U.S. Bureau of Reclamation, and FWS have agreed to cooperatively study and manage Pecos River resources. A 5-year management plan is now in place to guide the effort. Study objectives are to identify the dynamics and interrelationships of the fish community, riverine habitat, flows, and reservoir operations.

* * *

The Sonora chub is endemic to streams of the Rio de la Concepción drainage of Sonora in Mexico and Arizona in the U.S. This fish inhabits intermittent streams where it occurs in pools near cliffs, boulders, or other cover in the stream channel. Because of its severely limited habitat, the Sonora chub is vulnerable to all activities that threaten the stream or watershed. Impoundments and exploited watersheds threaten this species, along with the introduction of non-native fishes and the pathogens and parasites they may carry.

The recovery plan calls for protecting the Sonora chub in all areas, monitoring occupied habitats, removing non-native fish, and preventing degradation of the remaining habitats. Cooperation by Federal, State, and private interests in the U.S. and Mexico will be required if this species is to survive in the wild.

* * *

In cooperation with the Texas Water Commission, Texas Parks and Wildlife Department, and Utah State University, the FWS has initiated the "Habitat and Flow Requirements Study for the Comal Springs Ecosystem" as part of recovery implementation for listed species of the San Marcos and Comal Springs River systems in central Texas. From November 30 through December 11, 1992, the first round of biological analyses took place, marking the beginning of detailed field work that will continue through each of the four seasons. The purpose of the study is to identify optimum flow levels to maintain the ecosystem, which supports such protected species as Texas wild rice (*Zizania texana*) and the fountain

darter (*Etheostoma fonticola*), along with species of concern, including the Barton Springs salamander (*Eurycea* sp.).

* * *

Region 3 — In Michigan, progress continues toward recovering the Sturgeon River population of the lake sturgeon (*Acipenser fulvescens*), a category 2 listing candidate, and restoring its spawning habitat below the Prickett hydroelectric facility. Gains to date have resulted from cooperation by the Upper Peninsula Power Company in converting to a run-of-the-river flow regime consistent with recommendations by the Michigan Department of Natural Resources; Keweenaw Bay Indian Community; U.S. Forest Service; FWS Ecological Services Field Office in East Lansing, Michigan; and other interested parties.

Michigan Technological University has carefully monitored recovery progress over the past 6 years, noting an increase in the number of adult lake sturgeon, higher numbers of egg-bearing females, a reduction in the duration of spawning (reducing vulnerability to predators and stranding), and increased returns of large spawners. Egg and juvenile survival may also have improved. The improved viability of this unique lake sturgeon population should aid our understanding of important early life history and juvenile habitat requirements, which are now largely unknown. Additionally, the information can be used in formulating Federal and State regulations to conserve lake sturgeon habitat.

* * *

Staff from the FWS East Lansing Field Office also attended a meeting with The Nature Conservancy, Huron-Manistee National Forest, and Michigan State University researchers to discuss plans for 1993 field research on the Endangered Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*). Research will continue on the Huron-Manistee National Forest to identify the butterfly's habitat needs and determine appropriate management. The East Lansing Office also plans work on three forest management areas in 1993 in cooperation with The Nature Conservancy, and will conduct

research at the Allegan State Game Area on habitat delineation and effects of *Bacillus thuringiensis*, a bacterium used to control the gypsy moth.

* * *

Along with the Indiana Department of Natural Resources' Divisions of Law Enforcement and Oil and Gas, Scott Sobiech and Dan Sparks of the FWS Bloomington, Indiana, Field Office recently took part in an investigation of waste sludge pits associated with small oil drilling operations in southwestern Indiana. Although Indiana is not a major oil producing State, small operators have been extracting oil, largely unregulated, for over 40 years. The investigators expected to find birds in the pits but were not prepared for what they discovered — 80 carcasses of bats and birds in only 5 pits. The carcasses have been sent to the FWS National Forensics Laboratory for identification.

FWS personnel will continue to investigate oil pits this spring to gather enough documentation to require fencing and netting at all surface impoundments associated with oil well production, including temporary brine storage lagoons allowed under the Environmental Protection Agency's Underground Injection Control Program. Because at least two Endangered species, the Indiana bat (*Myotis sodalis*) and the gray bat (*Myotis grisescens*), are present in the region, Endangered Species Act violations may be occurring at these surface impoundments.

* * *

Region 4 - In Mississippi, biologists from the State's Natural Science Museum have discovered a population of the Endangered fat pocketbook mussel (*Potamilus capax*) in a side channel of the Mississippi River, more than 400 miles (640 km) downstream from the nearest known population in the St. Francis River in Arkansas. The FWS Jackson Field Office confirmed three dead shells as fat pocketbook specimens.

The Mississippi River soft substrate where the fat pocketbook mussels were discovered is abundant in the St. Francis

(continued on next page)

Regional News

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River, where they are the dominant mussel species. During the low water periods of 1993, FWS biologists will sample the Mississippi River for additional populations.

* * *

In conducting a 55-site survey of the Ouachita Mountain area in Oklahoma and Arkansas, the Arkansas Natural Heritage Commission discovered the Endangered harperella (*Ptilimnium nodosum*), a plant in the parsley family, in two additional Arkansas counties, extending its range to Montgomery and Polk Counties from the locations known in 1990 in Scott and Yell Counties.

Harperella is typically associated with mountain streams, where it occurs singly or in large clumps directly in the channel or in adjacent overflow channels and pools. In the Ouachita Mountains, researchers found harperella at 10 sites in 5 separate watercourses. Population sizes ranged from several hundred to more than 5,000 plants. All appeared to be stable, and no immediate or direct threats were identified.

With the exception of one population in the Fouché LaFave River basin, all populations were found in the Ouachita River watershed. Most of the plants in this area are afforded a measure of protection by their location on the Ouachita National Forest. However, any bridge construction or stream channel work near these plants should include protective measures.

Additional field searches are needed in Arkansas and Oklahoma to fully define the range of the species. Harperella also occurs in Alabama, Georgia, South Carolina, North Carolina, West Virginia, and Maryland.

* * *

Survey efforts in Louisiana by the Natural Heritage Program yielded only one confirmed population of *Oenothera pilosella* ssp. *sessilis*, a candidate plant. Historically, this species of evening-primrose was known from prairie remnants in Texas, Arkansas, and Louisiana, many of

which have been converted to agricultural use. The subspecies appears to be rare. It has not been found in Texas since the late 1800's. Only about 6 populations are reported from Arkansas and, despite an extensive survey by the Heritage Program, only one population was determined to be the subspecies *sessilis*.

Specimens collected during the Heritage Program survey often displayed overlapping morphological characteristics between two subspecies, ssp. *pilosella* and ssp. *sessilis*. Similar observations also have been reported for several Arkansas specimens. The taxonomic status of the *sessilis* subspecies as a distinct entity needs to be investigated before its eligibility for listing is assessed further.

* * *

Predation on nestlings and first-year birds appears to be the most immediate threat to the recovery of the Endangered Mississippi sandhill crane (*Grus canadensis pulla*), according to participants at a population and habitat viability analysis workshop held in Pascagoula, Mississippi, last fall. The workshop, which combined the knowledge and experience of 18 biologists involved in crane management and research, examined problems thwarting recovery and recommended management options.

Using computer models, biologists calculated population levels needed for the long-term viability of the species and determined whether additional habitat for feeding and nesting is necessary. Four working groups studied questions of habitat quantity and quality, life history parameters, health and disease, and captive propagation by analyzing current data from wild and captive crane flocks.

The workshop was cosponsored by the FWS Jackson Field Office and the Mississippi Sandhill Crane National Wildlife Refuge, in conjunction with Dr. Ulysses Seal of the IUCN Captive Breeding Specialist Group. Dr. Seal is known internationally for his expertise in small population biology. He has conducted workshops on population and habitat viability analysis for dozens of wildlife species worldwide, from butterflies to birds, reptiles to amphibians, and lemurs to rhinos.

* * *

Region 5 - A one-day seminar on the Endangered Species Act has helped the New England Field Office (NEFO) enhance its coordination with the Region 1 Office of the Environmental Protection Agency (EPA) regarding program responsibilities. In early December, FWS Region 5 and NEFO staff conducted section 7 training for about 60 EPA staff, including representatives from all branches. Since then, EPA permit and project leaders have consulted informally on a variety of National Pollution Discharge Elimination System permits and Superfund site assessments.

An important informal consultation is taking place regarding EPA's authority to regulate dioxin discharges from Kraft process (a chlorine and chlorine derivative bleaching process) pulp and paper mills in northern New England. Bald eagles (*Haliaeetus leucocephalus*) nest or winter along most of the affected waters. Two of the rivers, the Androscoggin in New Hampshire and Penobscot in Maine, also have human health advisories because of unacceptably high levels of dioxin in fish tissues.

The NEFO is evaluating whether further discharges of dioxin into these waters may adversely affect the bald eagle. In the northwest, the FWS Region 1 Office is also conducting a formal consultation with EPA's Region 10 Office regarding dioxin and bald eagles in the Columbia River. The NEFO is coordinating closely with the FWS Portland, Oregon, Field Office on this potentially controversial issue.

* * *

The NEFO is continuing efforts to protect wintering bald eagle habitat along the Merrimack River in New Hampshire. Three large highway projects—the Nashua-Hudson Circumferential, I-293 Widening, and South Manchester Airport Access—threaten this riparian corridor. As a result of FWS involvement, the Army Corps of Engineers is preparing a biological assessment for the Nashua-Hudson project, and the Federal Highway Administration has funded a wintering eagle habitat utilization study for the other two projects.

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* * *

Estimated numbers of Endangered roseate terns (*Sterna dougallii dougallii*) nesting in the Northeast were not at all "rosy" in 1992, slipping some 20 percent to 2,898 pairs from 3,603 pairs in 1991. These numbers, the lowest in 15 years, were mirrored throughout the region, with Great Gull Island, New York, reporting a drop to 1,050 pairs from 1,300 in 1991, and Massachusetts numbers declining to 1,412 pairs from 1,776 the year before. Despite an intensive search, Maine colonies were down 4 percent to 122 pairs from 127.

Researchers do not know whether reduced counts at breeding colonies reflect an actual drop in the roseate tern population or merely a reduction in the number of pairs that nested in 1992. As in recent years, more than 85 percent of the entire northeastern roseate tern breeding population occurs on just three islands, Bird Island (Massachusetts), Faulkner Island (Connecticut), and Great Gull Island (New York). (See *Bulletin*, Vol. XVI, Nos. 9-12; Vol. XII, Nos. 11-12; and Vol. XI, No. 12.)

* * *

On a more encouraging note, for the first time in 20 years, nesting common terns (*Sterna hirundo*) and least terns (*Sterna anillarum*) returned to Ram Island in Buzzards Bay, Massachusetts, responding to an effort by the FWS and the Massachusetts Division of Fish and Wildlife to reclaim the area for terns. Gull management, under way since 1990, will continue on the island, with the goal of fully restoring this historically important colony for common terns and roseate terns.

* * *

The final revised recovery plan for the small whorled pogonia (*Isotria medeoloides*) is available. This rare orchid species is widely distributed, with 86 known sites in 15 States and Canada, but populations continue to be lost as habitat is degraded, developed, and otherwise threatened. Recovery activity has gener-

ated new information about life history, distribution, and populations, and some level of habitat protection has been achieved for approximately 47 percent of the sites. Contact Susi von Oettingen at NEFO (603/225-1411) for more information. (See *Bulletin*, Vol. XVI, Nos. 7-8; and Vol. XI, No. 12.)

* * *

The FWS Chesapeake Bay Field Office (CBFO) presented a rare insects exhibit that was received enthusiastically at the national meeting of the Entomological Society of America, an event that attracted more than 2,500 registered participants to Baltimore, Maryland, from December 6 to 9, 1992. A key part of the display was a poster entitled "The Endangered Species Act: Protection of Rare Insects." Featuring all federally listed and proposed insect species throughout the U.S., the poster outlines protection and recovery activities. Many entomologists said they had been unfamiliar with FWS insect conservation efforts or had harbored misconceptions about them. They also made significant comments on the compilation of insect listing candidates or indicated they would do so. For more information, contact Judy Jacobs, CBFO, at 410/269-5448.

On February 24, FWS Region 5 and the Entomological Society of America co-sponsored a "Candidate Insect Assessment" workshop, in conjunction with the Society's Eastern Branch meeting in Williamsburg, Virginia. The purpose of the workshop, which was attended by professional entomologists as well as FWS and Natural Heritage Program biologists from the Northeast Region and North Carolina, was to assemble information on the more than 60 insects in Region 5 that are candidates for protection under the Endangered Species Act. The workshop was fruitful in prioritizing insect groups most in need of further status survey work.

* * *

Region 6 — The recovery program for the pallid sturgeon (*Scaphirhynchus albus*) is getting into full swing with a variety of research, survey, and captive propagation projects. In the spring of 1992, pallid

sturgeons were hatched for the first time in captivity at Missouri's Blind Pony State Hatchery, a unit of the Missouri Department of Conservation. Survival of fry exceeded expectations, and approximately 20,000 pallid sturgeon fingerlings are being kept at the hatchery. The Blind Pony State Hatchery and the Gavins Point Hatchery in South Dakota are gearing up for additional attempts at spawning the fish. These activities will increase our knowledge of successful spawning techniques and rearing requirements for developing future broodstock. No reintroductions will be proposed for this species until more information is available on the sturgeon's genetics.

Crews from the Louisiana Department of Wildlife and Fisheries captured a juvenile pallid sturgeon in the Mississippi River at its confluence with the Atchafalaya River. This is the youngest pallid sturgeon recorded in several decades and the first documentation that the species is reproducing in the wild. Because of the juvenile's size, it is believed to have spawned close by, and is evidence that some spawning still occurs in Louisiana. The juvenile sturgeon was captured along with 11 adult pallid sturgeons at the same location where 9 were captured by a commercial fisherman in 1991. The good news about the pallid sturgeon is tempered, however, by continuing concern about apparent frequent hybridization between the shovelnose sturgeon and the pallid sturgeon on the Mississippi River.

Genetics studies to guide propagation and reintroduction programs are under way. The Montana Department of Fish, Wildlife and Parks, through contract with the Army Corps of Engineers, is radio tracking pallid sturgeons in the Yellowstone and Missouri Rivers. One tagged fish was tracked over approximately 65 river miles (105 km).

* * *

Interim guidelines have been established to guide surveys for the Ute ladies'-tresses (*Spiranthes diluvialis*). This Threatened orchid occurs in seasonally moist soils and wet meadows near

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Regional News

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springs, lakes, and perennial streams and their associated floodplains below 6,500 feet (1,980 meters) in parts of Utah, Colorado, and Nevada. Because this orchid flowers for only a short time and may not flower every year, conducting effective surveys is difficult. Further, the species is so rare that little is known about its habitat requirements and population ecology. The interim guidelines were de-

veloped to streamline and standardize surveys for proposed projects that may have an impact on wetlands and floodplains where the species could occur.

* * *

Status surveys on two prairie butterfly species, the Dakota skipper (*Hesperia dacotae*) and the powesheik skipper (*Oarisma powesheik*), have been completed. The Dakota skipper inhabits undisturbed or lightly disturbed native tall grass and midgrass prairie; the powesheik skipper inhabits wetland communities,

such as meadows and fens, within native grasslands. These species probably were once widely distributed from Manitoba, Canada, southward to South Dakota and Illinois, but now they occur only in scattered, isolated locations.

The biggest threat to both species is the conversion of native grasslands to other uses. Additional threats are pesticide spraying, grazing, and invasions by exotic plant species. The powesheik skipper is also threatened by alteration of wetlands within native grassland habitats.

Final listing rules for six species were published by the Fish and Wildlife Service in December 1992. Endangered Species Act protection now applies to the following:

Karner Blue Butterfly (*Lycaeides melissa samuelis*)

The Karner blue butterfly once occurred within a rather narrow band extending from eastern Minnesota across portions of Wisconsin, Illinois, Indiana, Michigan, Ohio, Canada (Ontario), Pennsylvania, New York, Massachusetts, and New Hampshire. This small subspecies depends on the occurrence of wild lupine (*Lupinus perennis*), a wildflower in the pea family that is the only known food plant for the butterfly's larval stage. Over the past 100 years, silviculture, ur-

banization, and suppression of the wildfires needed to maintain the butterfly's open habitat have eliminated the Karner blue from about 99 percent of its historical range. On December 14, 1992, the Service listed the Karner blue butterfly as Endangered.

Five Idaho Snails

Five species of aquatic snails found in the middle Snake River in south-central Idaho also were given Endangered Species Act protection. The December 14 *Federal Register* notice listed four of these mollusks as Endangered:

- Idaho springsnail (*Pyrgulopsis idahoensis*)
- Snake River Physa snail (*Physa natricina*)

- Utah valvata snail (*Valvata utahensis*)
- Banbury Springs limpet (*Lanx* sp.).

One other snail, found to be vulnerable but not in imminent danger of extinction, was listed under the less critical classification of Threatened:

- Bliss Rapids snail — an undescribed species in the family Hydrobiidae.

Although the Banbury Springs limpet is not known to have declined significantly, its limited distribution of only three sites makes this snail vulnerable. The other four taxa now exist in only a small fraction of their historical range. Their clean, cold, free-flowing aquatic habitat has been reduced by hydroelectric development, water withdrawals, drought, and pollution from sewage effluents and agricultural runoff.

Lab Identifies Wolves

(continued from page 3)

and large size is typical of wolves found in southern Manitoba," according to biologist Dan Licht of the FWS Bismarck, North Dakota, Field Office. Again, the lab used DNA testing, supplemented by a variety of skull measurements, for its determination.

Ten wolves have been killed in North Dakota since 1981, including 5 in the past 2 years, and all have been about 2 years old. "That's a typical age for a wolf to leave the pack and attempt to establish

a new territory," said Licht. Biologists believe that residents of the Dakotas may occasionally see a wolf that has left its pack in Manitoba or Minnesota. The gray wolf historically ranged throughout North and South Dakota.

FWS law enforcement officials are investigating the circumstances of the North Dakota shooting. The penalties authorized under the Endangered Species Act for killing a listed animal without a permit are serious — up to a year in jail and/or a \$100,000 fine. Fortunately, most people support the protection of wolves that do not harm livestock. "The

positive response I've witnessed from North Dakotans toward wolves has been amazing," Licht noted.

Anyone seeing a wolf in the western United States is encouraged to contact the nearest State or Federal wildlife agency office.

Natural Areas Conference

This year, the 20th Natural Areas Conference will be held June 22-25 at the University of Maine. Its theme is "Conservation in the Working Landscapes," and it will include invited and contributed papers on the following symposia topics: Conservation in Marine Ecosystems, Conserving Rare and Endangered Species and Natural Communities in Working Landscapes, Biological Diversity in Working Landscapes, and Inventorying and Monitoring Natural Areas in Working Landscapes. A number of field workshops organized around the symposia will be available for participants.

This conference, underwritten in part by the Fish and Wildlife Service, Bureau of Land Management, Forest Service, National Park Service, Environmental Protection Agency, and National Oceanic and Atmospheric Administration, will offer participants the opportunity to explore a multitude of working landscapes in the United States and around the world through the presentation of over 150 papers, workshops, roundtable discussions, and posters. For more information, write Hank Tyler, Conference Coordinator, Maine State Planning Office, Station 38, Augusta, Maine 04333, or call 207/624-6041.

BOX SCORE LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	249	9	22	336	33
Birds	73	153	16	0	242	72
Reptiles	16	64	18	14	112	25
Amphibians	6	8	5	0	19	9
Fishes	55	11	37	0	103	57
Snails	12	1	7	0	20	8
Clams	50	2	5	0	57	39
Crustaceans	9	0	2	0	11	4
Insects	15	4	9	0	28	14
Arachnids	3	0	0	0	3	0
Plants	299	1	73	2	375	153
TOTAL	594	493	181	38	1306*	414**
Total U.S. Endangered	594		(295 animals, 299 plants)			
Total U.S. Threatened	181		(108 animals, 73 plants)			
Total U.S. Listed	775		(403 animals, 372 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, chimpanzee, 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.

** There are 334 approved recovery plans. Some recovery plans cover more than one species, 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: 53 fish & wildlife
39 plants

Number of CITES Party Nations: 117

April 2, 1993

January-February 1993

Vol. XVIII No. 1

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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ENDANGERED SPECIES

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Technical BulletinCLEMSON LIBRARY U.S. Department of the Interior
Fish and Wildlife Service**Navy is Enlisted in Plan to Protect Manatees**

by Robert Turner and Cheryl Buckingham



photo by Pat Hagan

On the morning of May 7, 1990, a tugboat at the Naval Submarine Base (SUBBASE) at Kings Bay, Georgia, struck something that nearly stopped one of its 4,000-horsepower engines. Blood and animal tissue filled the water. Within hours, Robert O. Turner, Manatee Coordinator for the U.S. Fish and Wildlife Service (FWS), received the report: a West Indian manatee (*Trichechus manatus*) might have been struck by a C-tractor tug, a 105-foot (32-meter) long boat designed to maneuver Navy submarines in the harbor. Bob Turner immediately contacted the manatee research group, the Sirenia Project, at the

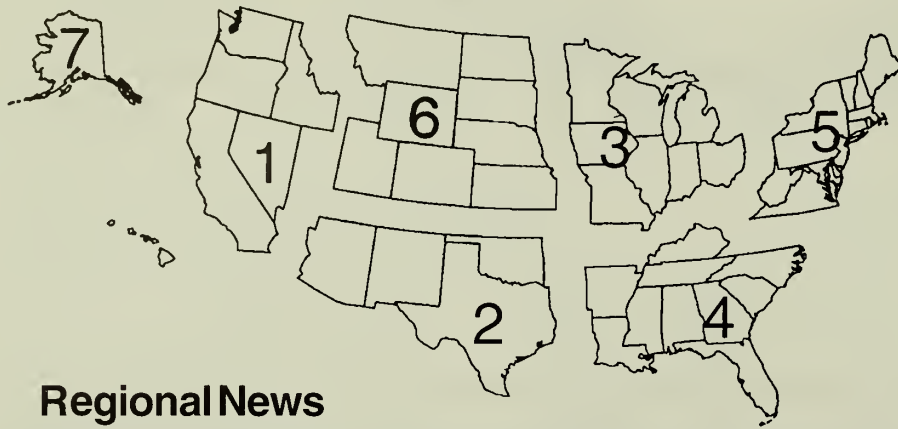
Gainesville, Florida, Field Station of the FWS National Ecology Research Center. The response to the incident touched off a series of events that has led to a new era in FWS/Navy cooperation for protection of this Endangered mammal.

The preceeding July, in Kings Bay, Sirenia Project biologists Barbara Zoodsma and Jim Reid had fitted a large adult manatee, Mary, with a tether and a floating radio transmitter. Using radio receivers mounted on trucks and boats, the biologists tracked Mary's movements for the next several weeks in Kings Bay and nearby creeks. A satellite also monitored the manatee's locations in the area

and her mid-August migration south to Brevard County, Florida, for the winter. When Mary returned to Kings Bay in the spring of 1990, her activities were logged for 46 days until her final location was received on May 7, the same day the C-tractor tug reported striking a manatee.

Three days after the accident, Zoodsma and Reid searched the area with a hydrophone and sonic receiver. They began receiving signals from the sonic beacon used to locate radio tags like Mary's at close range. Soon after the biologists detected the beacon, SUBBASE security staff discovered two parts of a

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Regional News

Regional endangered species staffers have provided the following news:

Region 1 - News from the California condor (*Gymnogyps californianus*) recovery

program has been mixed this spring. Following collisions with power lines, two of the giant vultures that were produced by the captive breeding flocks and

released into the wild have died in recent months. Both were about one year old. A male was electrocuted May 28 by a 17,000-volt power line south of the Sespe Condor Sanctuary in the mountainous Los Padres National Forest. The other condor, a female, was found dead June 12 near power lines along Highway 126 east of Fillmore; the cause of death was physical trauma, including internal injuries. These birds bring to three the number of California condors killed in conjunction with the program to reintroduce this Endangered species into the wild. The third fatality was a 15-month-old male that died in October 1992 after ingesting anti-freeze leaked from a vehicle.

The good news for the condor is that Southern California Edison has instituted measures to lessen the threat from powerlines. Among these measures are anti-perching devices, placement of lines, and configuration of poles. Fish and Wildlife Service staff termed the power company officials "extremely cooperative."

More good news: this year's total of 15 young condors hatched at the 2 captive breeding facilities is an increase from 12 the previous year. The Los Angeles Zoo program produced six chicks, and the San Diego Wild Animal Park produced nine (a record for that facility). In December 1993, the Service plans to release another five to seven young birds into the wild. In addition, a third captive-breeding project will begin when 10 to 12 condors are transferred to the Peregrine Fund's World Center for Birds of Prey in Boise, Idaho. The Center is now constructing a facility large enough to accommodate 10 condor pairs.

The California condor population now stands at 76, including 5 in the wild. This species was brought to the verge of extinction by loss of habitat, shooting, toxins, and accidents with man-made objects such as power lines. In 1987, only 27 condors remained.

* * *

Region 4 — The Alabama Natural Heritage Program has completed a pre-

(continued on page 6)

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

Acting Director
Richard N. Smith
(202-208-4717)

Michael J. Spear,
Assistant Director for
Ecological Services
(202-208-4646)

Jamie Rappaport Clark, Chief,
Division of Endangered Species
(703-358-2171)

Marshall P. Jones, Chief,
Office of Management Authority
(703-358-2093)

John J. Doggett, Chief,
Division of Law Enforcement
(703-358-1949)

TECHNICAL BULLETIN

Editor, Michael Bender
Assistant Editor, Dianne Taylor
Additional Editorial, Ann Haas
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S. 11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Steve Chambers, *Acting Endangered Species Specialist*.

U.S. Fish and Wildlife Service Regions

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Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; Craig Johnson, *Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *Assistant Regional Director*; David Flemming, *Endangered Species Specialist*.

Region 5, 300 Westgate Center Drive, Hadley, MA 01035 (413-253-8659); 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); Ralph O. Morgenweck, *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; John D. Buffington, *Regional Director*; Al Sherk, *Endangered Species Specialist* (703-358-1710).



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Agency Heads Testify on Plans to Protect and Maintain Nation's Biological Diversity

by Dianne Taylor

On April 1, 1993, the U.S. House of Representatives Committee on Merchant Marine and Fisheries held a hearing on conservation of the Nation's biological resources. Witnesses from both the public and private sectors testified, including Secretary of the Interior Bruce Babbitt, Secretary of Agriculture Mike Espy, and Administrator of the Environmental Protection Agency (EPA) Carol Browner. The three agency heads testified on plans for cooperative efforts to conserve biodiversity.

Babbitt Calls for Management of Habitat Systems

Secretary Babbitt began his statement by calling the biodiversity of the Nation "one of our greatest blessings." He spoke of proper stewardship of biodiversity as one of the major challenges facing our society, and called for the Federal government to develop a first-class scientific capability to promote creative problem solving and cooperation among Federal agencies, other governmental units, and the private sector.

Describing biodiversity as a "function of habitat," Secretary Babbitt said that "in a world in which the impacts of human activities are omnipresent, maintenance of biodiversity will require the careful management of habitat systems in the context of ongoing human use, including use of the biodiversity resources themselves." He said that, although it is right to deal with crises involving individual species, we should not manage lands and resources in ways that force us to react to an endless series of crises.

Secretary Babbitt also said that innovative approaches to endangered species conservation are being explored, and cited three examples:

- the proposed special rule that would rely on State and local government habitat conservation planning efforts to create

a new model for managing the habitat of the coastal California gnatcatcher (*Poliophtila californica californica*);

- a habitat conservation plan for the desert tortoise (*Gopherus agassizii*) in Clark County, Nevada, being developed jointly by the Bureau of Land Management, local public officials, home builders, private conservation groups, and the Fish and Wildlife Service, that would allow continued urban expansion of Las Vegas; and

- the Balcones Canyonland Habitat Conservation Plan, jointly developed by the City of Austin and Travis County, Texas; State agencies; and numerous development and environmental organizations. This plan will permit sound development in the Austin area while protecting numerous listed and candidate species.

Citing the need for a solid scientific foundation to manage Endangered and Threatened species, as well as to predict and deal with future trouble spots, Secretary Babbitt expressed his desire to establish a new scientific bureau within the Department of the Interior. The new agency, which would be called the National Biological Survey, would conduct inventories and research to provide the scientific information needed for rational resource management. It would analyze problems and develop information without the constraints of agency jurisdiction, enabling more informed and better choices about managing resources cooperatively and creatively.

Another strategy Secretary Babbitt mentioned for moving to a system of sustainable resource management is vigorous compliance with existing Federal laws, such as the National Forest Management Act and the Federal Land Policy and Management Act. These statutes require management on a large part of public lands to sustain both human economic benefit and the continued functioning of

ecological systems. He said other laws, such as the Clean Water Act and the Clean Air Act, contain authorities that could also be applied more aggressively to help conserve native species and natural systems.

Additionally, Secretary Babbitt discussed current opportunities for cooperative planning in areas where urbanization and other development are altering natural habitats. He provided three examples of efforts that "address important living natural resources at an ecosystem level, are based on sound science, and involve broadly shared cooperative efforts":

- The Trinity River Basin Fish and Wildlife Restoration Project, which addresses a number of environmental problems in the Trinity River basin in California, is being carried out cooperatively by five Federal agencies and several other Federal, State, tribal, and local entities. The project's goal is to restore basin species by correcting degraded watershed conditions related to certain logging, mining, and irrigation practices.

- Several Federal, State, and private entities have worked cooperatively since the early 1970's to improve management of native species in the Clinch, Powell, and Holston Rivers of Virginia and Tennessee. The work includes monitoring studies, restoration efforts, research on species management, strategic planning, and public education.

- The Fish and Wildlife Service's Bay/Estuary Program, now established in nine critical coastal watersheds around the country, incorporates all the Service's applicable authorities in collaboration with other Federal, State, and local governments and the private sector. The program addresses high-priority coastal watersheds and ecosystems in a preventative/restorative effort that will reduce risk to species.

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Listing Proposals — January/April 1993

From January through April 1993, 12 species — 10 plants and 2 animals — were proposed by the Fish and Wildlife Service (FWS) for listing as Threatened or Endangered. If these listing actions are approved, Endangered Species Act protection will apply to the following:

Five Hawaiian Plants

In three separate listing proposals, the Service called for protecting a total of five plant species endemic to the Hawaiian Islands. Three of these plants are found only on the tiny island of Nihoa:

- *Pritchardia remota* - a palm in the family Arecaceae with ruffled, fan-shaped leaves; known in the Hawaiian language as loulu.

- *Amaranthus brownii* - an annual herb in the family Amaranthaceae with green, separate male and female flowers.

- *Schiedea verticillata* - a perennial herb in the pink family (Caryophyllaceae).

Nihoa, the eroded remnant of a 7.5 million-year-old shield volcano, measures

only 156 acres (63 hectares) in area and is bordered on 3 sides by sheer sea cliffs. The uninhabited island contains a relatively intact low-elevation dryland ecosystem, and provides habitat for a number of animals and plants that are already listed under the Act or are candidates for listing. Nihoa is part of an archipelago of small islands, atolls, reefs, and shoals northwest of the main Hawaiian Islands that is managed as a national wildlife refuge. Although the island is protected, its

endemic plants are vulnerable because of their limited range and small numbers, competition from an established alien (non-native) plant species, the possibility of other accidental introductions (including rats), and the impacts of unauthorized visitors on Nihoa's fragile environment. Because of these threats, the Service proposed on March 24 to list the three endemic Nihoa plants as Endangered.

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The small island of Nihoa is the remnant of a large, ancient shield volcano.



a grove of *Pritchardia remota*



Amaranthus brownii

Listing Proposals

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Pamakani (*Tetramolopium capillare*) was proposed March 25 for listing as Endangered. This sprawling shrub, a member of the aster family (Asteraceae), is endemic to the island of Maui. Its habitat has undergone extreme alteration since the island was settled. The most serious damage came after 1793, when domestic cattle were introduced. Feral livestock trampled and ate native plants, caused erosion, and promoted the spread of alien plants. Only two populations of *T. capillare*, with a total of 12 individuals, are known to survive, both growing on State land in the southwestern portion of West Maui. Currently, the main threats to the species are its limited distribution, fire, and competition from aggressive, non-native plants.

Mann's bluegrass (*Poa mannii*), a perennial in the family Poaceae with tall, bunched stems, was proposed April 7 for listing as Endangered. This plant is endemic to the island of Kaua'i. Like many of Hawaii's native species, *P. mannii* has been reduced in range and numbers by severe habitat damage and by the effects of accidentally and deliberately introduced plants and animals. Grazing, trampling, and erosion by feral goats have been especially harmful to Mann's bluegrass, as well as other rare and Endangered plants of Kaua'i. These goats are managed as a game species for sport hunting, and their numbers are large enough to cause considerable habitat damage. The four remaining populations of *P. mannii*, which total only about 125 individuals, survive on cliffs and rock faces. Although these sites may be inaccessible to goats, they are vulnerable to invasion by naturalized, non-native plants.

Three Puerto Rican Plants

Three species of evergreen trees native to the Commonwealth of Puerto Rico, one of which also occurs in the Virgin Islands, have been proposed for listing protection:

- ***Auerodendron pauciflorum*** - a small shrub or tree in the buckthorn family

(Rhamnaceae) restricted to privately owned land in the limestone hill area of northwestern Puerto Rico. Only 10 individuals are known, and the species was proposed March 18 for listing as Endangered.

- ***Myrcia paganii*** - a small tree in the myrtle family (Myrtaceae) with leathery leaves and mottled, flaky bark. Only eight individuals have been reported, all on private and Commonwealth lands in the limestone hills of northwestern Puerto Rico. *M. paganii* was proposed January 5 for listing as Endangered.

- ***Calypttranthes thomasiana*** - a shrub or small tree, also in the myrtle family. A population of 10 to 12 individuals is found within U.S. Navy property on the islet of Vieques off Puerto Rico; up to 100 grow within a national park on the island of St. John in the U.S. Virgin Islands; and a small number occur on the island of Virgin Gorda in the British Virgin Islands. This species was proposed January 5 with *M. paganii* for listing as Endangered.

All three of these species have been reduced in range and numbers, making them vulnerable to extinction from further habitat loss. Among the threats facing the remaining populations are the conversion of forests to pastures, recreational development for the tourist industry, urbanization, impacts from feral livestock, and limestone quarrying.

Beach Jacquemontia (*Jacquemontia reclinata*)

This plant, a sprawling, perennial vine with fleshy leaves and brilliant white flowers, is a member of the morning glory family (Convolvulaceae). It is native to barrier islands on the southeastern coast of Florida from Miami north to Palm Beach County, where it grows in openings within coastal strand vegetation and maritime hammocks, typically among sea-grape (*Coccoloba uvifera*) trees.

The vast majority of the species' former habitat has been destroyed by urban development. Small populations remain at 11 sites, 10 of which are public parks or recreation areas. The sole



The brilliant white flowers of the beach jacquemontia have a nearly circular corolla with fold-marks forming a five-pointed star.

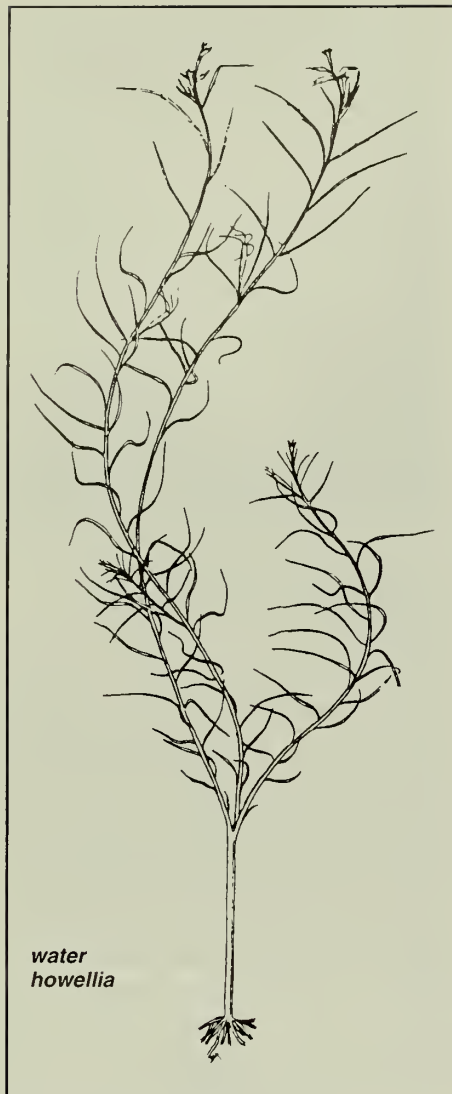
known site on private land contained only one individual when surveyed recently. Due to its severely reduced range, *J. reclinata* is particularly vulnerable to beach erosion, competition from invasive non-native plants, and impacts from recreational development. Routine grounds maintenance at parks that does not take the species' ecological needs into account also is a problem. On March 18, the Service proposed to list the beach jacquemontia as Endangered.

Water Howellia (*Howellia aquatilis*)

The only species in its genus, *H. aquatilis* is an annual, aquatic plant with submerged or floating stems and small white flowers. For its seeds to germinate, they must be exposed to air. For this reason, the water howellia is found only in seasonal wetlands that become at least partially dry by the end of the growing season. There appears to be no genetic variation within or between populations of this species.

Historically, the water howellia occurred in Montana, Idaho, Washington, Oregon, and California. The 79 remaining colonies are clustered primarily in two population centers, one in northwestern Montana and the other in western Washington. In Idaho, it survives at

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Listing Proposals

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only one known site, and the plant has been eliminated altogether from California and Oregon. Because the water howellia has very narrow ecological requirements, it is vulnerable to even subtle environmental changes. Activities that affect the amount or quality of water in the species' habitat, or have impacts on

the pond basins, are the most direct threats. Such factors include timber harvesting, commercial and residential development, grazing, and encroachment of wetlands by an invasive grass. For these reasons, *H. aquatilis* was proposed April 16 for listing as Threatened.

Hungerford's Crawling Water Beetle (*Brychius hungerfordi*)

Native to the Great Lakes region, this small, yellowish-brown insect is known from only three locations: the East Branch of the Maple River (Michigan), the East Branch of the Black River (Michigan), and the North Saugeen River (Ontario, Canada). Both Michigan sites are in the lower peninsula within the Cheboygan River watershed. The Maple River population numbers from 200 to 500 individuals, and the other two are too small to estimate.

Habitat modification is the main danger to this species. It inhabits the riffles of cool, clean, slightly alkaline streams. In recent times, dredging, channelization, bank stabilization, and impoundment have directly eliminated the beetle from parts of its free-flowing habitat. Water quality degradation from siltation and agricultural chemical runoff are also potential dangers. The Service recognized these threats by proposing on March 2 to list Hungerford's crawling water beetle as Endangered.

Rio Grande Silvery Minnow (*Hybognathus amarus*)

Historically, *H. amarus* was one of the most abundant and widely distributed fish species in the Rio Grande basin. This small, stout minnow occurred in the

Rio Grande from northern New Mexico to the Gulf of Mexico, and in most of the Pecos River (a major Rio Grande tributary) in New Mexico and Texas. However, extensive habitat alteration, pollution, and the introduction of competing, non-native fishes have eliminated the species from approximately 95 percent of its former range. It survives in only a 170-mile (273-kilometer) stretch of the Middle Rio Grande in New Mexico from Cochiti Dam to the headwaters of Elephant Butte Reservoir. Due to continuing threats, the Service proposed March 1 to list the Rio Grande silvery minnow as Endangered and to designate most of its remaining range as Critical Habitat. (See habitat description and map in the March 1 *Federal Register*.)

A series of dams built on the Rio Grande to provide water for agriculture have modified the natural flow of the river over most of its course. During low water years, these dams have the capacity to divert all flows from the river channel to irrigation ditches. At other times, a large percentage of the river's flow consists of municipal, industrial, and agricultural discharges. Degradation or loss of habitat may have already rendered two Rio Grande fishes extinct, and are believed to threaten *H. amarus* in the last of its range.

The Pecos River population of the Rio Grande silvery minnow was eliminated by competition and/or hybridization with the plains minnow (*Hybognathus placitus*), a non-native fish released into the system. Exotic game fishes introduced into Rio Grande reservoirs for sport fishing have escaped the impoundments, and could also prove a threat to the silvery minnow in its remaining habitat.

Regional News

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liminary status survey in Alabama of the dusky gopher frog (*Rana capito sevosa*), a Category 1 listing candidate. Breeding populations were found to exist on only three tracts of land, two private and one public. The Heritage Program's report indicates that they were able to verify only five separate breeding populations.

The dusky gopher frog is found only in natural communities currently or historically dominated by longleaf pine. It inhabits and shares burrows of the Threatened gopher tortoise (*Gopherus polyphemus*), another species dependent on longleaf pine habitats. However, these habitats are being lost to residential and commercial development, and many longleaf pine forests are being replaced with loblolly or slash pine plantations.

Fire suppression has also been detrimental because longleaf pine habitat in its natural state is maintained by fire.

According to the Forest Service's Forest Inventory, between 1972 and 1990, naturally-regenerating longleaf pine forest in Alabama decreased from 741,100 acres (299,900 hectares) to 481,600 acres (204,900 ha): a 35-percent decline.

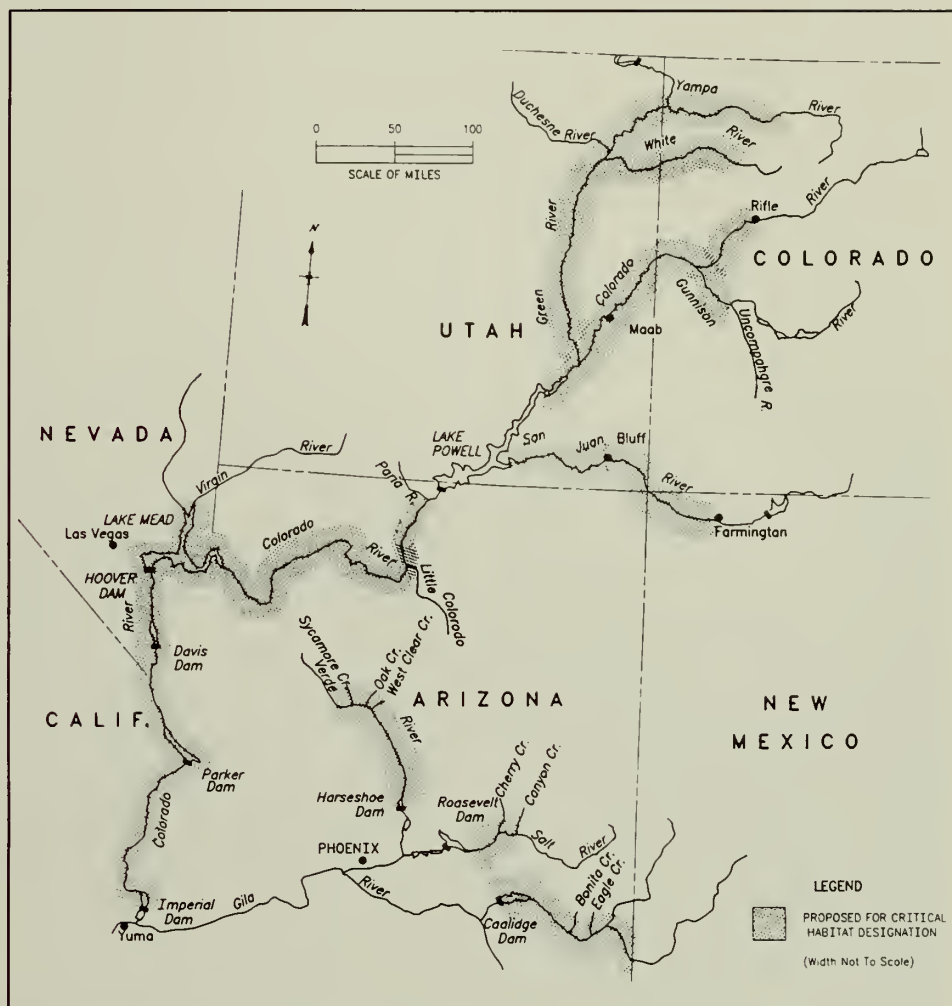
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Critical Habitat Designations Proposed for Four Colorado River Fishes

The Fish and Wildlife Service (FWS) proposed on January 29, 1993, to designate Critical Habitat for four Endangered fish species of the Colorado River basin: the Colorado squawfish (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). Critical Habitat designations apply to Federal agencies, assisting them in meeting their conservation responsibilities under the Endangered Species Act. (For a discussion of Critical Habitat, see the accompanying article.)

Largest of the four species, the Colorado squawfish is an elongated, pike-like fish that once reached lengths of up to 6 feet (1.8 meters) and weights exceeding 80 pounds (36 kilograms). In earlier times, it was an important food source for people of the region. The razorback sucker reaches 3 feet (0.9 m) in length and has a pronounced dorsal keel. As its name suggests, the humpback chub is characterized by a pronounced dorsal hump. Its relative, the bonytail, is an elongated, somewhat laterally compressed fish with a small head that arches into a predorsal hump. Both chubs grow to about 18 inches (45 centimeters). The

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Combined critical habitat proposed for the razorback sucker, bonytail chub, Colorado squawfish, and humpback chub.

Critical Habitat: What It Is and Is Not

Habitat loss, whether by modification or outright destruction, is the greatest threat to most rare animals and plants. In passing the Endangered Species Act, Congress recognized this fact and provided "a means whereby the ecosystems upon which endangered and threatened species depend may be conserved." To help meet this goal, the Act calls for designating "Critical Habitat" for Endangered and Threatened species.

Some of the questions most frequently asked about Critical Habitat are:

Just what *is* Critical Habitat?

Critical Habitat is a regulatory term describing the areas of land, water, and air space containing the physical and biological features essential for the survival and recovery of Endangered and Threatened species. Such areas include, for example, sites for breeding and rearing, movement or migration, feeding, roosting, cover, and shelter. Habitat characteristics that may require special management and protection, such as water quality and quantity, host animals and plants, food availability, pollinators, sunlight, and specific soil types, are also considered.

Although a Critical Habitat designation usually delineates only habitat occupied by a species at some time in its life cycle (e.g., nesting grounds, migration routes, staging areas, and wintering grounds), the designation may include enough surrounding habitat to allow normal behavior and population growth. If necessary for a species' recovery, currently unoccupied habitat within its historical range may also be protected. On the other hand, a Critical Habitat designation is not intended to encompass a species' total current range unless doing so

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Critical Habitat: What It Is and Is Not

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is essential for recovery. Regardless of whether or not a particular habitat has been designated "critical," Federal agencies must avoid jeopardizing listed species wherever they occur.

Why designate Critical Habitat?

The Endangered Species Act recognizes that the Federal Government is involved, directly or indirectly, in many habitat altering activities that can affect Threatened and Endangered species. For this reason, section 7 of the Act requires Federal agencies (and *only* Federal agencies) to ensure that their actions are not likely to jeopardize the survival of a listed species or adversely modify its Critical Habitat (if designated). Formal designation of Critical Habitat helps promote a species' recovery and assists Federal agencies in fulfilling their conservation responsibilities under the Act. Once Critical Habitat has been identified, Federal agencies can predict potential effects of their activities on a listed species or its habitat early in the project planning process, making it easier to avoid or minimize conflicts.

Is Critical Habitat similar to a Wilderness Area or Wildlife Refuge?

No. A Critical Habitat designation does not in any way create a wilderness area, preserve, or wildlife refuge, nor does it close an area to human access or use. It applies only to activities sponsored at least in part by Federal agencies. Such federally permitted land uses as logging, grazing, and recreation may take place if they do not adversely modify Critical Habitat. Critical Habitat designations do not constitute land management plans.

How does Critical Habitat affect the private landowner?

Activities of a private landowner,

such as farming, grazing, logging, or constructing a home, generally are not affected by a Critical Habitat designation, even if the landowner's property is within the geographical boundaries of the Critical Habitat. The designation has no impact on individual, town, county, or State actions if there is no Federal involvement, nor does it signal any intent of the government to acquire or control the land.

How does Critical Habitat affect Federal agencies?

Section 7 of the Endangered Species Act requires Federal agencies to evaluate the effects that any activities they fund, authorize, or carry out may have on Endangered or Threatened species. Agencies are required to ensure that such activities are not likely to jeopardize the survival of a listed species or adversely modify (e.g., damage or destroy) its Critical Habitat. By consulting with the Fish and Wildlife Service, an agency can usually minimize or avoid any potential conflicts. Activities have almost always been allowed to proceed in some form.

What happens during the consultation process?

If an agency finds that one of its planned activities may affect a listed plant or animal, it must consult with the Fish and Wildlife Service. Each project or activity is reviewed on a case-by-case basis. After considering all of the information provided by the consulting agency, the Service makes a determination and issues a "biological opinion" on the projected impacts. If the Service reaches a "no jeopardy" opinion, the proposed activity may proceed. But if the activity would jeopardize the survival of a listed species or adversely modify its Critical Habitat, the Service makes a "jeopardy" or "adverse modification" finding. In such cases, the Service is required to identify any possible "reasonable and prudent alternatives" that

would allow the activity to proceed while at the same time ensuring the species' well-being. The alternatives can include project modifications, changes in construction schedules (e.g., to avoid an animal's breeding season), additional research, protecting other habitat, and a variety of other measures.

Can an action that would impact a listed species or its habitat be exempted?

In the very rare cases when no reasonable and prudent alternatives are found, the issue can be elevated to the Endangered Species Committee, a Cabinet-level body composed of the Secretaries of the Interior, Army, and Agriculture; the Administrators of the Environmental Protection Agency and the National Oceanic and Atmospheric Administration; the Chairman of the President's Council of Economic Advisors; and a single representative from the Governor(s) of the affected State(s). If the necessary procedural requirements have been met, a majority of at least five members can exempt a proposed action from section 7 of the Endangered Species Act.

How is Critical Habitat designated?

The process for designating Critical Habitat is similar to the one for listing a species as Threatened or Endangered, and the procedures are often concurrent. The Service follows a rulemaking procedure for both.

A rulemaking process is used by Federal agencies to propose and later adopt regulations that have the effect of law. The proposed rulemaking to designate Critical Habitat (which may accompany the listing proposal) is published in the *Federal Register*, a daily government publication. Such a proposal contains information about the species, the need for conserving its habitat, and possible economic impacts of the design-

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Critical Habitat: What It Is and Is Not

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nation, as well as a map and description of the proposed Critical Habitat. After a specified period for public review and comment, the Service evaluates all information provided and decides whether to adopt, modify, or withdraw the proposal. The final decision is then published in the *Federal Register*.

What are the opportunities for public comment on a Critical Habitat proposal?

The Endangered Species Act ensures the public ample opportunity to comment on Critical Habitat proposals, and the Service's policy is to encourage such participation in the rulemaking process. Proposed designations provide for a public comment period of at least 60 days. To ensure that all interested members of the public are aware of the proposals, announcements of the proposed rulemaking and the public comment period are published in local newspapers. In addition, the Service directly notifies Federal, State, and local agencies, as well as other interested parties. A public hearing is held in the vicinity of the affected area if requested within 45 days of the published proposal. The Service also can extend or reopen the public comment period, and schedule additional hearings, if it

finds there is good reason to do so. All written and oral information provided during the public comment period is analyzed carefully by the Service prior to a final decision on the proposal, and responses to comments received are published in the decision document.

Are potential economic impacts considered?

Yes. Although listing decisions must be based solely on biological grounds, potential economic and social effects of Critical Habitat designations are analyzed and considered before such designations are completed. An area may be excluded from proposed Critical Habitat if the Secretary of the Interior finds that the economic or other benefits of such an exclusion outweigh the conservation benefits of including the area. However, excluding an area from a Critical Habitat designation is allowed only if doing so will not lead to the extinction of the species.

When are Critical Habitat designations proposed?

The Endangered Species Act requires that Critical Habitat be proposed "to the maximum extent prudent and determinable" when proposing to list a species as Threatened or Endangered. Normally, final decisions on listing and Critical Habitat designations are made within one year of the proposals.

In practice, Critical Habitat is not designated for every species. Identifying a species' location through a Critical Habitat designation (which includes a map and habitat description) could subject it to increased threats from collectors or vandals. In such an instance, the Service can make a "not prudent" finding. Species that are particularly attractive or unusual, and thus in demand for trade, often fall into this category. Some examples include cacti, carnivorous plants, and showy wildflowers. A "not prudent" finding is also possible when designating Critical Habitat would not provide additional protection, such as when a species is already protected under a special agreement. If there is not enough information available to perform the required economic analyses, or if the species' biological needs are not known well enough to identify its Critical Habitat, a designation is deemed "not determinable."

If Critical Habitat designation is "not determinable" at the end of the first year, a finding must be made by the end of the second year on the basis of the best available information, unless designating Critical Habitat is found to be "not prudent." Revisions of Critical Habitat may be proposed as new information becomes available.

Colorado River Fishes

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unusual shapes are thought to be adaptations that enabled the fish to navigate the turbulent waters that once characterized most of the Colorado River system.

The four Endangered fishes are endemic to the Colorado River basin, including its major tributaries, and once occurred from Wyoming to Mexico. Extensive habitat alteration, particularly the system of impoundments that now manage the river's flow, seriously reduced the range of these species, making them vul-

nerable to extinction. The proposed Critical Habitats encompass most but not all of their remaining distribution:

- Six reaches of the upper Colorado River system (including the Colorado, Green, Yampa, White, Gunnison, and San Juan Rivers) were proposed as Critical Habitat for the Colorado squawfish. They total 1,148 miles (1,848 kilometers), or about 29 percent of the species' former range.

- For the razorback sucker, fifteen reaches of the Colorado, Green, Yampa, Duchesne, White, Gunnison, San Juan,

Gila, Salt, and Verde Rivers were proposed. These segments total 1,824 miles (2,935 km), approximately 52 percent of the historical habitat.

- Seven reaches of the Colorado, Green, Yampa, and Little Colorado Rivers were proposed as Critical Habitat for the humpback chub. They total 379 miles (610 km), or 28 percent of the former range.

- Five reaches of the Colorado, Green, and Yampa Rivers were proposed as Critical Habitat for the bonytail. The

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Manatee Protection

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manatee carcass mutilated by a large propeller. Unique scar patterns provided conclusive evidence: the accident victim was Mary. The search also yielded additional evidence—parts of two other manatees. A fetus, very likely Mary's, was discovered on the shore near the impact site, and the upper trunk of a calf was found along the shore, south of Kings Bay.

Manatee Protection Plan

On May 16, 1990, the Sirenia Project biologists and Manatee Coordinator Turner met with Captain John Nuernberger, the Commanding Officer of SUBBASE. They discussed how the manatees met their deaths and how to prevent such tragic events in the future. The discussion initially focused on the C-tractor tug's twin 86-inch (218-centimeter) propellers, each encircled with an outer ring and attached to a pivoting drive shaft that gives the boat the ability to turn quickly and even move sideways, providing maneuverability important in confined areas. Because each of the large, unguarded propellers can create enough suction to pull in a nearby manatee, and because the propellers can change direction rapidly, any manatee near the craft could be in danger.

The group then broadened its sights to other Navy vessels stationed at the Kings Bay base, especially large boats that leave little room in fairly narrow channels for manatees to share. The best approach, all participants agreed, was for the Navy to develop a comprehensive Manatee Protection Plan for the base.

Fortunately, much is known about manatees in the Kings Bay area. Although it is at the northernmost end of their winter range, a small number of manatees can be found using the warm-water discharges from paper mills operated by the Gilman Paper Company in St. Marys, Georgia, and the Container Corporation in Fernandina Beach, Florida. During the summer, this population is supplemented by manatees like

Mary that migrate northward along Florida's east coast. Since 1986, 12 of these manatees have been radio-tagged. Their movements have demonstrated that Kings Bay is a center for manatee activity during the warm seasons. A graduate study on the feeding ecology of manatees provided additional information on their activity patterns and habitat use. Based on these biological findings, Sirenia Project staff outlined the SUBBASE manatee protection plan.

Analysis of the manatee carcasses and the circumstances associated with the tug's report of a manatee strike showed that Mary and her unborn calf had been killed by one of four C-tractor tugs operating in Kings Bay. The other manatee was killed by another unknown, large vessel in the same area. The Service recommended, therefore, that the SUBBASE Manatee Protection plan include caging the tunnel-style openings of the C-tractor tug's propulsion system to prevent manatees from being pulled into the propellers.

Because manatees have more time to avoid slow-moving boats, another recommendation was to establish a baywide idle-speed zone for all boats except security boats responding to emergencies. In places where manatees are known to congregate, the FWS recommended establishing and posting no-entry areas. In addition, since manatees are frequently sighted near docking facilities, where they drink fresh water from leaking water pipes and storm water runoff from small creeks, the FWS recommended identifying all fresh-water discharges in Kings Bay and implementing special protection measures, such as idle-speed or no-entry zones. The FWS encouraged the Navy to eliminate artificial fresh-water discharges from areas where manatees could be struck by boats, or to reroute the discharges to other areas.

The FWS also recommended that the Navy develop a formal Manatee Watch and Alert program involving all base operations, including Port Services, Navy and Port Security, tug and boat operators, and dock personnel. Manatee sightings could then be relayed to a central loca-

tion, such as Port Services, to alert personnel conducting operations that could pose a danger to manatees. The final recommendation was for a formal protocol for verifying and recovering manatee carcasses.

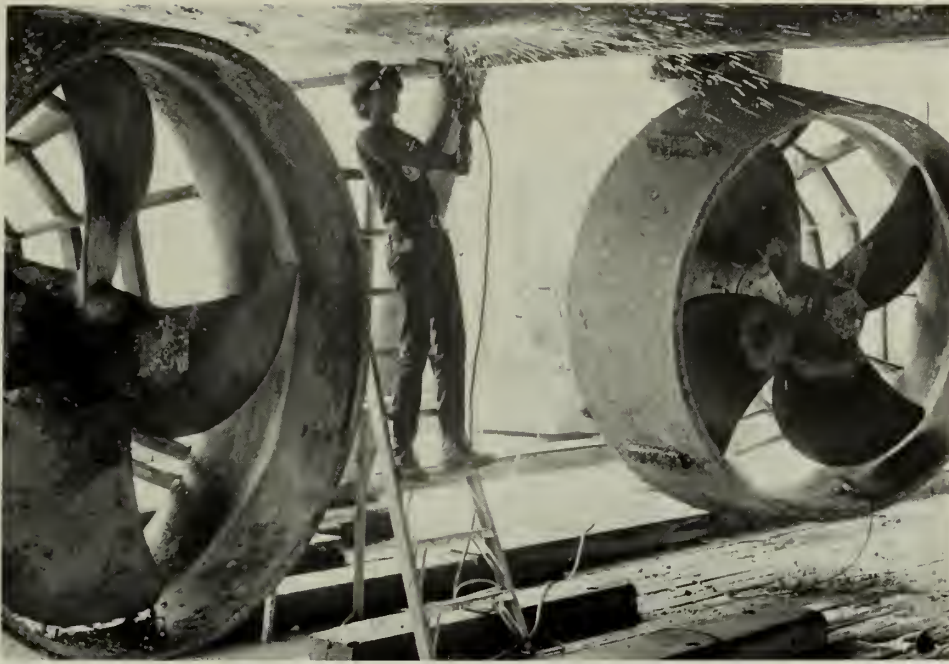
Using FWS recommendations, Captain Nuernberger quickly demonstrated the Navy's concern for manatees by implementing an in-depth Manatee Protection Plan for SUBBASE.

Designing a Safer Propeller

As part of the Manatee Protection Plan, the Navy undertook an engineering study to determine what type of system for caging the intakes of the C-tractor tugs' propulsion would best protect manatees while providing enough thrust for the boats to operate efficiently. In early July 1990, with the backing of Military Sealift Command in Washington, D. C., the Navy began a cooperative effort with Edison Chouest Offshore, owners of the C-tractors, to complete the feasibility study. The company then designed a prototype propeller guard and evaluated it to see if it would protect manatees without adversely affecting the performance of the tug. Protecting the manatees was not difficult—a simple cage with properly spaced bars could do it—but the performance of the tug was critical, as was the ability of the cage to withstand tremendous pressure and strain. The evaluation showed that even under extreme environmental conditions, the guards caused the tug to experience no more than a 10 percent efficiency loss, well within acceptable limits.

On September 13, 1991, after thousands of hours of work, the manatee guards were installed on the first C-tractor tug at a shipyard in Savannah, Georgia. The tug resumed normal operations and underwent a 60-day trial period. Tests indicated that the tug's drives were as effective as ever; in fact, the guards reduced vibration and cavitation, thus improving overall performance. Based on these exciting test results, the remaining three C-tractors were equipped with pro-

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U.S. Navy photo

A clear view of the 86-inch propellers of a C-tractor tug. Manatee guards are unnecessary on the back of the propellers because reversing is accomplished by rotating the propellers on a vertical axis.

Manatee Protection

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propeller guards before the end of March 1992.

The Navy's efforts did not stop there. Along with outfitting the C-tractors at a cost of \$50,000 apiece, the Navy installed propeller guards on all 24 of the small craft operating out of Port Services, at an additional cost of \$12,000. These 24 vessels include 8 boom-boats, 3 john-boats, various security boats (including 2 cigarette-type boats), a landing craft, and other work boats and platforms.

"I salute the Navy for its rapid response to the unfortunate death of Mary and its

willingness to extend a Manatee Protection Plan to every vessel at the base," said FWS Regional Director Jim Pulliam in Atlanta. "The Fish and Wildlife Service will remember the Navy's comprehensive approach to protection when we develop plans for other port operations in manatee habitat. I regard the Kings Bay partnership in this conservation effort as a model for successful coordination among Federal agencies."

Robert Turner, the FWS Manatee Coordinator, is based in the Jacksonville, Florida, Field Office.

Cheryl Buckingham is his assistant.

Colorado River Fishes

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344 miles (554 km) comprise about 15 percent of the bonytail's historic range.

The proposed Critical Habitats include river reaches in parts of Colorado, Utah, New Mexico, Nevada, Arizona, and California. Many of the areas overlap; the grand total is 2,094 miles (3,370 km).

The FWS is analyzing the potential economic effects of the Critical Habitat designations, and may exclude some areas

from any final designations if the economic benefits of exclusion outweigh the conservation benefits of inclusion. For details on the Critical Habitat proposals, including maps and habitat descriptions, see the January 29 and March 15, 1993, editions of the *Federal Register*. The analysis of economic impacts and other support documents will be available to the public in early September.

Regional News

(continued from page 6)

Status surveys are also being conducted for the flatwoods salamander (*Ambystoma cingulatum*) the Florida gopher frog (*Rana capito aesopus*), and the Carolina gopher frog (*Rana capito capito*). All three, which are Category 2 listing candidates, are residents of longleaf pine forest in the southeastern coastal plain. Although the gopher frog is primarily a resident of sandhill habitats, and the flatwoods salamander is a resident of pine flatwoods, individuals of all three taxa may be found as larvae within the same temporary pond when their habitats coincide. Status reviews for these amphibians will be completed when their distribution is better defined.

* * *

Region 5 — On February 19, 1993, the FWS New Jersey Field Office, in conjunction with the New Jersey Department of Environmental Protection and Energy and the New York Department of Environmental Conservation, conducted a survey to confirm that the Endangered Indiana bat (*Myotis sodalis*) was using an abandoned mine in Morris County, New Jersey, as a winter hibernaculum. A total of 24 Indiana bats were found in the mine. Although the bat's presence in New Jersey had been suspected, this was the first confirmed sighting of hibernating Indiana bats in the State.

* * *

Several New Jersey populations of the bog asphodel (*Narthecium americanum*), a Category 1 candidate plant, are being afforded intensive protection through a cooperative effort between the FWS New Jersey Field Office and the New Jersey Office of Natural Lands Management. Signs are being posted in the pine barrens of Burlington and Ocean Counties to prevent trespass into sensitive areas, and population surveys to determine the plant's specific geographic distribution are under way. This pre-listing recovery effort, which may eliminate the need for listing, will also include the erection of barriers to prevent vehicle access to prime habitat, creation of public information

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Endangered Classification May No Longer Be Needed for Six Species of Animals and Plants

Six taxa — four animals and two plants — were proposed by the Fish and Wildlife Service (FWS) recently for reclassification from Endangered to the less serious category of Threatened, or for delisting altogether:

Three Kangaroo Species

Three kangaroo species of mainland Australia — the red (*Macropus rufus*), western gray (*Macropus fuliginosus*), and eastern gray (*Macropus giganteus*) — were proposed January 21, 1993, for removal from the U.S. List of Threatened and Endangered Species. They were listed by the FWS in 1974 as Threatened due to concerns about the adequacy of management plans and the levels of hide exports from Australia. In 1981, after new management plans and survey techniques were developed, the United States lifted its ban on kangaroo imports, although the three species were retained on the Threatened list because of a severe drought in their habitat. The drought has since ended and, citing new information, the FWS believes that the Australian States have conservation programs effective enough to ensure the survival of these unique animals.

Siler Pincushion Cactus (*Pediocactus sileri*)

This small plant, a globose or cylindrical cactus with yellow flowers, grows in parts of northwestern Arizona and southwestern Utah. It was listed in 1979 as an Endangered species because of threats posed by livestock grazing, off-road vehicle use, mining, road construction, energy development, and illegal collecting to the small number of known plants.

The recovery plan for the Siler pincushion was completed in 1986. Recovery actions carried out in recent years by the Bureau of Land Management, which administers most of the species' range, include developing a habitat management



photo by Sue Rutman

Siler pincushion cactus

plan and conducting surveys for unknown populations. Although threats to the cactus remain, the habitat conservation measures implemented thus far and the discovery of additional populations indicate that it is no longer in danger of imminent extinction. In recognition of the Siler pincushion's improved status, the FWS proposed March 10, 1993, to reclassify the species from Endangered to Threatened.

Louisiana Pearlshell (*Margaritifera hembeli*)

The prospects for recovery are also better now for the Louisiana pearlshell, a small freshwater mussel proposed March 1, 1993, for reclassification to Threatened. When it was listed in 1988 as Endangered, this mollusk was known only from the Bayou Boeuf, which flows through the Kisatchie National Forest into the Gulf of Mexico. Among the

threats facing the species, in addition to its restricted range, were impoundment of its free-flowing stream habitat and water quality degradation. Recovery measures taken by the Forest Service to improve the pearlshell's habitat include controlling beaver dams and providing better management of riparian zones for water quality and wildlife. Also, logging practices have been modified to minimize siltation and scouring of stream beds. Another important development was the discovery in 1991 of *M. hembeli* in another Louisiana drainage, the Red River. Although the populations are still fragmented and vulnerable to water pollution, the species as a whole no longer appears to warrant the classification of Endangered.

Spineless Hedgehog Cactus (*Echinocereus triglochidiatus* var. *inermis*)

In 1979, the FWS recognized this spineless, mound-forming cactus as a unique variety and listed it as Endangered. Known only from southeastern Utah and southwestern Colorado, it was believed to be vulnerable to illegal collecting for the cactus trade. A recent taxonomic revision, however, indicates that the listed variety is not a valid taxon and is therefore ineligible for Endangered Species Act protection. The Act authorizes protection for species, subspecies, and varieties of plants, but not for finer distinctions such as forms. This plant is now regarded merely as a sporadically occurring spineless form of a common and widespread variety, *E. t.* var. *melanacanthus*. Accordingly, the FWS proposed January 14 to remove the spineless hedgehog from the list of Endangered and Threatened species.

Final Listing Rules Approved for 39 Species

Final rules adding 39 species — 25 animals and 14 plants — to the U.S. List of Endangered and Threatened Wildlife and Plants were published by the Fish and Wildlife Service from January through April 1993. These animals and plants now receive Endangered Species Act protection, and recovery plans will be developed for all but the three foreign species. A list of the newly added taxa, with their legal classifications and *Federal Register* publication dates, follows:

ANIMALS

- **Coastal California Gnatcatcher** (*Poliophtila californica californica*) - a small songbird native to coastal sage scrub habitat in southern California and northwestern Baja California, Mexico; Threatened; 3/30/93.

In this case, the final listing rule was accompanied by a proposed special rule that would allow limited incidental take of the gnatcatcher in conjunction with a habitat conservation plan being written under the State of California's Natural Community Conservation Planning Act of 1991. The intent of the plan is to promote the gnatcatcher's recovery while avoiding a halt to economic development in the area. For details, see the March 30, 1993, *Federal Register*. (The plan will be discussed in a future edition of the *Bulletin*.)

- **Delta Smelt** (*Hypomesus transpacificus*) — a small fish endemic to the brackish waters of California's Sacramento-San Joaquin River Delta; Threatened; 3/5/93.

- **Western Snowy Plover** (*Charadrius alexandrinus nivosus*) - The Pacific Coast population of this pale-colored shorebird, which ranges from Washington to Mexico, was listed March 5 as Threatened; however, the interior population is not affected.

- **Mexican Spotted Owl** (*Strix occidentalis lucida*) - One of three recognized spotted owl subspecies, this relative of the northern spotted owl occurs in the southwestern U.S. and northern Mexico; Threatened; 3/16/93.

- **Bruneau Hot Springsnail** (*Pyrgulopsis bruneauensis*) - a small freshwater snail endemic to thermal springs and outflows in southwestern Idaho; Endangered; 1/25/93.

- **Cave Crayfish** (*Cambarus aculabrum*) - a small, cave-dwelling crayfish known only from two sites in Arkansas; Endangered; 4/27/93.

- **13 Freshwater Mussels:**

- A March 17 rule listed 11 mussels of the Mobile River drainage in Mississippi, Alabama, Tennessee, and Georgia. Eight were listed as Endangered: southern acornshell (*Epioblasma othcaloogensis*), ovate clubshell (*Pleurobema perovatum*), southern clubshell (*Pleurobema decisum*), upland combshell (*Epioblasma metastrata*), triangular kidneyshell (*Ptychobranthus greenii*), Coosa moccasinshell (*Medionidus parvulus*), dark pigtoe (*Pleurobema furvum*), and the southern pigtoe (*Pleurobema georgianum*). Three were listed as Threatened: Alabama moccasinshell (*Medionidus acutissimus*), orange-nacre mucket (*Lampsilis perovalis*), and the fine-lined pocketbook (*Lampsilis altalis*).

- A January 22 rule listed two mussels once widespread in the eastern U.S.: northern riffleshell (*Epioblasma torulosa rangiana*) and the clubshell (*Pleurobema clava*); both Endangered.

- **Three Southeastern Fishes:**

- An April 27 rule listed three fish taxa of the Tennessee and Cumberland River systems in the southeastern U.S.: pygmy madtom (*Noturus stanauli*), palezone shiner (*Notropis* sp.), and duskytail darter (*Etheostoma* sp.); all three Endangered.

- **Three Foreign Butterflies:**

- On January 14, the FWS listed three tropical species of butterflies as Endangered: the Homerus swallowtail (*Papilio homerus*) from Jamaica, Corsican swallowtail (*Papilio hospiton*) from the Mediterranean islands of Corsica and Sardinia, and Luzon peacock swallowtail (*Papilio chikae*) from the Phillipine Islands.

PLANTS

- **Seven Central Florida Plants:**

- An April 27 rule listed seven species of plants that occur primarily in the dry upland vegetation of central peninsular Florida. Five of them — the Florida perforate cladonia (*Cladonia perforata*), a "reindeer moss" lichen; Avon Park harebells (*Crotalaria avonensis*), a perennial herb; Britton's beargrass (*Nolina brittoniana*), a relative of the yuccas and agaves; Lewton's polygala (*Polygala lewtonii*), a small perennial herb; and sandlace (*Polygonella myriophylla*), a low-growing shrub — were listed as Endangered. The other two plants — the pigeon wings (*Clitoria fragans*) and scrub buckwheat (*Eriogonum longifolium* var. *gnaphalifolium*), both perennial herbs — were listed as Threatened.

- **Four Puerto Rican Plants:**

- On April 27, the FWS listed three plants endemic to Puerto Rico as Endangered: *Aristida chaseae*, a perennial grass; *Lyonia truncata*, an evergreen shrub; and *Vernonia proctori*, a small, bushy shrub.

- A February 26 rule listed *Leptocereus grantianus*, a columnar, nearly spineless cactus endemic to Culebra Island (off the main island of Puerto Rico) as Endangered.

- **Ka'u Silversword** (*Argyroxiphium kauense*) - a usually single-stemmed rosette shrub with silvery, sword-shaped leaves and a multi-branched flowering stem, endemic to the island of Hawai'i (the "Big Island"); Endangered; 4/7/93.

- **Seabeach Amaranth** (*Amaranthus pumilus*) - a prostrate annual herb once growing on Atlantic coast beaches from Massachusetts to South Carolina; Threatened; 4/7/93

- **Nelson's Checker-mallow** (*Sidalcea nelsoniana*) - a perennial herb found primarily in Oregon's Willamette Valley; Threatened; 2/12/93.

Kirtland's Warbler Recovery Team Effectively Coordinates Interagency Research and Management

by David L. Trauger and Carol I. Bocetti

With the Endangered Species Act due for reauthorization, it is timely to recognize the outstanding interagency cooperation fostered by members of the Kirtland's Warbler Recovery Team. Their success provides a good example of what this law can accomplish. Although there have been challenges through the years, the Team's actions have resulted in improved habitat conditions and an encouraging increase in the Kirtland's warbler (*Dendroica kirtlandii*) population (Figure 1).

Over the past 20 years, the Kirtland's Warbler Recovery Team has consisted of seven to nine members appointed by the U.S. Fish and Wildlife Service (FWS). It includes representatives of the principal cooperating agencies — the Michigan Department of Natural Resources (MDNR), the U.S. Forest Service (FS), and the FWS — as well as interested private citizens.

Early Interagency Efforts

In the late 1950's, prior to the official designation of a Recovery Team, a group of dedicated land managers and concerned citizens organized a Kirtland's warbler task force. In the process, they set an enduring precedent for interagency cooperation. The task force planted experimental tree plantations (which later served as a stronghold for the warbler), attempted innovative silvicultural activities, and helped prioritize research. Participants in this group included Larry Ryel (MDNR), John Byelich (MDNR), Nicholas Cuthbert (Central Michigan University), Lawrence Walkinshaw, Harold Mayfield, and later G. William Irvine (FS), Nels Johnson (MDNR), and Robert Radtke (FS).

In the early 1970's, when the third decennial census indicated that the

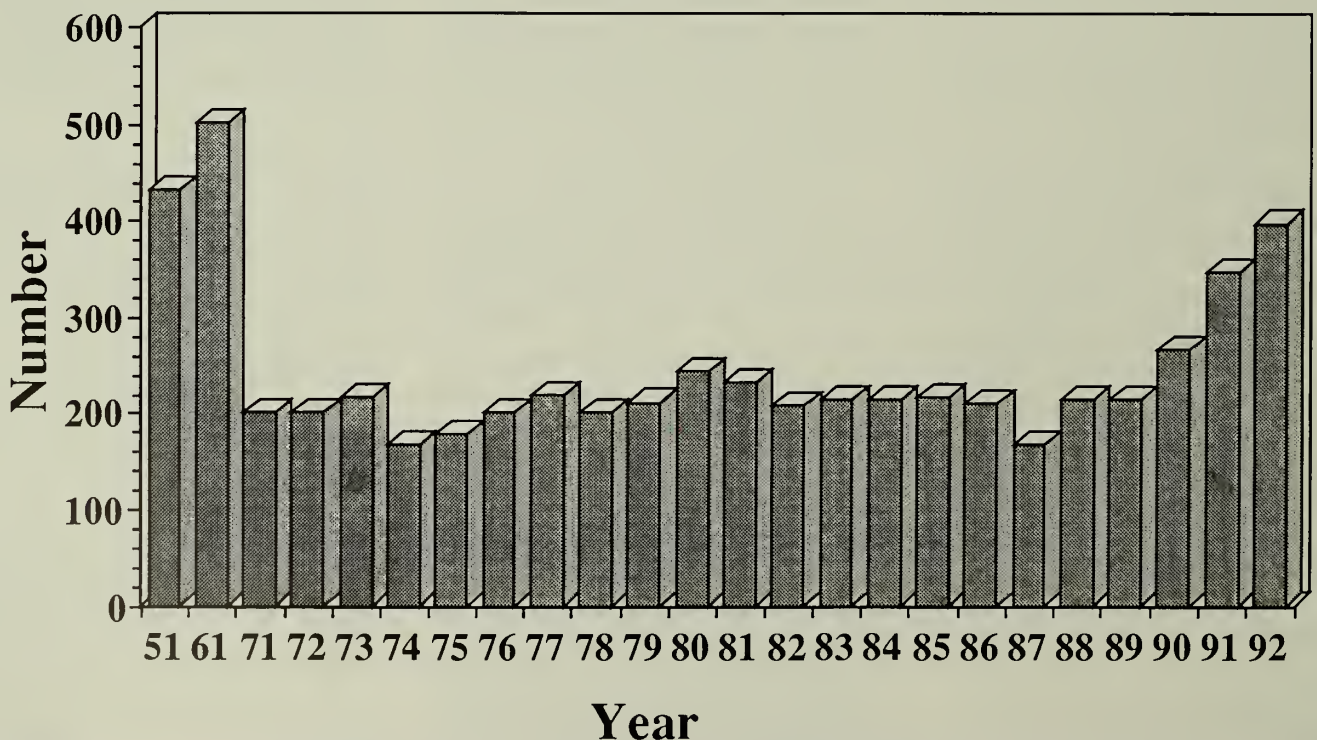
Kirtland's warbler was declining dramatically (Figure 1), the task force recommended swift action. Nest parasitism by brown-headed cowbirds (*Molothrus ater*) was identified as the likely cause for the decline in warbler productivity. In response, the FWS, MDNR, FS, state and local chapters of the Michigan Audubon Society, and Michigan Natural Areas Council joined in a massive trapping program to control cowbirds. This highly successful effort stabilized the warbler population.

The Recovery Team

In 1973, the Endangered Species Act called for restoring Endangered and Threatened species to a secure status. The FWS recognized the valuable contributions of the task force by naming many

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Kirtland's Warbler Singing Male Population Trends



Kirtland's Warbler and the Jack Pine Plains of Michigan

by Carol Bocetti

The Kirtland's warbler is just one of many plants and animals that live on the jack pine plains of northern Lower Michigan, an ecosystem characterized by extremely well-drained sandy soil with low nutrient content. The habitat is maintained in a young condition by extensive forest fires that burn the jack pine about every 50 years. Along with scrub oaks, this tough pine is one of the few tree species able to survive on such poor soils. Jack pines outcompete the scrub oaks because the pine is well adapted to fire, actually requiring the heat of fire to open its cones and spread the seeds.

Jack pine forests created by wildfires are very patchy, with clumps of pines interspersed with grass and sedge openings. Kirtland's warblers make their nests on the ground at the edge of these openings, where nest are concealed by thick ground cover and low branches of jack pine. Many other ani-

mals, such as the eastern bluebird, sharp-tailed grouse, upland sandpiper, American kestrel, white-tailed deer, and snowshoe hare, also make their homes in the pine barrens. Rare plants like the bird's-nest violet and allegheny plum also are found in this pine barren ecosystem.

The Kirtland's warbler uses the pine barrens when the trees are about 6 to 20 years of age, or about 5 to 20 feet (1.5 to 6 meters) tall. When the pines exceed 20 feet in height, the lower branches become shaded and die, leaving the warbler less cover in which to hide its nest. The warblers breed in loose "colonies" and prefer to colonize large areas of pine barren (300 or more acres, or 120 hectares, in size), and a minimum of 80 acres (32 ha) is usually required to attract warblers. A pair of warblers defends about 30 acres (12 ha) of jack pine habitat as a territory for raising young.

Much of the pine barren habitat has been altered as a result of fire suppression, which promotes vegetative succession, or has been changed for alternative land uses. Recognizing the warbler's plight, land managers have created habitat that resembles the pine barrens by planting jack pines on the region's sandy soil in a wavy pattern that mimics the patchiness of the natural habitat. The Kirtland's warbler and its dry plains neighbors have successfully inhabited these artificial pine barrens. The plantations are managed on a 50-year rotation and serve many uses, including a commercial harvest of jack pine. By properly managing and preserving the pine barrens, we will maintain the biodiversity of Michigan's jack pine plains, allowing future generations the delight of hearing the sweet song of the Kirtland's warbler.



Kirtland's warbler in jack pine

photo by Bob Harrington, Michigan Department of Natural Resources

Warbler Recovery Team

(continued from page 14)

of its members to the Kirtland's Warbler Recovery Team, the first recovery team established by the Service. Original Team members were John Byelich (MDNR), the team leader; G. William Irvine (FS); Nels Johnson (MDNR); Wesley Jones (FWS); Harold Mayfield; Robert Radtke (FS); and William Shake (FWS). In 1976, they prepared the first Kirtland's Warbler Recovery Plan. The Team updated the Recovery Plan in 1985 with the help of new members Michael DeCapita (FWS) and William Mahalak (MDNR).

Today, the Recovery Team is made up of new members who uphold the high standards established by their predecessors. The Team now includes K. Rex Ennis (FS), leader; John Probst (FS); George Burgoyne, Jr. (MDNR); Gary Boushelle (MDNR); William Mahalak (MDNR); Ronald Refsnider (FWS); Michael DeCapita (FWS); and Cameron Kepler (FWS).

Numerous individuals working independently or representing various agencies, universities, and private organizations have supported the task force and Recovery Team over the years. Although it would be impossible to acknowledge all of the people involved, their efforts have been important to the species' conservation. We have attempted to identify those playing key roles in recent years.

Management for Warbler Recovery

To date, a total of \$2.7 million has been spent on habitat acquisition by the FWS, and about 130,000 acres (52,600 hectares) of public lands in north-central Michigan are being managed by the MDNR and FS specifically for the Kirtland's warbler. In addition, the FWS and MDNR coordinate personnel and funds to create warbler habitat on lands owned by each agency. Participating in this collaboration have been Thomas Weise, Gary Boushelle, Sylvia Taylor (retired), William Mahalak, Jerome Weinrich, and Everett Lake (retired) of the MDNR, and Ronald Refsnider, Michael Tansy, and James Engel (retired) of the FWS. In a continuing effort to

control the problem of nest parasitism, Leonard Schumann and Michael DeCapita of the FWS are working with many of the MDNR personnel mentioned above on a cowbird trapping program.

New silvicultural techniques are being developed by the FS to enhance Kirtland's warbler habitat. Rex Ennis, Horace LaBombard, William Jarvis, Phillip Huber, David Kline, Douglas Munson, and Randall Marzolo have ensured that FS advances in this area are communicated to other land managers. The FS and FWS also conduct tours to promote a greater public awareness of habitat management activities. Even the military has joined the conservation effort. Gregory Huntington and Andrea Sikkenga of the Michigan National Guard (Camp Grayling) have worked with the Recovery Team to ensure that the military meets its responsibilities in management of military lands for the Kirtland's warbler.

Since 1971, State and Federal agency personnel, assisted by a large contingent of volunteer birders, have joined in conducting an annual Kirtland's warbler census throughout the bird's breeding range. During 1990-92, Wesley Jones (retired FWS), a former Recovery Team member, did an enormous amount of work in coordinating and expanding annual surveys for Kirtland's warblers in Wisconsin, where a few birds have been sighted in recent summers. Kathleen Fruth and Randy Hoffman of the Wisconsin Department of Natural Resources (WDNR) coordinated warbler surveys in that State in 1988 and 1989, respectively. Earlier surveys in Wisconsin were conducted on a much smaller scale.

Research for Warbler Recovery

Research biologists continue to address questions put forth in the Kirtland's Warbler Recovery Plan and prioritized by the Recovery Team.

For example, Cameron Kepler and Paul Sykes (FWS) are banding and marking warblers to determine if migrational or overwintering mortality is limiting the species' population. Their research program also provides an opportunity to es-

tablish adult-to-juvenile ratios as a productivity index, evaluate colony fidelity and dynamics, and examine intercolonial movements. They have also mapped breeding territories to identify habitat factors critical to Kirtland's warblers. One immediate result of their research was an extended closure period for critical areas occupied by the birds.

John Probst (FS) has investigated habitat characteristics, such as the density and arrangement of jack pines (*Pinus banksiana*), to determine what conditions the Kirtland's warbler prefers. Land managers have increased the stems/acre planted as a result of his work. He has also studied aspects of the species' breeding biology. Probst is currently working on a plumage evaluation so that observers can age and sex the species on sight, and he is developing a landscape approach for evaluating warbler habitat use.

Carol Bocetti (Ohio State University) developed a reintroduction strategy for the Kirtland's warbler based on work with a surrogate species. She is currently studying predation, the mated status of males, and recruitment rates in various habitat types. David Ewert of (The Nature Conservancy) recorded singing males to understand the song types and make "fingerprint-like" sonograms of individual birds. The above research has been heavily dependent on the FWS banding program.

Also studying the Kirtland's warbler is Burton Barnes (University of Michigan), who developed an ecosystem approach to habitat evaluation that will benefit both land managers and researchers. Paul Aird (University of Toronto) surveyed and studied the warbler in the periphery of its range in Ontario, Canada. Jerome Weinrich (MDNR) has been a constant source of information and insight on the species as a long-term manager and researcher. While the Recovery Team helps to coordinate research to minimize overlap, the researchers themselves have been sharing and exchanging data freely so that disturbance to this endangered species is minimized.

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Warbler Recovery Team

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Outlook for Recovery

Although far below the recovery goal of 1,000 breeding pairs, the Kirtland's warbler population has remained relatively stable over the past 2 decades (Figure 1). Throughout the 1980's, the population fluctuated around 200 singing males. In the early 1990's, however, numbers increased above this critically low, albeit stabilized level.

Recently, the Kirtland's warbler population has shown encouraging signs of recovery, primarily in response to seral succession of jack pine habitat following the extensive Mack Lake burn. The 1992 census of 394 singing males represents the highest breeding population in

20 years. Furthermore, both the banding program and recruitment study indicate that productivity was also quite high during the past two breeding seasons.

The Kirtland's Warbler Recovery Team faces new challenges as members continue to search for ways to increase the population. In addition to maintaining or enhancing ongoing activities, Team members are interested in the possibility of establishing a second Kirtland's warbler population in Wisconsin. Recently, WDNR personnel became involved in team deliberations and recovery activities. Another State could become involved as well; the Team has recommended that surveys for Kirtland's warblers be conducted in suitable habitats throughout Minnesota.

All of the people involved in recovering the Kirtland's warbler have shown outstanding dedication to their cause. Although the various agencies face increasing public demands on their lands, each continues to keep the Kirtland's warbler as one of its top resource management priorities. If the cooperating agencies meet the challenging habitat management goals of the Recovery Plan, and if researchers can unravel the remaining biological mysteries, the Kirtland's warbler will have real hope for survival.

Dr. Trauger is Deputy Director of the Fish and Wildlife Service's Patuxent Wildlife Research Center in Laurel, Maryland.

Carol Bocetti is with the Ohio Cooperative Fish and Wildlife Research Unit at Ohio State University in Columbus, Ohio.

Agency Heads Testify

(continued from page 3)

In his concluding remarks, Secretary Babbitt said that the future of resource management in this country will involve greater development of, and reliance on, science in support of management, as well as a greater partnership of individuals, groups, and organizations to sustain natural systems.

Espy Pledges Conservation and Stewardship of Forests, Range, and Croplands

Secretary of Agriculture Mike Espy began his statement by saying he intends to ensure his agency works with the Department of the Interior and the EPA to conserve biodiversity. He said that how we use the land affects biological resources and ecosystems in many ways, and that over time certain land use activities can damage the value of soil and water resources. Examples of such uses include growing the same crop on a large acreage year after year, draining wetlands to grow crops, and overgrazing.

Citing the Department of Agriculture's tradition of leadership in conservation and forestry, Secretary Espy said the Soil Conservation Service (SCS), the Agricultural Stabilization and Conservation Service (ASCS),

and the Forest Service will all play roles in improving management of ecosystems and biodiversity. He said, for example, that SCS is a source of technical support to farmers, ranchers, and others, providing leadership for such issues as nonpoint source pollution, wetland protection, and watershed restoration and management, primarily on non-Federal, agricultural lands. Secretary Espy added that ASCS programs provide substantial cost-share and other financial incentives to help farmers invest in land and water conservation.

Secretary Espy said the Forest Service is the only Federal land resource agency with a clear mandate to manage its lands to conserve biological diversity. An example of Forest Service efforts to carry out that mandate is the program "Every Species Counts." This program, he said, "provides the foundation upon which to build an ecosystem approach to evaluating habitats that may be at risk, and to ensure that management activities do not allow a decline in the habitat of identified species."

Browner says EPA Can Help to Foster Ecosystem Health

EPA Administrator Carol M. Browner testified that EPA, in partnership with other Federal agencies, has a vital role in protecting

biological diversity and ecosystems. She said that, because of the ongoing degradation of natural systems in the country, EPA is "placing more emphasis on the protection of habitat, both for its own sake, and because it protects human life." Browner cited the 1990 Science Advisory Board report to EPA, *Reducing Risk*, which advised emphasis on habitat protection. She said the report based its recommendations on a belief that ecosystems, and the biological diversity they support, have an intrinsic value beyond their direct utility to humans.

Administrator Browner spoke of EPA initiatives to measure trends in the health of ecosystems and to anticipate emerging threats in specific geographic areas, such as the Gulf of Mexico, the Chesapeake Bay, and the Great Lakes. The EPA, she said, is developing a process for assessing ecological risks much like the process now used to assess human health risks. The agency will review its programs for additional opportunities to protect species and habitat in the course of carrying out its statutory responsibilities, and will seek to incorporate ecological components into its ongoing programs.

Urban Falcons Return to Baltimore High-Rise for 14th Year

by Mark Phillips

On Friday May 28, 1993, Sandra Bruce and I took a brief break from our positions as biologists with the Fish and Wildlife Service's Office of Management Authority to witness an urban wildlife success story. We had the pleasure of accompanying Craig Koppie from the Service's Chesapeake Bay Field Office as he banded four peregrine falcon (*Falco peregrinus*) chicks in downtown Baltimore, Maryland. The nest site was situated on a ledge outside the 33rd floor of the US F & G (Fidelity and Guaranty) Building, where peregrines have successfully bred for 14 years.

In 1979, a female peregrine, Scarlett, selected the site for her nest and became probably the most widely publicized Endangered bird to have adapted to life in an urban setting. Unbeknownst to her and her family, Scarlett became an effective ambassador for wildlife when her story publicized the plight of rare animals in today's world. Unfortunately, however, possessing quintessential flying skills did not exempt her from the hazards of city life. Scarlett and many of her descendants have succumbed to various hazards, ranging from roof tar to, possibly, poison intended to control the pigeon population.

The current tenants of the nesting site, a pair known as Felicity and Beauregard, became the parents of four chicks that hatched appropriately enough on Mother's Day. The banding session for their chicks was timed so that the young birds would not be mature enough to avoid capture. At almost 3 weeks of age,

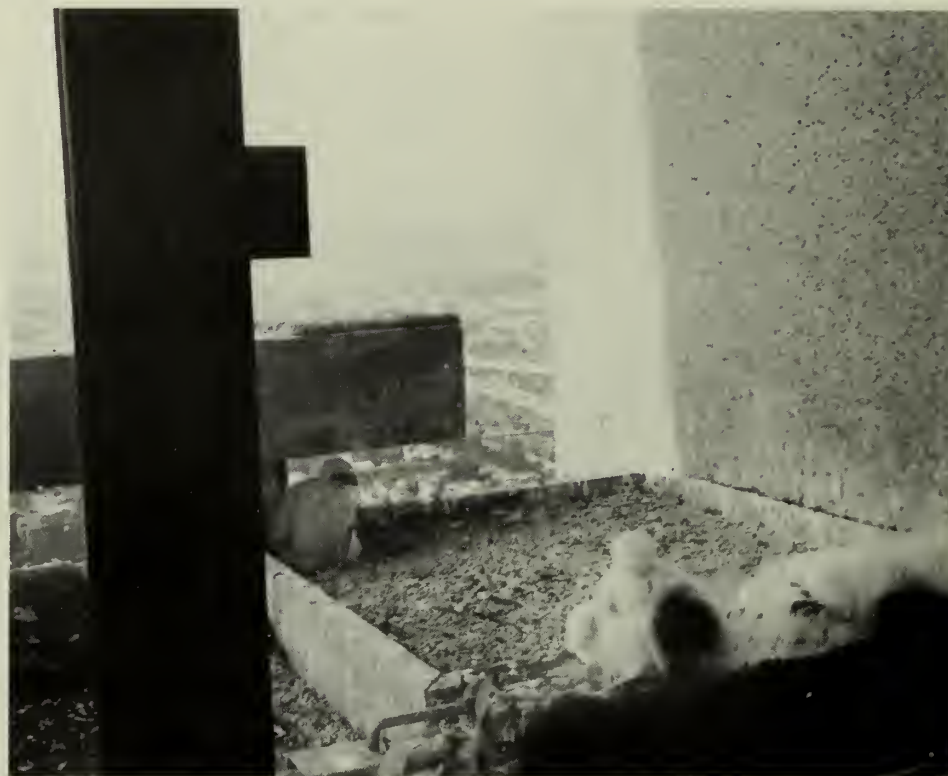


photo by Sandra Bruce

Two of the banded peregrine chicks are visible on their ledge of a downtown Baltimore office building. Note the adaptations to assist the birds in nesting—the carpeted landing area provides traction, while the frame and gravel help prevent eggs from rolling. John Barber, formerly with the Smithsonian Institution and now with U.S. F & G, has overseen the project since 1979 when Scarlett chose this site.

the 2 females were already noticeably larger than their male nest mates. All four had fluffy white down and inordinately large legs and feet.

Felicity and Beauregard did not seem to appreciate Craig's efforts to benefit the species. Although absent while their offspring were being removed from the ledge, the adults showed their displeasure by subjecting Craig to repeated attacks and very near misses as he safely returned

the four banded birds to the nest. Despite the commotion, the mission was a success. If all goes well, the young peregrines should fledge 5 to 6 weeks after hatching, gracing the skyline of Baltimore by Father's Day and continuing a legacy pioneered by Scarlett 14 years ago.

(Editor's note: Good news—as the Bulletin was preparing to go to press, we received word that all four young have fledged.)

Regional News

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brochures, and maintenance of seed banks from the most threatened drainage basins to preserve genetic diversity.

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During meetings with the FWS, the Federal Emergency Management Agency (FEMA) was made aware of its responsibility to conduct consultations under sec-

tion 7 of the Endangered Species Act for federally funded disaster relief projects that may affect Threatened or Endangered species. Recent severe storms along the Atlantic coast have resulted in proposals for beach and dune reconstruction and restoration projects that could affect the piping plover (*Charadrius melodus*), a beach-dwelling bird listed as Threatened. Depending on the timing and design of the projects, adverse impacts to nesting

piping plovers could occur; however, with appropriate timing and design, many projects could be beneficial to the plover. In New Jersey, approximately 75 projects were submitted for consultation during March and April.

* * *

Each January, throughout the Northeast, biologists and volunteers head for

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Yankton Research Station Studies Effects of Environmental Contaminants on Endangered Fish

by Steven J. Hamilton

Scientists at the Fish and Wildlife Service's (FWS) Yankton, South Dakota, Field Research Station are studying the effects of inorganic contaminants on three Endangered fish of the upper Colorado River. Employing the Station's unique capability to simulate water characteristics in the fishes' range, these contaminant studies are focusing on the Colorado squawfish (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and bonytail chub (*Gila elegans*).

Toxicity Assessments

Dam placement in the upper Colorado River and its tributaries has caused substantial adverse physical changes in the river, such as alterations in flows, water temperature, turbidity, salinity, and habitat. Although biologists investigating the decline of the three Endangered fish species have focused primarily on the physical alterations of the Colorado River, the role of chemical contaminants is also of critical concern. The upper Colorado River basin contains large areas of high-selenium (seleniferous) soils and bedrock. Selenium and other trace elements, such as arsenic, copper, and zinc, can adversely affect fish survival, growth, and reproduction.

In 1988, a Department of the Interior interagency working group made a reconnaissance investigation on the middle Green River, a major tributary to the upper Colorado River, in the known range of the three species. The investigation found levels of selenium, uranium, boron, zinc, and nitrate that may pose hazards to wildlife and human health. In limited samples, concentrations of selenium in Colorado squawfish and other fishes from the upper Colorado drainage were found to be at levels known to adversely affect reproduction in other fish species. Selenium in adult female fish is deposited in their eggs, lessening the chance for viable offspring.

Based on the 1988 investigation and an investigation conducted by the FWS Division of Environmental Contaminants, the Yankton Field Station is assessing the short-term (acute) toxicity of seven inorganic chemical contaminants in the Colorado squawfish, razorback sucker, and bonytail chub. Contaminants being studied include selenium (as selenate and selenite), boron, lithium, uranium, vanadium, and zinc. Additionally, the Station is assessing the long-term (chronic) toxicity of selenium in these fishes. The research is currently focused on the effects of selenium and other trace elements in irrigation waste water. Preliminary results of acute toxicity tests indicate that the three species have similar sensitivity to the seven inorganics at three life stages or sizes: swimup, about 1-gram fry, and about 2-gram fry. The exceptions are 1-gram and 2-gram razorback suckers, which were found to be two to three times more sensitive to selenate than the other two species.

In general, the Station's assessments ranked the chemical contaminants, from most toxic to least toxic, as follows: vanadium, zinc, selenite, lithium, uranium, selenate, boron. Further research is planned to (1) determine the concentrations of inorganics that, with long-term exposure, adversely affect survival, growth, and behavior; (2) link those effects to waterborne and foodborne concentrations, as well as body burdens (concentrations in whole body—a standard measure in toxicity studies); and (3) assess the threats posed by inorganic contaminants to endangered fish populations by comparing concentrations causing adverse biological effects to concentrations found in the environment.

Yankton's Unique Facilities Simulate Natural Conditions

The Yankton station is one of eight under the direction of the FWS National

Fisheries Contaminants Research Center in Columbia, Missouri. The Yankton Station is well equipped to perform toxicity studies on fish species. Facilities include two wells that provide an uncontaminated source of hard water suitable for maintaining cold- and warm-water fishes and aquatic invertebrates. Waste water from toxicity studies goes to a zero-discharge, evaporative lagoon. Research equipment includes large, temperature-controlled water baths used in acute and chronic toxicity testing, and flowing water test systems that are controlled to simulate natural environmental conditions (including photoperiod and water temperature). These systems provide realistic environmental pollution conditions for studying the long-term effects of contaminants on test animals' survival, growth, and behavior at various life stages.

The Station's experimental water treatment facilities have the unique ability to create large quantities of waters characteristic of a wide range of environmental conditions, from the soft waters of acid-sensitive lakes in the northeastern United States to saline ocean water. Thus, the Station can conduct special studies with test species native to areas outside the Midwest. Use of site-specific water qualities in toxicity studies is important because certain characteristics, such as pH and hardness, can greatly alter the toxic effects of inorganic contaminants. For research studies on the Endangered fish of the upper Colorado River, the Station simulates the characteristics of the middle Green River in northeastern Utah.

Dr. Hamilton is the leader of the Yankton Field Research Station. He also holds faculty appointments at the University of South Dakota and South Dakota State University.

ice-free waterways to census wintering bald eagle (*Haliaeetus leucocephalus*) populations. Like the nesting population, which is slowly but steadily increasing in the Northeast (149 pairs in New England in 1992), the numbers of bald eagles wintering along major rivers, lakes, and coastal areas are also growing. Maine, with the region's largest nesting population, also supported the most wintering birds, estimated at about 400. Massachusetts reported a record high of 70 wintering birds in 1992-1993, while Connecticut reported 61, New Hampshire 23, and Vermont 12. In Rhode Island, where a sighting of a bald eagle is still an uncommon event, eagles were observed from November to March, and three were counted during the mid-winter census.

Many volunteers and a number of industries have cooperated or donated time, funds, or services to bald eagle conservation efforts in New England, including Northeast Utilities in Connecticut, and Massachusetts Electric Company, Bank of Boston, Eagle Aviation, and Boston Whaler Company in Massachusetts.

* * *

Region 6 – The Service is continuing to coordinate with Washington County, Utah, on development of a Habitat Conservation Plan for the desert tortoise (*Gopherus agassizii*). Washington County is experiencing accelerated growth and de-

BOX SCORE						
LISTINGS AND RECOVERY PLANS						
Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	249	9	22	336	34
Birds	73	153	17	0	243	72
Reptiles	16	64	18	14	112	26
Amphibians	6	8	5	0	19	9
Fishes	58	11	37	0	106	59
Snails	12	1	7	0	20	26
Clams	51	2	5	0	58	40
Crustaceans	10	0	2	0	12	4
Insects	15	4	9	0	28	14
Arachnids	3	0	0	0	3	0
Plants	311	1	76	2	390	157
TOTAL	611	493	185	38	1,327*	441**
Total U.S. Endangered	611	(300 animals, 311 plants)				
Total U.S. Threatened	185	(109 animals, 76 plants)				
Total U.S. Listed	796	(409 animals, 387 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, chimpanzee, 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.

** There are 347 approved recovery plans. Some recovery plans cover more than one species, 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: 53 fish & wildlife
39 plants

Number of CITES Party Nations: 117

June 30, 1993

velopment, much of which is projected for existing desert tortoise habitat. Plan issues being worked out include levels of

incidental take, size and location of protected habitat, and inclusion of listing candidate species in the Plan to provide them protection.

March–May 1993

Vol. XVIII No. 2

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

FIRST CLASS
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U.S. DEPARTMENT OF THE INTERIOR
PERMIT NO. G-77



ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service



FEDERAL
PUBLICATION

Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho

by Edward E. Bangs and Steven H. Fritts

Wolves were once one of the most widely distributed land mammals on earth. In North America, gray wolves (*Canis lupus*) historically occurred in almost every habitat north of what is now Mexico City. However, as European settlers decimated wild ungulate populations and replaced them with livestock, wolves and other large predators that occasionally attacked livestock were persecuted. In addition to the real and perceived conflicts with livestock, old myths had portrayed wolves as evil and satanic. For these reasons, it is not surprising that most people during the settlement era viewed wolves in an extremely negative context.

Wolf persecution and eradication were relentless and conducted with almost hysterical zeal. Wolves were not just shot, trapped, and poisoned but burned alive, dragged behind horses, and mutilated. By 1930, government predator eradication programs had eliminated wolf populations from the western United States. Similar attitudes resulted in the elimination of wolf populations from the southern portions of the western Canadian provinces by the 1950's. The fact that these events happened within the lives and memories of many western residents strongly affects the social and political climate surrounding wolf recovery efforts today.

Natural Wolf Recovery

In the 1960's, after scientific wildlife research began to dispel many of the



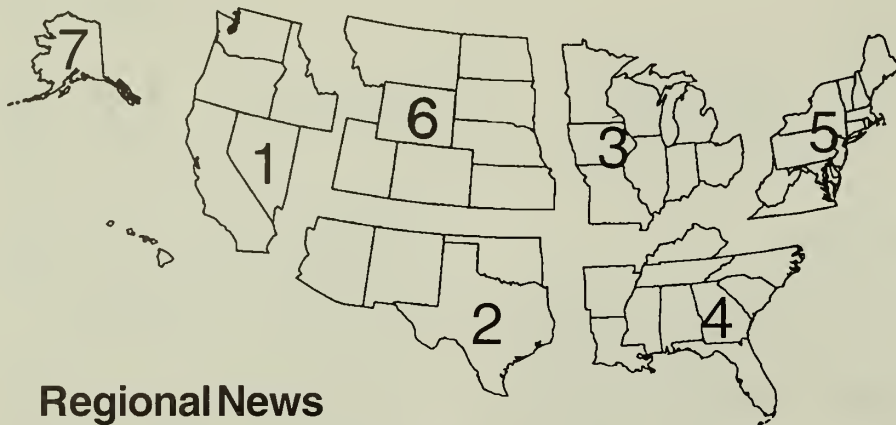
Fish and Wildlife Service photo

negative myths surrounding predators, the first calls for reintroduction of wolves to Yellowstone National Park were made. About the same time, Canadian wildlife management agencies took steps to encourage reestablishment of wolf populations in parts of southern British Columbia and Alberta by eliminating bounties and restricting wolf hunting and trapping. Throughout the 1960's and 1970's, lone wolves were occasionally sighted or killed in the northern Rocky Mountains of Montana, Idaho, and Wyoming (Weaver 1978, Ream and Mattson 1982). While Canadian wolf populations continued to expand southward, it was not until 1986 (55 years after eradication) that wolves again produced pups in the western United States (Ream et al. 1989). By 1993, the wolf population in

northwestern Montana had increased to about 50 wolves in 5 packs. No wolf packs have been documented in other areas of the western United States, although lone wolves continued to be reported in Wyoming, Idaho, Washington, and other areas.

In 1988, the U.S. Fish and Wildlife Service (FWS) established an interagency wolf recovery program to assist natural recolonization in Montana (Bangs 1991). The program strongly emphasized public education and information. Controversy over wolves and their management was still largely an issue of symbolism, with strong emotion, rumor, and myth on both "sides" of the wolf recovery issue. As a result, illegal killing by the public was the single greatest threat to wolf recovery in Montana.

(continued on page 18)



Regional News

Regional endangered species staffers have reported the following news:

Region 1 - On July 27, the Fish and Wildlife Service (FWS) issued two no-

jeopardy biological opinions for the National Marine Fisheries Service (NMFS) and Bureau of Indian Affairs (BIA) allowing commercial net fisheries to begin for

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

Director
Mollie Beattie
(202-208-4717)

Michael J. Spear,
Assistant Director for
Ecological Services
(202-208-4646)

Jamie Rappaport Clark, *Chief,
Division of Endangered Species*
(703-358-2171)

Marshall P. Jones, *Chief,
Office of Management Authority*
(703-358-2093)

John J. Doggett, *Chief,
Division of Law Enforcement*
(703-358-1949)

TECHNICAL BULLETIN
Editor, Michael Bender
Assistant Editor, Ann Haas
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S. 11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Steve Chambers, *Acting Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; T.J. Miller, *Acting Endangered Species Specialist*.

Region 4, Richard B. Russell Federal Bldg., 75 Spring Street, S.W., Atlanta, GA 30303 (404-331-3580); James W. Pulliam, *Regional Director*; Tom Olds, *Assistant Regional Director*; David Flemming, *Endangered Species Specialist*.

Region 5, 300 Westgate Center Drive, Hadley, MA 01035 (413-253-8659); 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); Ralph O. Morgenweck, *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*.

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.



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steelhead (tribal fisheries only), salmon, herring, anchovy, and dogfish shark in ocean and bay waters around the State of Washington. The consultations, conducted under Section 7 of the Endangered Species Act, were initiated in late May. At issue was the potential for take of the Threatened marbled murrelet (*Brachyramphus marmoratus*) in gillnets and purse seines along with the targeted fish.

The biological opinions allow each fishery (treaty and non-treaty) an incidental take of five marbled murrelets. Neutral and volunteer observers on a small percentage of the boats will total the marbled murrelet mortalities and retrieve the birds. If the limit of five is reached, the agencies will reinitiate consultation with the FWS. A group of FWS, NMFS, BIA, Washington Department of Wildlife, Washington Department of Fisheries, and environmental and fishing industry representatives will meet weekly to review observer data and possibly modify the fishery to avoid take.

* * *

Steve Goodbred of the FWS Sacramento Field Office attended the western division of the American Fisheries Society meeting, including sessions on stream habitat evaluation and sensitive aquatic ecology. The opening session featured speakers such as Tom Harris (known for his coverage in the *Sacramento Bee* of selenium poisoning from irrigation wastewater flowing into Kesterson National Wildlife Refuge), Marc Reisner of *Cadillac Desert* fame, and Van Stauter, President of Fox News. One of the major messages of the conference was studying and managing aquatic ecosystems for biodiversity and landscape ecology, not just single species or habitats.

* * *

A biologist from the FWS Carlsbad (California) Field Office met with representatives of the City of San Diego and the Navy at the Naval Air Station in Miramar regarding vernal pools that have formed on top of a landfill on the base. The landfill had been capped with clay soil that eventually settled to form de-

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Mollie Beattie Sworn in as Director of the Fish and Wildlife Service



photo by Tami Heilemann

Mollie Beattie was sworn in September 14 as Director of the Fish and Wildlife Service (FWS) following confirmation by

the Senate September 10. Ms. Beattie, a veteran State natural resources official from Vermont, becomes the first woman to direct the 9,000-person agency.

"Mollie Beattie brings experience, commitment, and energy to the U.S. Fish and Wildlife Service," said Interior Secretary Bruce Babbitt. "She is certain to provide the strong leadership we need to conserve our fish and wildlife resources for present and future generations."

Before President Clinton nominated her for the FWS post, Ms. Beattie was executive director of the Richard A. Snelling Center for Government in Vermont. She served as deputy secretary for Vermont's Agency of Natural Resources in 1989-90; Commissioner for the Vermont Department of Forests, Parks and Recreation in 1985-89; and Program Director and Lands Manager for the

non-profit Windham Foundation in 1983-85. Ms. Beattie earned a B.A. in Philosophy from Marymount College in Tarrytown, N.Y., an M.S. in Forestry from the University of Vermont, and an M.P.A. from the Kennedy School of Government.

The major responsibilities of the FWS are migratory birds, endangered species, freshwater and anadromous fish, and certain marine mammals. It manages 491 National Wildlife Refuges, covering more than 91 million acres, and 84 National Fish Hatcheries. The FWS mission includes enforcement of Federal wildlife laws, administration of the Endangered Species Act, wetland protection and management, and distribution of Federal aid to the States for fish and wildlife restoration.

Regional News

(continued from page 2)

pressions that hold water and support the Endangered San Diego mesa mint (*Pogogyne abramsii*). Recently, cracks formed in the clay and started leaking methane gas. The Air Pollution Control District has issued a violation notice and is asking Miramar to re-cap the landfill. This action will require a Clean Water Act 404 permit. The FWS advised the Navy and the City of San Diego that a Section 7 consultation will be required to address impacts to the mesa mint.

* * *

The FWS Ventura (California) Field Office has issued a no-jeopardy biological opinion for the Rail-Cycle/Bolo Station Landfill, a large-scale landfill operation that would dispose of non-hazardous solid waste from southern California coastal cities in a 4,800-acre (1,940-hectare) area of the Mojave Desert near Amboy, California. Most of the project site is not desert tortoise (*Gopherus agassizii*) habitat, but project implementation would result in an estimated inci-

dental take of up to 18 desert tortoises. According to a biologist familiar with the project, trash from the Los Angeles Basin would be buried in this giant landfill at an old railroad station stop "on a scale that most people cannot envision."

* * *

The FWS Law Enforcement Office in Torrance, California, is developing a brochure and public service announcement for radio and television to alert members of Asian communities in the Los Angeles area about Endangered Species Act protection for desert tortoises and sea turtles, following the conviction of two men who took nine tortoises from the Mojave Desert as food for a Cambodian wedding ceremony. The men were fined \$5,000 each.

In an effort to prevent future violations, FWS Special Agents are working with public and private agencies to prepare alerts in several languages, including Cambodian, Vietnamese, and Laotian.

A California Highway Patrol Officer, Dan Laza, initiated the investigation on May 7 when he pulled over a 3-car carava-

van driving slowly along Interstate 15, near Barstow, apparently looking for more tortoises. After being stopped, a passenger tried to stuff under the rear seat a large, white rice-bag that contained round, hard, moving objects—five desert tortoises. A second bag contained four more. Officer Laza then contacted a Bureau of Land Management (BLM) ranger and a California Department of Fish and Game warden. The cases were prosecuted before U.S. Magistrate Kirtland L. Mahlum in Barstow. The Cambodian nationals also face State charges of failure to appear in court and possession of an endangered species.

All of the desert tortoises are being tested for Upper Respiratory Disease. The three tortoises that had been removed from BLM study plots will be returned to their burrow sites, health permitting. The other six will be placed through the tortoise adoption program.

* * *

In early July 1993, the Reno Field Office and the Seattle national Fisheries Re-

(continued on page 20)

Cooperative Program Pays Off for the Endangered 'Alala

by Barbara Maxfield

When only 24 birds make up a species' entire population, the addition of 7 chicks is a noteworthy event. And it's one that has all the parties involved — from the State of Hawaii, the U.S. Fish and Wildlife Service (FWS), the Zoological Society of San Diego, The Peregrine Fund, Greenfalk Consultants, National Audubon Society, and Hawaii Audubon Society to the private landowners whose ranches support the last remaining wild population — smiling broadly. The object of their cooperative efforts is the 'alala or Hawaiian crow (*Corvus hawaiiensis*), one of the most endangered birds in the world, according to the National Academy of Sciences' National Research Council.

For almost 10 years, differing opinions on appropriate management of wild 'alala populations led the landowners to restrict access to their property and the 'alala. A lawsuit filed by the Sierra Club Legal Defense Fund in April 1991 on behalf of the National and Hawaii Audubon Societies against the landowners and the FWS sought "to force the Federal government to take action to save the 'alala before it becomes extinct." In an effort to resolve the lawsuit, the parties involved — plus cooperators from across the nation — have joined in a program to benefit the 'alala.

Decline From Abundance

Once one of three *Corvus* species in the Hawaiian Islands, the 'alala is the only remaining Hawaiian crow. Its ancestral origins are unknown, but it is probably a descendant of a *Corvus* ancestor from the Australasian region¹. Although similar to North American crows, the 'alala has a bulkier bill and a duller black color, with tinges of brown in the wings.

The Hawaiians considered the 'alala an 'aumakua or spirit. When Captain Cook

arrived in the islands in the 1770's, he was not allowed to collect it since such an action would hurt or offend the spirit. (The earliest 'alala specimen was taken during the visit of Cook in 1778, despite the warning.)

The range of the 'alala apparently was relatively restricted even when populations were abundant. Its historic range is a narrow v-shaped belt of dry woodlands, o'hia (*Metrosideros polymorpha*) forests, and moist o'hia-koa (*Acacia koa*) forests at elevations of about 1,650 to 5,900 feet (500 to 1,800 meters) on the Island of Hawai'i (the "Big Island"), stretching from Hualalai southward to South Kona and northwest again to Kilauea Crater.

Although the species was described as "abundant locally" in the late nineteenth century, 'alala populations shortly began to fall². The exact causes of the decline and their relative importance may never be known, but scientists have identified several probable factors:

- **Habitat modification.** The relatively narrow range of the species suggests a specific habitat preference for open wet o'hia/koa forests or dry o'hia forests. Lava flows, agriculture and ranching, and commercial logging have greatly reduced this forest habitat. In like manner, the diverse understory of fruit-bearing trees and shrubs that serve as the 'alala's primary food source has been heavily impacted by introduced ungulates such as cattle, sheep, and pigs as well as by non-native plants.

- **Predation.** Although early Polynesians did use crow feathers in some of their ceremonies, the brightly colored honeycreeper feathers were more popular. Arriving Europeans hunted crows for sport, and farmers shot them as agricultural pests. Mongooses, feral cats, and roof rats also prey on eggs and/or young crows. Even the pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) and the 'io or Hawaiian hawk (*Buteo*



Adult 'alala at the Olinda Endangered Species Propagation Facility on Maui.

solitarius), a species recently proposed for reclassification from Endangered to Threatened, are probable predators on 'alala chicks.

- **Diseases and parasites.** Introduced diseases, such as avian pox and malaria, appear to have played an important role in the decline of many endemic Hawaiian birds, including the 'alala. Mites have also been documented to parasitize the 'alala.

By 1940, the 'alala was still common within its range, but was declining rapidly. In early 1993, only 12 'alala were known to exist in the wild, all on private land in the Kona District. An additional 11 birds were in captivity at the State of Hawaii's Olinda Endangered Species Propagation Facility on the Island of Maui.

¹ National Research Council, *The Scientific Bases for the Preservation of the Hawaiian Crow*, Washington D.C., National Academy Press, 1992, page 12.

² Ibid., page 16.

(continued on page 5)

Cooperative Program for 'Alala

(continued from page 4)

National Research Council Issues 'Alala Report

Because of the differing views on appropriate management of 'alala, the FWS asked the National Research Council (NRC) in 1991 to review the existing information and develop recommendations for recovering the species. Options considered ranged from bringing all the remaining 'alala into a captive breeding program to leaving the wild population completely undisturbed. The NRC completed its work and filed its report in May 1992.

The information and recommendations contained in the report formed the basis for the Long-Term Management Plan for the 'alala, prepared by the FWS and completed in 1993. This plan was reviewed and endorsed by the newly reinstituted 'alala recovery team, and served as the guideline for management during the 1993 'alala breeding season.

Peregrine Fund Joins Project

In March, the FWS entered into a cooperative agreement with The Peregrine Fund of Boise, Idaho, to carry out part of the plan. The Zoological Society of San Diego and Greenfalk Consultants of Boise, Idaho, subcontracted with the Fund to assist in the project.

Because knowledge about appropriate techniques for incubating 'alala eggs, rearing young, and reintroducing them to the wild is very limited, Greenfalk Consultants was asked to conduct research on similar crow and raven species in Idaho to improve the success rates in working with 'alala. The studies focused on nest manipulation techniques, egg transportation and incubation procedures, and nestling release methods.

The management plan calls for removing the first clutch of eggs from nesting wild 'alala, then incubating, rearing, and releasing at least some of the young back into the wild. Upon the removal of the first clutch, the 'alala will be allowed to raise their second clutch on their own.

This technique is known as double-clutching, and has been used successfully with other Endangered species, such as the California condor (*Gymnogyps californianus*), to bolster population sizes rapidly.

During April of this year, first clutches were collected from the three breeding pairs in the wild. This season's nesting pairs (named Kalahiki, Kealia, and Kiilae after the geographic areas in which they reside) were closely monitored by FWS personnel. Several days after incubation appeared to begin, an FWS biologist scaled the nest tree and removed the eggs for artificial incubation and rearing.

First Clutch Produces Six Chicks

Four eggs were removed from the Kalahiki nest, three from the Kealia nest, and one from the Kiilae nest. All were flown out via helicopter and taken to a temporary incubation facility, affectionately known as the Egg House. This facility is operated by personnel from the San Diego Zoological Society at a rented house in the town of Captain Cook, Hawaii.

Shortly, the first chick (named *Hiwa hiwa*, Hawaiian for "precious, black, and pleasing to the gods") hatched. Within 2

weeks, she was joined by five other chicks. One egg (that of the Kiilae pair) proved to be infertile, and the fourth egg from the Kalahiki pair failed to hatch.

After about 7 weeks of tender, loving care by the San Diego Zoo personnel, the birds outgrew the rearing facility and were ready to be moved. On June 7, the oldest three chicks, all females, were taken to a hacking facility and aviary built by The Peregrine Fund on State land adjacent to the wild 'alala habitat. Two of the other birds, both males, joined them in an adjacent hack box on June 17. The sixth chick joined the captive breeding flock.

Strengthening the Olinda Flock

One of the priorities of the 'alala management plan is to increase and genetically diversify the captive breeding flock so that it can produce additional birds for restocking wild habitats. The FWS and State of Hawaii entered into a cooperative agreement in September 1992, providing much needed funding to improve the Olinda Endangered Species Propagation Facility.

(continued on page 6)



The Peregrine Fund built this aviary and hacking facility adjacent to the 'alala habitat to promote interaction between the fledglings and the wild flock.

Fish and Wildlife Service photo

Cooperative Program for 'Alala

(continued from page 5)



Fish and Wildlife Service photo

This hungry 'alala hatchling is one of several surviving chicks produced in 1993.

On June 18, the sixth chick from the wild flock's first 1993 clutch, a female from the Kealia pair, was flown to Olinda. She will be paired with a male chick hatched at the facility in 1992. Biologists hope she will provide some genetic diversity in the flock to reduce the inbreeding problems experienced at Olinda.

In the meantime, the Olinda staff was successful in incubating and hatching an egg from its own flock on June 8. Scientists spent 36 hours carefully picking off pieces of the shell. The chick was positioned under the egg's air cell, which probably would have been fatal in the wild. Unfortunately, despite these heroic efforts, the chick died several weeks later. A necropsy revealed no signs of injury or disease, but tissue samples have been sent to the San Diego Zoo pathology department for further analysis. The remaining 13 'alala in the Olinda flock were quarantined as a precaution, but they appear to be healthy.

Wild 'Alala Continue Renesting

After the removal of its first clutch, the Kalahiki pair hatched at least one and probably two additional eggs, but the hatchlings disappeared within a few days. The cause of the nest failure has not been determined.

This year, the Kealia pair also renested and hatched at least one, and probably more, eggs. They raised the chicks for approximately 2 weeks, but then began exhibiting unusual behavior. Biologists investigated and found a dead chick at the base of the tree, along with an empty nest. The chick could have been dislodged by the parents or a predator, but it showed no sign of predation and was apparently healthy before its fall from the nest.

Although the Kiilae pair also built a second nest, no chicks hatched. A fourth pair (known as the Hookena pair) was seen building a nest—believed to be their first—but no eggs were laid.

The Kalahiki pair, which succeeded in raising one chick in the wild in 1992, renested for a third time this season and began incubating eggs. After biologists monitoring the nest observed that the adults were not spending enough time in the nest to ensure the survival of the eggs, the nest tree was climbed and the three eggs removed on June 30. The eggs were cold and wet, and were immediately transferred to the temporary incubation facility in Captain Cook.

Two of the eggs were infertile, but the third egg was viable and hatched on July 4. Named *Pomaika'i* (Hawaiian for "fortunate" or "lucky"), this seventh 1993 chick from the wild 'alala flock was later transferred to Olinda to join the captive breeding flock.

Biologists are unsure why the Kalahiki pair abandoned their third nest. The male became less and less attentive to the female, and she may have been forced to leave the nest to search for her own food. The birds also began molting and may have been unable to produce a third nest.

Back at the Aviary . . .

Meanwhile, back at the aviary, the oldest three chicks were released from the hack box into the aviary and began to explore their new temporary home. The 50- by 110-foot (15- by 34-meter) aviary was designed and constructed by Peregrine Fund staff. Elaborate precautions were taken to protect the chicks from predators and disease. The entire facility is surrounded by livestock fencing and an electrified wire to deter feral pigs and domestic livestock. Steel siding, electrified wire, and hardware mesh on the sides of the aviary prevent access by rats, cats, and mongooses. Mosquito-proof netting surrounds the hack box to protect the less than fully feathered young from being infected with avian malaria or pox.

After their release from the hack box, all of the birds became acclimated to the aviary and actively explored the entire area. They were fed an assortment of food, including a variety of native fruits typical of the species' natural diet.

Joining the Wild Flock

One of the reasons the aviary was constructed near the wild habitat was so that interaction between the fledglings and wild population could be enhanced before the young birds were released into the wild flock. The surrogate research has shown that young crows and ravens on the mainland can be quickly assimilated into the wild flock if there are interactions and associations before the release. When the young 'alala were first placed into the facility, some of the wild birds approached and communicated with their off-spring. From the beginning, the male of the Kalahiki pair (and the father of the three oldest chicks), visited the facility regularly.

From the time their eyes opened, the birds were fed with a crow hand puppet to prevent them from imprinting on humans. In the aviary, the birds were free to forage from the vegetation within their

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Genetic Restoration as a Survival Tool: Fish and Wildlife Service Reviews Comments on Florida Panther Recovery

One hundred years of isolation and inbreeding have reduced the Florida panther to a single 30- to 50-member population that faces extinction unless immediate steps are taken to restore its genetic health, experts say. Accordingly, the Fish and Wildlife Service is now reviewing public input on options and issues that should be considered in developing an Environmental Assessment (EA) to address genetic management options for this critically endangered species, as described in the approved recovery plan. Other members of the Florida Panther Interagency Committee will participate in the EA preparation. The comment period was announced in the *Federal Register* on August 17 and open for 30 days.

One option under consideration is a program to restore the historic gene flow from other *Felis concolor* subspecies that exchanged genes with the Florida panther under natural conditions. Scientists believe that gene exchanges occurred from the north through *F. c. cougar*, and from the west and northwest through *F. c. stanleyana* and *F. c. hipplestes*. The Florida panther now contains only a fraction of the genetic variability that existed before the animals were isolated a century



photo: John and Karen Hollingsworth

Florida Panther #45, a 14-month-old male, at the Florida Panther National Wildlife Refuge.

or more ago as a result of human persecution (shooting, trapping, and poisoning) and habitat destruction.

In particular, the Florida panther suffers from sperm abnormality that exceeds 90 percent, cryptorchidism (a testicle-descending abnormality that can render males functionally sterile, as noted in 2 of

4 kittens handled in 1992), congenital heart defects, and possible immune deficiencies.

Workshops on genetic health and population viability in May 1991 and October 1992 brought together geneticists and experts on small population bi-

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Cooperative Program for 'Alala

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realm and from food placed on a platform. Then, on August 23, this year's efforts at the aviary culminated in a happy event. The doors of the facility were opened and, in a "soft release," the young crows were freed into the wild. Supplemental feeding on the platform will be maintained until they learn to find their own food. By the end of August, all six of the released birds were doing well.

Cooperation Pays Off

Although disappointed that no young were raised in the wild this year, FWS

personnel — as well as all the cooperators — are very pleased that the 'alala population increased by seven birds. After years of controversy and dissent, the cooperative efforts of the past 2 years have definitely benefited the species.

The parties involved in the lawsuit have come to a final settlement and attention is turning to other management actions to benefit the 'alala. Topping the agenda is support for a second captive propagation facility, this one to be located on the Big Island. The facility will concentrate first on the 'alala, but in future years will expand to aid as many as 18 other rare species of Hawaiian forest birds.

Coordinating with more than 12 separate entities has been a challenge at times, but the FWS Pacific Islands Office staff knows the effort has its rewards. Last year, on its own, the wild 'alala flock fledged only one chick. But in 1993, with considerable help, this severely endangered species increased its numbers by nearly one-third, to a grand total of 31 birds!

Barbara Maxfield is the Information and Education Specialist for the FWS Pacific Islands Office in Honolulu, Hawaii.

ology, captive-breeding, and panther health, biology, and demographics. They concluded that restoration of genetic variability is critical to the survival of the Florida panther. In view of population viability analysis projections that the spe-

cies will likely become extinct in 25 to 40 years and the threat that a single catastrophic event could hasten this process, experts emphasize that a program to restore the panther's genetic health should be initiated as quickly as possible.

Rapid and gradual extinction processes have depleted panther numbers. In addition to genetic erosion, other contribut-

ing factors include habitat loss, environmental contaminants, highways, human activities, and a lack of prey resources.

The Fish and Wildlife Service expects to publish a Notice of Availability of the draft EA in the *Federal Register* later this fall.

Some Thoughts on Panther Study: A Personal View

by Ronald M. Nowak

When Roy McBride and I began an investigation of the Florida panther in early 1973, under sponsorship of the World Wildlife Fund, we could not have imagined the management, scientific, political, and financial developments that would follow. Indeed, we were looking for an almost mythical animal—one that some authorities thought was already extinct. Certainly, no definitive breeding population was known.

We had suggested that perhaps the dog-tracking procedures used by western mountain lion hunters could help locate such a population in Florida and lead to methods that would aid in its conservation. A west Texas rancher, Roy McBride was also a mountain lion hunter. We received a \$1,700 grant and spent about a month in Florida. Remarkably, McBride and his team of lion-hunting dogs treed a panther near Lake Okeechobee shortly after our arrival. We confirmed that several other panthers had been killed in the area during the previous year. On a brief return visit in 1974, McBride located panther sign in two places.

Despite our findings in southern Florida, we generally were pessimistic about the panther's situation, and were concerned that its rarity and vulnerability might preclude further intensive study. But the die had been

cast. There *was* a population, and individuals *could* be located and captured through the methodology developed in the west. It was not long before Federal and State agencies were planning major investigations.

McBride, and later his son Rocky, and their dogs were called into regular service. (In recent years, Roy McBride's younger son, Rowdy, has worked with him in Florida on the panther study.) Over time, dozens of animals were live-captured and radio-tracked, making it possible to determine the precise distribution of populations. Ecological and physiological research proliferated, millions of dollars were spent for land purchase and roadway modifications, and the panther became Florida's official State Animal. However, controversy also followed about stress to the cats, the possible long-term effects of removing wild animals for captive-breeding purposes, and even whether the panther population was a fully native component of the south Florida ecosystem.

Some people say that researchers should never have begun chasing, marking, and analyzing panthers, but should have left them behind their veil of mystery and simply done what was possible to protect their habitat. On the other hand, could the immense public and scientific support for panther conservation have developed

without gaining some familiarity with the animal?

Looking back, I am not certain that what we did two decades ago was for the best. Yet the fact that we still have wild Florida panthers, together with many people prepared to support their continued survival and well-being, gives cause for hope.

Dr. Nowak, a mammologist with the Fish and Wildlife Service's Office of Scientific Authority, is the author of the fifth edition of *Walker's Mammals of the World*, published in 1991 by Johns Hopkins University Press, Baltimore, Maryland. The late Ernest Walker was assistant director of Washington's National Zoological Park. Dr. Nowak's views as presented in this article do not necessarily represent those of the Fish and Wildlife Service.

(Editor's Note: Since the radio-collaring program began in 1982, 2 panther deaths have been attributed, directly or indirectly, to this component of the recovery program. Altogether, 54 animals have been radio-instrumented and monitored.)

Hockey Team Energizes Florida Panther Recovery Fund

by Ann Haas

A new hockey team, the Florida Panthers, has given impetus to ensuring the survival of its namesake, one of the most critically endangered species in the country.

H. Wayne Huizenga, owner of this National Hockey League team, has donated \$34,000 to the Panther Recovery Fund held by the National Fish and Wildlife Foundation, a non-profit conservation organization that in turn has provided \$16,000 in matching funds to benefit *Felis concolor coryi*.

In addition to this donation, the sports franchise will institute a "Panther Saves" project, through which the team will solicit pledges from corporations and the general public to contribute to the fund each time a Panther goalie makes a "save"—that is, prevents an opponent from scoring—during home games of the 1993-94 season. Along with the "Panther Saves" project, the organization is sponsoring the production of a hockey videotape, to be available from Blockbuster Video stores, which will donate all rental fees to restoring the endangered cats. The Foundation has agreed to match every dollar with an additional 50 cents. The educational video will rent for 50 cents.

In making the announcement of the historic partnership, Acting Director of the Fish and Wildlife Service (FWS) Richard Smith termed the initiative "an excellent model" and observed that it will "raise not only funds, but public awareness of the current plight of the Florida panther." Commented the Executive Director of the National Fish and Wildlife Foundation, Amos S. Eno, "It is encouraging to see professional sports, corporate America, and a conservation organization joining hands to bring attention to our rare and endangered species."

Mr. Huizenga added, "Our name-the-team contest showed real enthusiasm for the Florida Panther, and we want to do something tangible on behalf of our State animal. I'm inviting hockey fans to participate in the "Panther Saves" program,



Logo for the Florida Panthers, a new National Hockey League Team.

and hoping for support from a whole range of donors—from school children to corporations. I'm glad to be a part of efforts to help Florida panthers return to the wild and ensure that those wild places are there for the future."

Among the priority projects of the fund are protecting and acquiring habitat, reintroducing Florida panthers into their historic range, restoring the genetic diversity of the species, and creating educators' guides and developing displays. Working with private landowners to protect high-quality habitat also is an important aspect of recovery.

The number of Florida panthers in the wild is estimated at only 30 to 50 adult animals. A single catastrophe could result in their extinction. Listed since 1967 as Endangered, the cat continues to be threatened by habitat loss, declining genetic diversity, highway-related mortality, and environmental contamination.

In 1984, Congress established the National Fish and Wildlife Foundation to act as a catalyst for conservation by making Federal funds available to match private sector contributions, thus creating an incentive for giving by individual citizens and organizations. The Foundation is a non-profit organization dedicated to conservation including programs for habitat protection, environmental education, public policy development, natural re-

sources management, ecosystem rehabilitation, and leadership training for conservation professionals. To date, the Foundation has undertaken more than 700 projects and leveraged more than \$85 million for fish and wildlife protection.

The Florida Panthers recently began their first NHL season in Miami. Mr. Huizenga is also the founder of Blockbuster Entertainment Corporation and owner of the new Florida Marlins baseball team. He was one of three founders of Waste Management, Incorporated, which began as a trash company in Chicago, Milwaukee, and Fort Lauderdale, and now is the largest of its kind, disposing of all types of waste and employing thousands of people in the United States and 20 other countries.

Four agencies are actively involved in restoring Florida Panthers to a secure status in the wild. Pledged to coordination and public participation, the Florida Panther Interagency Committee consists of the FWS, the National Park Service, the Florida Game and Fresh Water Fish Commission, and the Florida Department of Environmental Protection. Recently, the FWS created the Florida Panther National Wildlife Refuge near Naples for this Endangered species.

The FWS Regional Director in Atlanta, Jim Pulliam, signed an agreement with the Foundation on April 15, 1992, establishing the Florida panther fund to provide a repository for contributions for the species. The Foundation manages the panther fund for the State and Federal recovery effort.

How You Can Help

The Florida panther recovery fund is one of several the National Fish and Wildlife Foundation operates on behalf of the FWS to help restore endangered and threatened species. Individual funds

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Ecosystem Management and Linkage Zones for Grizzly Bears and Other Large Carnivores in the Northern Rocky Mountains in Montana and Idaho

by Christopher Servheen and Per Sandstrom



grizzly bear

photo by William S. Keller

Habitat fragmentation, as well as outright destruction, is a major cause of wildlife decline throughout the world. Many formerly intact North American ecosystems supporting large mammals have been divided to the point that they have lost considerable value as wildlife habitat. Causes of habitat fragmentation directly related to human activities include road building and use, residential development, timber harvest and associated cover removal, water impoundments, railroads, and human presence. When such activities occur in a linear pattern, such as along a valley bottom, they have the potential to inhibit the movement of large carnivores and increase their mortality risk.

Grizzly bear habitat has been fragmented to a significant degree in the past 200 years, a fact that complicates recovery efforts. Small habitat fragments are more difficult to manage, and the populations living within them are more vulnerable to deleterious demographic, genetic, and stochastic or random factors.

The recently revised Grizzly Bear Recovery Plan outlines a process for evaluating the areas between ecosystems to assess

their usefulness for bear movement. The objective of such an assessment is to identify viable linkage zones so that managers can maintain or enhance their value. It is important to recognize, however, that simply allowing the possibility of movement does not guarantee that these areas will be used; we have no way to make bears or any other animal use linkage zones.

Evaluating Habitat From a Landscape Approach

Landscape ecology is the study of the interactions between organisms and the environment at the landscape scale. The analysis of the interaction between landscape structure and its effect on organisms in the environment is spatial analysis. Characteristics of the landscape, combined with the ecology of the animals in question, determine the land's ability to support the needs of resident wildlife for food, shelter, breeding sites, and natural movements. As human actions change the characteristics of the landscape, they also change its capability of supporting resident wildlife.

To evaluate habitat fragmentation in the northern Rocky Mountains of Montana and Idaho, we combined several layers of landscape-level information in a computer-based geographical information system (GIS). This method assesses the degree of habitat fragmentation caused by the cumulative impacts of various human actions, and allows an evaluation of the resulting habitat disturbance and wildlife mortality risk. By rating human impacts in the linear area in question, we are able to identify land that can potentially link sections of suitable wildlife habitat separated by, or being fragmented by, human activities. For the purposes of this model, we are concerned with the wildlife and human elements within a landscape and the relationship between landscape ecology, spatial analysis, and wildlife-human interaction.

In traditional terms, areas between larger patches of habitat are termed corridors. We believe the word corridor is misleading about how animals move between areas; it connotes an area used only for travel. Therefore, we substitute the term "linkage zone," which we define as combinations of landscape structural factors that allow wildlife to move through, and live within, areas influenced by human actions.

Using GIS methodology to rate human impacts allows managers the option of working at a landscape level to minimize future habitat fragmentation or enhance linkages between areas that are being fragmented. This has direct application to the maintenance of ecosystems for large mammals like the grizzly bear (*Ursus arctos*), which is listed as Threatened in the 48 conterminous States.

An animal's ability to move from one habitat area to another depends on the

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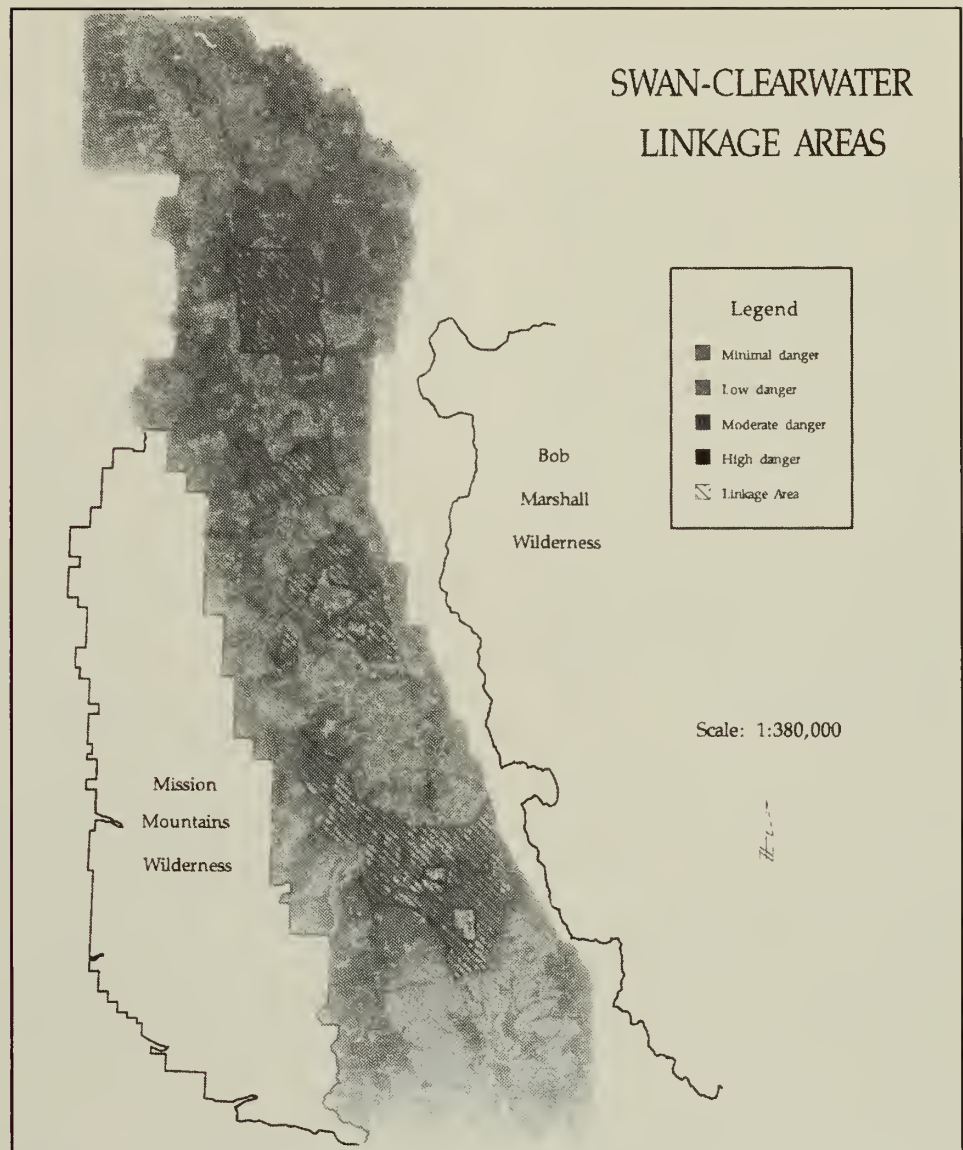
Ecosystem Management for Grizzly Bears

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level and types of human activities present in the linkage zone, as well as the natural history of the species. We are now seeing increasing human development in valley bottoms within several ecosystems used by grizzly bears. This linear pattern of development in valley bottoms, what we define as a "habitat fracture zone," is fragmenting occupied grizzly habitat.

Long-term conservation of large carnivores in the northern Rocky Mountains, not only the grizzly bear but also the Endangered gray wolf (*Canis lupus*), and potential listing candidates such as the wolverine (*Gulo gulo*) and lynx (*Felis lynx*), depends on managing large, contiguous habitat units in ways that balance the needs of these species with the needs of humans. Such conservation efforts could be more efficient if they were combined into an integrated multispecies conservation program. Western Montana and northern Idaho, a region still occupied by all four of these carnivores, provides an opportunity for integrated species management in one of the largest regions of public land in the conterminous 48 States. Employing integrated ecosystem management in the northern Rockies rather than individual species management would follow the requirement of the Endangered Species Act to conserve listed species *and the ecosystems on which they depend*.

To be successful at ecosystem management, we must identify, understand, and manage the factors that affect the movement of wildlife across habitat fracture zones. For help in identifying and understanding these factors, we have developed To be successful at ecosystem management, we must identify, understand, and manage the factors that affect the movement of wildlife across habitat fracture zones. For help in identifying and understanding these factors, we have developed a linkage zone prediction model. This model combines various human-related factors, such as roads, home development, and visual cover changes, and displays their current level and the distribu-



The linkage zones shown above are areas where contiguous habitat of low human influence is available across the valley and where good grizzly bear habitat is available on both sides of the valley. This black and white rendition of the original color map is printed to give an example of the type of map used to plot linkage zones.

tion of their effects. The spatial distribution of these human effects can be used to determine if animals can move across, and/or live seasonally within, areas of development. Managers can use maps produced with such a model to identify areas still having potential to allow wildlife movement. They can then focus appropriate management actions in such areas. Private land trust organizations can also use such maps to better target conservation easements and habitat acquisitions with willing property owners.

Study Area

The prediction model to test the linkage zone concept was developed for the

Swan/Clearwater Valleys in western Montana. This area is within currently occupied grizzly bear range in the Northern Continental Divide ecosystem, and is a habitat fracture zone. It is bounded on the east by the Swan Mountain Range and on the west by the Mission Mountains, and it covers 624 square miles (1,620 square kilometers). Land ownership in the Swan-Clearwater Valleys complex is distributed in a checkerboard pattern.

Study Methods

The traditional approach for evaluating the suitability of an area for grizzly

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Ecosystem Management for Grizzly Bears

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bears has been to build a detailed habitat map based on available food types. This approach assumes that the distribution of quality habitat, as defined by the potential of the habitat to provide food and cover, is the primary factor determining bear distribution. Our approach differed; we assumed the most critical factor determining grizzly bear habitat selection and movement patterns in developed valleys within the northern Rockies was not quality habitat containing bear foods, but human activity. Using this approach, we were concerned primarily with the presence and types of specific human activities in the study area instead of the distribution of bear foods.

To proceed on this assumption, we assigned a score to the influence of various human activities on bear habitat use and mortality risk. Scores were subjectively based on general knowledge of how bears react to human presence. We developed computer-based digital maps of the four data layers used in the analysis—human residences and developments, open roads, hiding cover, and riparian zones—using aerial photos, Landsat images, and field checking. Much of this data was collected by the Forest Service. Maps were developed at a resolution of 50 by 50 meter (165 by 165 feet) pixels.

Developed sites with potential influence on bear habitat use were assigned an influence zone according to whether they may attract a bear (such as a house where garbage could be present) or be avoided by a bear (because of fear of humans). Riparian zones were the base habitat layer because they are used for feeding, travel, and cover, and they extend across valleys.

To assess the impacts of roads, it was necessary to know the spatial distribution of road density in the area. We used a computer-based method we called a Moving Circle Analysis to determine this. It enabled us to calculate open road density for the square mile (2.6 sq km) circle surrounding each pixel. The program then moves from pixel to pixel, repeating

the process, which accounts for the name “moving circle.” The Swan-Clearwater Valleys analysis area contains 648,960 pixels of 50 by 50 meters.

Open road density, as calculated by the moving circle analysis method, varied by ownership. As expected, private lands had the highest scores, given the high level of development and roads associated with dwellings on many small parcels. Road density on private lands is expected to increase as development increases.

Densities of open roads are not equally distributed throughout the valleys. The highest densities are in central portions of the valleys, where human settlement often occurs in a linear pattern. High open road densities also occur in areas of intensive commercial timber harvest.

Open road densities were grouped into four categories for scoring purposes: 0 mile per square mile, 0.01-1.0 miles per square mile, 1.01-2.0 miles per square mile, and greater than 2.0 miles per square mile. Each pixel received an open road density influence score based on one of four categories. The variation in the amount of area in each category gives a far different picture of the open road density in the Swan-Clearwater Valleys when compared to the average open road density of 1.49 miles per square mile for the entire 624 square mile area.

Scores For Human Influence

To score the combined influence of open roads, human developed sites, hiding cover/non-cover, and riparian layers, the values assigned to each 50 by 50 meter pixel for each layer were combined to create a single scored map. The range of possible values ranged from 7 to 20, and they were grouped into four categories to simplify interpretation (Table 1).

As expected, the distribution of scores by land ownership shows that private lands are areas of high human influence and risk to wildlife. The areas of highest influence (those in the “high danger” category) exist in only three percent of the Swan-Clearwater Valleys. However, using the scored map, managers can see that these areas occur linearly along the

INFLUENCE LEVEL	SCORE
Minimal Danger	7-10
Low Danger	11-12
Moderate Danger	13-14
High Danger	15-20

TABLE 1. Levels of influence on the scored map of human influence. The higher the score, the higher the influence on bear behavior and the higher the mortality risk from development and other human activities.

valley bottom, creating a barrier to wildlife movement and occupancy, and increasing the risk of mortality.

By using the scored map to determine spatial distribution of the high danger areas, we could identify five wildlife linkage zones across the Swan/Clearwater Valleys. In these places, the effects of human activity are currently at lower levels.

Management Options

If we are to maintain opportunities for grizzly bears and other large carnivores to move between large blocks of Federal lands, we must understand the impacts of land use decisions on habitat values. Because of the intermingled ownership of lands within many linkage zones, proper management requires a team approach involving private, State, corporate, and Federal participants. Such a team has been created to establish linkage zone management in the Swan Valley. Some management options for linkage zones are presented in Table 2. Human activities in these areas need not be precluded, but they should be planned and carried out with consideration for their impacts on animal behavior and mortality.

* * *

History shows that we can rapidly fragment wildlife habitat through human. Our ability to conserve species, especially large carnivores, is compromised by such habitat fragmentation. An integrated ecosystem management approach can work where several species coexist and habitats are still relatively intact. Applying the type of model discussed above to predict the level and distribution of hu-

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Ecosystem Management for Grizzly Bears

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man activities in the northern Rockies is an important part of ecosystem management of this vast and important area.

The long-term maintenance of grizzly bears, gray wolves, wolverines, lynx, and many other large mammals in the northern Rocky Mountains depends on our ability to limit fragmentation of wildlife habitat caused by human activities. The land ownership pattern in this region of-

fers a chance to control fragmentation through innovative cooperative efforts between private landowners and government agencies. We still have a window of opportunity to maintain intact ecosystems, but it will not remain for much longer.

Christopher Servheen is the Grizzly Bear Recovery Coordinator, U.S. Fish and Wildlife Service, NS 312, University of Montana, Missoula, Montana 59812.

Per Sandstrom is with the Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana 59812.

Hockey Team Energizes Panther Fund

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benefit the black-footed ferret (*Mustela nigripes*), red wolf (*Canis rufus*), Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*), California least tern (*Sterna antillarum browni*), Mexican wolf (*Canis lupus baileyi*), grizzly bear (*Ursos arctos horribilis*), Coachella Valley fringed-toed lizard (*Uma inornata*), and four Colorado River fish species. Funding for the fish species now amounts to \$500,000.

For information about how to contribute—and help generate matching funds—contact the National Fish and Wildlife Foundation, 1120 Connecticut Avenue, N. W., Suite 900, Washington, D. C. 20036; telephone 202/857-0166.

Road management to limit road density
Close roads where possible
New roads of low standard open only during duration of management activity, then obliterated
Maintain existing percentage of areas of no road density
Increase size and distribution of security areas away from roads
Special emphasis on garbage management and food attractant management
Minimize roads in areas of limited hiding cover
Careful review of subdivision development
Careful review of commercial development such as restaurants, campgrounds, etc.
Public education about the value of linkage zones to the preservation of large carnivores
Maintenance of hiding cover through innovative silvicultural practices
Clearcut management to assure no openings more than 50 meters (165 feet) from adjacent hiding cover
Riparian wet site management to maintain contiguous hiding cover and limitations on roads through riparian zones
Cooperation on development of conservation easements on private lands
Team approach to cooperative management program involving federal, state, corporate, and private landowners

TABLE 2. Management options to maintain linkage zones

New Hope for the Peters Mountain Mallow

by Judy Jacobs

The Peters Mountain mallow (*Iliamna corei*), a plant in the hibiscus family (Malvaceae), occurs naturally at only one spot on earth — Peters Mountain in southwestern Virginia. In 1927, when the species was discovered, its population totalled about 50 individuals. Due to a variety of factors (such as a lack of new plants, browsing by deer and feral livestock, and an invasion of weedy competitors following habitat alteration), this number steadily declined. By the time the species was listed in 1986 as Endangered, only three individuals remained. To make matters worse, the fruits were dropping from these plants before seeds were produced, and no new mallow plants were germinating. It seemed cer-

tain that, unless drastic measures were taken, extinction was imminent.

Listing the Peters Mountain mallow focused the attention of the botanical community on the species' plight, and the Endangered Species Act provided a funding avenue for research and recovery. Botanists at Virginia Polytechnic Institute and State University (VPI & SU) began looking for viable seeds at the population site. By sifting painstakingly through samples of the leaf litter, they were able to find more than 95 mallow seeds. The next problem was to determine why these seeds were not germinating naturally. Botanists learned that the seeds had to be scarified (i.e., have the hard seed coat opened) in order to germinate. Nicking



Peters Mountain mallow in experimental gardens at VPI & SU.

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New Hope for Peters Mountain Mallow

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the seed coats with a razor blade permitted germination and the production of many healthy mallow plants. Later, these plants bore healthy fruits that, in turn, produced thousands of seeds.

This seed source has provided critical stock for studying the species' biology. For example, cross-pollination experiments revealed that the original plants were not producing seeds because the species is not self-compatible — that is, the flowers must be pollinated by another individual to produce viable seed. Having an expanded seed source also permitted botanists to conduct germination studies. In an important discovery, they found that, under natural conditions, the

seed coats were almost certainly broken by light fires. Thus, the suppression of wildfires had actually contributed to the species' decline.

Finally, listing the Peters Mountain mallow provided impetus to preserving its ecosystem. This goal was accomplished in 1992 when a private conservation organization, The Nature Conservancy (TNC), purchased the only known site. Now that the habitat is under protective ownership and we understand many of the species' requirements, attention has shifted to the use of management tools, such as prescribed burning, to promote the species' recovery.

Following its acquisition of the Peters Mountain site, TNC and biologists with the Virginia Natural Heritage Program began conducting limited spring burns to stimulate seed germination. The 1992

burn resulted in 12 mallow seedlings, 4 of which survived their first year. But this year's success exceeded all expectations. Following the May 1993 burn, some 500 seedlings appeared in the 33- by 43-foot (10- by 13-meter) test area! Even with only a projected 20 percent survival rate, this will greatly increase the natural population, and take the Peters Mountain mallow closer to the day when it will be a secure, self-sustaining member of its ecosystem.

Judy Jacobs, a biologist in the FWS Annapolis, Maryland, Field Office, wrote the Peters Mountain Mallow Recovery Plan.

Listing Proposals — May/July 1993

From May through July 1993, three animals and seven plants were proposed by the Fish and Wildlife Service for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The breeding range of this small songbird includes Arizona, New Mexico, southern California, extreme southern portions of Nevada and Utah, far western Texas, and perhaps southwestern Colorado and extreme northwestern Mexico. Within this region, however, the southwestern willow flycatcher is restricted to remnants of dense riparian (streamside) vegetation. Because of large-scale habitat loss and nest parasitism, the flycatcher's population now probably numbers fewer than 500 pairs. On July 23, the FWS proposed to list the subspecies as Endangered and to designate important parts of its remaining range as Critical Habitat.

As its name implies, the southwestern willow flycatcher depends on dense



Southwestern willow flycatchers are small songbirds with a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly. Their nests, built in thickets of shrubs or trees, are compact cups of fiber, bark, and grass lined with a layer of grass or other fine, silky plant material. The birds typically raise one brood of three or four young per year.

growths of willow (*Salix* spp.) and structurally similar vegetation. Such thickets, often with a cottonwood (*Populus* spp.) overstory and surface water nearby, provide necessary foraging and nesting habi-

tat. Unfortunately, most of the southwest's riparian habitats have been modified or lost altogether due to live-

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photo by B. "Moose" Peterson/WRP

Listing Proposals

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stock grazing, urban and agricultural development, stream channelization and diversion, invasions of the non-native tamarisk or saltcedar (*Tamarix* spp.), and gross changes in the watershed. The few that remain are mostly small and widely scattered.

As the flycatcher populations become fragmented by habitat loss, they grow increasingly vulnerable to nest parasitism by the brown-headed cowbird (*Molothrus ater*). Cowbirds lay their eggs in the nests of other, usually smaller, songbirds, and their eggs are incubated along with those of the host species. Because cowbird chicks generally hatch earlier, and are larger and more aggressive, they usually outcompete the hatchlings of the host bird. Livestock grazing and associated agricultural developments are promoting the spread of cowbirds.

Portions of the flycatcher's remaining range in California, Arizona, and New Mexico have been proposed for designation as Critical Habitat. (See the July 23 *Federal Register* for maps and habitat descriptions.) Under the Endangered Species Act, Federal agencies are required to ensure that their activities do not adversely modify designated Critical Habitat.

Kootenai River White Sturgeon (*Acipenser transmontanus*)

The Kootenai River population of the white sturgeon inhabits a stretch of about 168 river miles (270 kilometers) from Cora Linn Dam in British Columbia, Canada, through northern Idaho, to Kootenai Falls in Montana. Isolated from other white sturgeon stocks of the Columbia River basin for 10,000 years, the Kootenai River population is genetically distinct. It is also small in number and rapidly aging. Habitat alteration has reduced the population to approximately 880 individuals, with about 80 percent over 20 years of age. There has been an almost complete lack of recruitment to the population since 1974, soon after Libby Dam began operation. On July 7, the FWS proposed listing the population as Endangered.

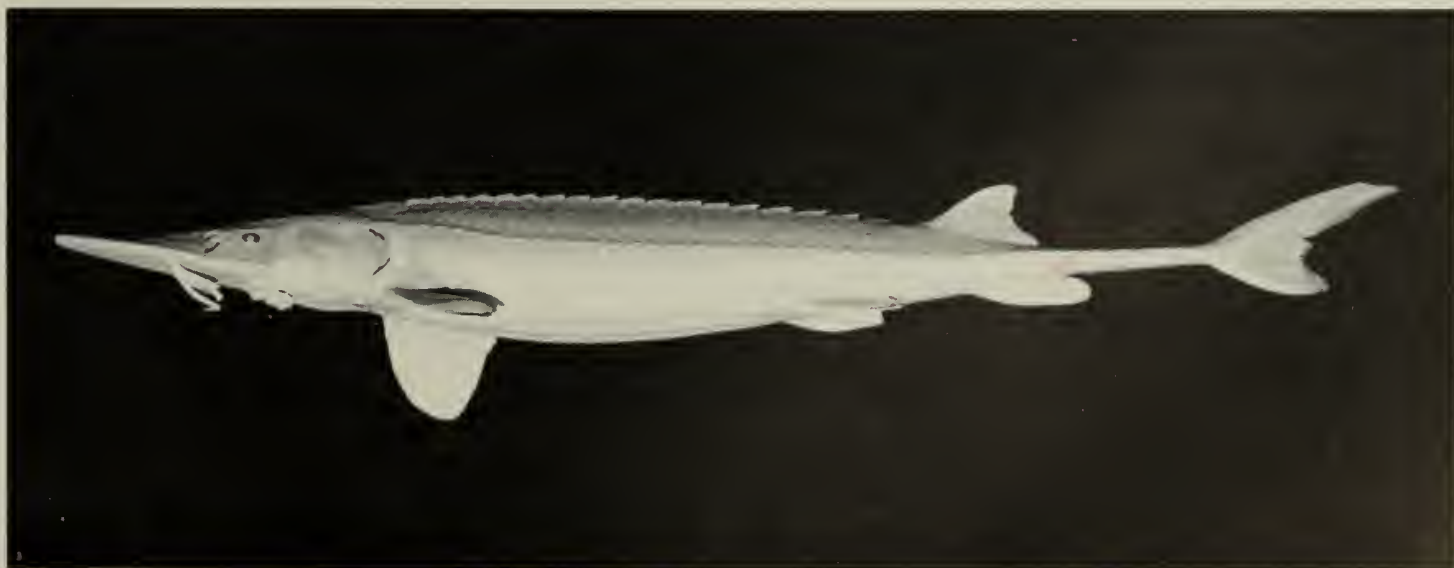
Sturgeon are distinguished by their cartilaginous skeleton, protractile, tubelike mouth, and bony plates (scutes) lining the body. White sturgeon are the largest freshwater or anadromous fish in North America, reportedly weighing up to about 1,800 pounds (820 kilograms). Individuals from the Kootenai River population, however, are smaller, with no recorded specimens exceeding 200 pounds (90 kg) in size. White sturgeon up to 44 years of age have been collected from the Kootenai River.

Construction of the Libby Dam for hydropower and flood control has altered much of the sturgeon's free-flowing habitat, reducing flows during the critical spawning and early rearing stages, and lowering the river's overall biological productivity. If the Kootenai River white sturgeon population is listed as Endangered, the Federal agencies involved in operation of the Libby Dam — the Army Corps of Engineers and the Bonneville Power Administration — will be responsible for ensuring that their activities are not likely to jeopardize the sturgeon's survival.

Alabama Sturgeon (*Scaphirhynchus suttkusi*)

The Alabama sturgeon, a distinctive freshwater fish, has an elongated, heavily armored body. Relatively small for a sturgeon, it reaches a maximum standard length of about 28 inches (72 cm). This species is endemic to the Mobile River system of Alabama and Mississippi, where it once was considered common. Widespread habitat modification, however, has eliminated the Alabama sturgeon from most of its range. Its decline can be traced primarily to the widespread conversion of free-flowing habitat to impoundments, other water flow alter-

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Alabama sturgeon are elongate, heavily armored fish that were once abundant in the Mobile River system of Alabama and Mississippi.

photo by James D. Williams

Listing Proposals

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ations, gravel dredging, and certain channel maintenance methods. On June 15, the FWS proposed listing the Alabama sturgeon as Endangered.

Based on a 1985 capture of two gravid females and a juvenile, and unconfirmed reports of subsequent captures, the FWS believes the Alabama sturgeon may still reproduce, at low levels, in the Cahaba and lower Alabama Rivers (two tributaries of the Mobile River) in Alabama. Both of these areas, and the free-flowing portion of the lower Tombigbee River in Alabama, have been proposed as Critical Habitat for the sturgeon. (See the June 15, 1993, *Federal Register* for a map and habitat description.) The FWS does not anticipate that the listing and Critical Habitat designations, if approved, would significantly affect river channel maintenance for navigation purposes.

Seven Hawaiian Plants

Seven plant taxa endemic to the Hawaiian Islands were proposed recently in two separate packages for listing as Endangered. One proposal, published May 11, covered three species in the genus *Melicope*, which belongs to the citrus family (Rutaceae). All three are found only on the slopes of the volcano Haleakala on the island of Maui, and are very rare:

- *Melicope adscendens* - a sprawling shrub; one individual is known to exist.

- *Melicope balloui* - a small tree or shrub; two populations contain a total of no more than 10 plants.

- *Melicope ovalis* - a small tree; one small population is known.

The second package, published June 24, proposed listing four taxa of ferns. Three are in the spleenwort family (Aspleniaceae):

- *Asplenium fragile* var *insulare* - a variety once found on two islands but now

surviving only on the island of Hawai'i (the "Big Island").

- *Ctenitis squamigera* - a species historically recorded from six islands but seen only on O'ahu, Maui, and Lana'i in recent decades.

- *Diplazium molokaiense* - reduced in distribution from five islands to two (O'ahu and Maui).

The fourth species in the second Hawaiian plant package is a member of the maidenhair fern family (Adiantaceae):

- *Pteris lidgatei* - a species recorded from two islands but now found only on O'ahu.

Native vegetation on all of the main Hawaiian Islands has undergone extreme alteration. Like the other 105 Hawaiian plants already listed as Endangered or Threatened, the 7 recently proposed species have declined in numbers and range because of urbanization, ranching and ag-

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Final Listing Rules Approved for 17 Species

Final rules adding 17 species — 3 animals and 14 plants — to the U.S. List of Endangered and Threatened Wildlife and Plants were published by the Fish and Wildlife Service from May through July 1993. These animals and plants now receive Endangered Species Act protection, and recovery plans will be developed for all but the one foreign species. A list of the newly added taxa, with their legal classifications and *Federal Register* publication dates, follows:

ANIMALS

- Spectacled Eider (*Somateria fischeri*) - a large-bodied marine duck found only in Alaska and Russia (Siberia); Threatened; F.R. 5/10/93.

- Carolina Heelsplitter (*Lasmigona decorata*) - a freshwater mussel that survives in a few small streams in North and South Carolina; Endangered; F.R. 6/30/93.

- Saimaa Seal (*Phoca hispida saimensis*) - a subspecies of the ringed seal that has adapted to the freshwater environment of Lake Saimaa in eastern Finland; F.R. 5/6/93.

PLANTS

- Seven Puerto Rican Ferns

— On June 9, four species of ferns endemic to the island of Puerto Rico were listed as Endangered: *Adiantum vivesii*, *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana*.

— A separate July 2 rule listed another three endemic Puerto Rican ferns as Endangered, all in the genus *Thelypteris*: *T. inabonensis*, *T. verecunda*, and *T. yaucoensis*.

- Five Florida Plants

— A July 12 rule listed five Florida plants, all but one in the category of En-

dangered: the Apalachicola rosemary (*Conradina glabra*), short-leaved rosemary (*Conradina brevifolia*), Etonia rosemary (*Conradina etonia*), and Okeechobee gourd (*Cucurbita okeechobeensis*). The fifth plant, Godfrey's butterwort (*Pinguicula ionantha*), judged to be in slightly less danger, was listed as Threatened.

- Applegate's Milk-vetch (*Astragalus applegatei*) - a perennial herb growing only in the vicinity of Klamath Falls, Oregon; Endangered; F.R. 7/28/93).

- Penland Alpine Fen Mustard (*Eutrema penlandii*) - perennial wildflower found only in high mountain wetlands in central Colorado; Threatened; F.R. 7/28/93.

Listing Proposals

(continued from previous page)

ricultural development, and the introduction (accidental as well as intentional) of non-native animals and plants. Habitat degradation and/or predation by feral goats, sheep, cattle, axis deer, and pigs are continuing problems, as is competition from alien plants for space, water, light, and nutrients.

* * *

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from adverse effects of Federal activities; restrictions on take and trafficking; a requirement that the FWS develop and carry out recovery plans; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments

that have approved cooperative agreements with the FWS. Listing also lends greater recognition to a species' precarious status, which encourages other 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 any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable and prudent alternatives," such as project modifications, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required

to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by Section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to possess, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant 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 more restrictive laws specifically against the take of State or federally listed plants and animals.

Delisting Actions

The Fish and Wildlife Services (FWS) recently took action to remove two plants from the list of Threatened and Endangered species:

Tumamoc Globeberry (*Tumamoca macdougalii*)

Named for Tumamoc Hill, a site west of Tucson where it was first collected, this vining perennial occurs primarily in the Sonoran Desert. It is a member of the gourd family (Cucurbitaceae) and grows from a tuber-like root, producing lobed leaves, yellowish-green flowers, and bright red fruits. In 1986, when this species was listed as Endangered, the total known population numbered fewer than 2,400 individuals in southern Arizona and northern Mexico, and much of its habitat was considered vulnerable. Subsequent surveys have located enough additional

populations that the species is no longer in danger of extinction; accordingly, the Tumamoc globeberry was removed from Endangered Species Act protection on June 18, 1993.

The FWS will continue to monitor the species' status for at least 5 years (as required under the Act), and both the Bureau of Land Management and the Forest Service — which manage much of the globeberry's habitat — will retain it on their "sensitive species" lists. In addition, preserves for the species, established by the Bureau of Reclamation to mitigate habitat damage caused during construction of the Central Arizona Project Canal, will be maintained indefinitely.

Cuneate Bidens (*Bidens cuneata*)

The cuneate bidens, an herb or small shrub in the aster family (Asteraceae), is

endemic to the Hawaiian Islands. It was described as a species in 1920 from a specimen collected on the slopes of Diamond Head, a volcanic crater on the island of O'ahu. Based on the very small known range and the vulnerability of its habitat, the cuneate bidens was listed in 1984 as Endangered.

Recently, however, the taxonomy of the genus *Bidens* has been revised, and the cuneate bidens is now considered an outlying population of *Bidens molokaiensis*, a species common on the island of Moloka'i. Because it apparently is not a distinct taxon, the cuneate bidens is considered ineligible for Endangered Species Act protection. It was proposed July 7, 1993, for removal from the Endangered Species List.

Reintroduction of Gray Wolves

(continued from page 1)

Since 1989, FWS biologists have given more than 300 presentations to livestock, hunter, environmental, and civic groups that attracted over 13,000 local residents. In addition, the FWS helped generate hundreds of newspaper, television, and magazine articles that provided information about wolves and their recovery. Other FWS-led interagency wolf recovery programs were established in Idaho, Wyoming, and Washington. They are focused primarily on wolf monitoring and on public information and education (Fritts et al. 1993).

Since 1980, conflicts with livestock production have been minor, although still controversial (Bangs et al. 1993). As of September 1, 1993, 17 cattle and 12 sheep have been killed by wolves, all in Montana. Seventeen wolves were moved or killed by FWS and U.S. Department of Agriculture Animal Damage Control personnel to prevent further livestock losses and build local tolerance of non-depredating wolves (the majority of the wolf population). In 1987, a private organization, Defenders of Wildlife, established a successful program that compensates ranchers for livestock killed by wolves. About \$11,000 has been paid to date. In 1993, Defenders also began a program that pays \$5,000 to any land-owners on whose property wolves successfully raise pups. Effective agency control of problem wolves and the private compensation program have helped reduce controversy about the presence of wolves.

The FWS, other cooperators, and the University of Montana have initiated research on wolves and ungulates in and adjacent to Glacier National Park. Wolves in the Glacier Park area generally live in packs of 8-12 wolves, use territories of about 300 square miles (780 square kilometers) in valley bottoms, have a single litter of 5 pups in late April, feed primarily on white-tailed deer (*Odocoileus virginianus*), and die most often at the hands of people.

Data indicate that wolves are simply another predator in the northern Rocky Mountains ecosystem. Of 120 adult female white-tailed deer, elk (*Cervus elaphus*), and moose (*Alces*) monitored with radio telemetry over the past 4 years in the Glacier Park area, 49 have died. Mountain lions (*Felis concolor*) killed 15, wolves 11, grizzly bears (*Ursus arctos*) 8, humans 8, coyotes (*Canis latrans*) 3, old age 1, and 3 others died from unknown causes (D. Pletscher, Univ. of Montana, pers. commun.). Research on mountain lions in 1992 suggested that wolves may be a more direct competitor with them than previously believed. Wolves killed 3 mountain lions, and it was not uncommon for wolves to track lions and usurp their ungulate kills (M. Hornocker, Hornocker Wildl. Res. Inst. Inc., pers. commun.). These data suggest that the potential impact of wolves on ungulate populations may be lower than previously predicted.

Recovery Planning

In 1974, wolves gained Federal protection under the Endangered Species Act of 1973 (Act) and restoration programs were initiated in the northern Rocky Mountains (Fritts 1991, Fritts et al. 1993). The State of Montana led an interagency team, established by the FWS, that developed a formal Northern Rocky Mountain Wolf Recovery Plan. That 1980 plan recommended that a combination of natural recovery and reintroduction be used to restore wolf populations in the area around Yellowstone National Park and north to the Canadian border.

The FWS approved a revised recovery plan in 1987. It defined wolf recovery in the northern Rockies as the survival of at least 10 breeding pairs of wolves, for 3 consecutive years, in each of 3 recovery areas (northwestern Montana, central Idaho, and the Yellowstone area). Including all pack members, this would mean a total of approximately 300 wolves. The plan also recommended using the "experimental population" provision of the Act to promote public acceptance of the

timely reintroduction of wolves into Yellowstone National Park. This designation, authorized in section (10j) of the Act, allows considerable management flexibility, particularly in the control of problem animals, as a means of allaying local concerns about potential negative impacts. Under the revised recovery plan, if 2 wolf packs had not been discovered in central Idaho within 5 years, a similar reintroduction would occur there also.

Carefully controlled reintroductions into designated recovery zones is preferred as an alternative to waiting indefinitely for wolves to reestablish themselves. Recolonizing wolves could disperse into areas where they may pose a problem, real or perceived, for people and livestock, thereby undermining public support for wolf recovery. Reintroduced wolves can be designated as an experimental population — a management option not legally available for naturally recolonizing wolves, which have full protection under the Endangered Species Act. In addition, reintroduction would lead to a more rapid recovery, and thereby hasten the day when the northern Rocky Mountain wolf can safely be removed from the endangered species list.

Gray Wolf EIS

In November 1991, Congress directed the FWS, in consultation with the National Park Service and Forest Service, to prepare an environmental impact statement (EIS) that considered a broad range of alternatives on wolf reintroduction in Yellowstone National Park and central Idaho. In 1992, Congress further directed the FWS to complete the EIS by January 1994 and to select a preferred alternative consistent with existing law.

The FWS formed and funded an interagency team to prepare the EIS. In addition to the National Park Service and Forest Service, the States of Wyoming, Idaho, and Montana, the USDA Animal Damage Control, and the Wind River Tribes participated. The Gray Wolf EIS

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Reintroduction of Gray Wolves

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program emphasized public participation. In the spring of 1992, nearly 2,500 groups or individuals that had previously expressed an interest in wolves were contacted directly, and the EIS program was widely publicized.

In April 1992, 27 "issue scoping" open houses were held in Montana, Wyoming, and Idaho, along with 7 more in other locations throughout the U.S. The meetings were attended by nearly 1,800 people, and thousands of brochures were distributed. Nearly 4,000 people provided thoughts on issues they felt should be addressed in the EIS. The most commonly mentioned issues involved ecosystem completeness, land use restrictions, livestock losses, humane treatment and respect of wolves, potential impacts on ungulate populations and hunting opportunities, and management strategies and costs. A report describing the public's comments was mailed to 16,000 people in July 1992.

In August 1992, another 27 "alternative scoping" open houses and 3 hearings were held in Wyoming, Montana, and Idaho. Three other hearings were held in the States of Washington (Seattle) and Utah (Salt Lake City), and in Washington D.C. In addition, a copy of the alternative scoping brochure was inserted into a Sunday edition of the two major newspapers in Montana, Wyoming, and Idaho. Nearly 2,000 people attended the August meetings, and nearly 5,000 comments were received.

The public comment reflected the strong polarization that has typified management of wolves. A majority (many urban or not living in the potentially affected areas) indicated it wanted immediate reintroduction and full protection of wolves. Many others (primarily rural residents in or near central Idaho or Yellowstone) indicated they did not want wolves to be recovered. A report on the public's ideas and suggestions was mailed to about 30,000 people in November 1992.

In April 1993, a Gray Wolf EIS planning update report was published. It discussed the status of the EIS, provided factual information about wolves, and requested the public to report observations of wolves in the northern Rocky Mountains. It was mailed to nearly 40,000 people in all 50 States and over 40 foreign countries that had requested information.

Reintroduction of Wolves as Nonessential Experimental Populations

The draft EIS was released to the public on July 1, 1993, for review and comment. It contained an FWS proposal to reintroduce gray wolves into both Yellowstone National Park and central Idaho if 2 naturally occurring wolf packs are not found in either area before October 1994. The reintroduced wolves would be designated "nonessential experimental populations" to allow additional flexibility in the management of wolves by government agencies and the public. Such a designation would minimize conflicts over public lands, effects on domestic animals and livestock, and impacts on ungulate populations. There would be no land use restrictions for wolf management. State and tribal wildlife agencies would be encouraged to take the lead in wolf management outside national parks and national wildlife refuges. The EIS estimated that reintroduction would result in wolf recovery in and around Yellowstone National Park and central Idaho by 2002. Total management costs of the program until recovery (10 breeding pairs in each area for 3 years) and delisting were projected to be about \$6 million.

In the draft EIS, the FWS considered 4 alternatives to the proposed action: 1) "Natural Recovery" (which could lead to wolf recovery by about 2025 and cost about \$10-\$15 million); 2) "No Wolf" (which would expressly prohibit recovery, in violation of law, and cost about \$100,000 to eliminate recolonizing wolves); 3) "Wolf Management Committee" (which could lead to recovery by

about 2015, and cost \$100-\$129 million for land acquisition and intensive management of wolves, ungulates, and their habitat); and 4) "Reintroduction of Nonexperimental Wolves" (which could lead to recovery by about 2000, with a total cost of \$28 million, including habitat purchases). The impact of each wolf management strategy (except the "No Wolf" alternative) on livestock, ungulate populations, hunting, land use restrictions, visitor use, and local economies varied primarily in the time and location of the impacts rather than major differences in the *level* of impacts.

The Yellowstone area comprises about 25,000 square miles (64,750 sq km), 76 percent of which is federally managed land. This area has over 95,000 ungulates (with a hunter take of 14,314 annually), is grazed by about 412,000 livestock, receives about 14,500,000 recreational visits annually, and supports a \$4.2 billion local economy (3.5 percent due to livestock). The central Idaho area is about 20,700 square miles (53,613 sq km) in size and is nearly all National Forest land. The central Idaho area has about 241,000 ungulates (with an annual hunter take of 33,358 ungulates), is grazed by about 306,525 livestock, receives about 8,000,000 recreational visits annually, and supports a \$1.43 billion local economy (5.2 percent due to livestock).

A recovered wolf population in the Yellowstone area would be anticipated to kill about 19 cattle (1-32), 68 sheep (17-110), and up to 1,200 ungulates (primarily elk) each year. It would not affect hunter take of male ungulates, but could reduce harvests of female elk, deer, and moose from some herds. A recovered wolf population would not affect hunter harvests or populations of bighorn sheep (*Ovis canadensis*), mountain goats (*Oreamnos americanus*), or pronghorn (*Antilocapra americana*). A recovered wolf population may reduce populations of elk 5-30 percent (30 percent in some small herds), deer 3-19 percent, moose 7-13 percent, and bison (*Bison bison*) up to 15 percent.

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Reintroduction of Gray Wolves

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The presence of wolves would not change uses of public or private land except for restricting potential use of M-44 cyanide devices ("coyote getters") for predator control in occupied wolf range. Visitor use would increase (at least 5 percent for out-of-State residents and at least 10 percent for local residents), and would generate \$7-10 million in additional net economic benefits each year.

A recovered wolf population in the central Idaho area would kill about 10 cattle (1-17), 57 sheep (32-92), and up to 1,650 ungulates (primarily mule deer) each year. It would not measurably affect ungulate populations. Although hunter take of female elk could fall 10-15 percent, harvest of male elk would be unaffected. Further, a recovered wolf population in this region would not measurably affect hunter take of deer, moose, bighorn sheep, or mountain goats. Wolf presence would not change uses of public or private land (except for restricting use of M-44 devices in occupied wolf range). Visitor use would likely increase (at least 8 percent for out-of-State residents and at least 2-12 percent for local residents), and would generate \$5.6-\$8.4 million in additional net economic benefits each year.

Public Comment on the Draft EIS

Nearly 1,700 copies of the draft EIS and 75,000 copies of the summary draft

EIS were distributed in July, August, September, and October of 1993. A copy of the summary draft EIS, a schedule for 16 public hearings (4 each in Montana, Idaho, and Wyoming, and 4 in other parts of the country), and a request for the public to report wolf observations were published in the 2 major newspapers serving Montana, Wyoming, and Idaho. Public comments on the draft EIS will be accepted until November 26, 1993.

Preparing the Final EIS

Public comments are being analyzed this fall and winter, and a final EIS will be completed in early 1994. Once the EIS is completed, it will be forwarded to decisionmakers in the Department of the Interior, who will determine how wolf recovery will proceed. All requests for information or the final EIS should be directed to Ed Bangs, Gray Wolf EIS, P.O. Box 8017, Helena, Montana 59601 (telephone 406/449-5202).

The only prediction considered absolutely safe is that controversy will continue to characterize wolves and wolf management for many years to come.

* * *

Suggested Reading about Wolves in the West:

Bangs, E. 1991. Return of a predator: wolf recovery in Montana. *Western Wildlands* 17:7-13.

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Fritts, S.H. 1991. Wolf and wolf recovery efforts in the northwestern United States. *Western Wildlands* 17:2-6.

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Ream, R.R. and U.I. Mattson. 1982. Wolf Status in the northern Rockies. Pages 362-381 in E.H. Harrington, and P.C. Paquet, eds. *Wolves of the World: perspectives of behavior, ecology, and conservation*. Noyes Publ. Park Ridge, NJ.

Ream, R.R., M.W. Fairchild, D.K. Boyd, and A.J. Blakesley. 1989. First wolf den in western U.S. in recent history. *NW. Naturalist* 70:39-40.

Weaver, J. 1978. The Wolves of Yellowstone. Research report 14. National Park Service, Yellowstone National Park, WY.

Edward Bangs is Project Leader for the Gray Wolf EIS, and Steven Fritts is the Northwest U.S. Wolf Coordinator. Both can be contacted at the Helena Field Office, U.S. Fish and Wildlife Service, 100 North Park, Suite 320, Helena, Montana 59601 (telephone 406/449-5225).

Regional News

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search Center inventoried the only remaining population of an Endangered Nevada fish, the White River spinedace (*Lepidomeda albivallis*), but observed only 14 fish. In June 1991, biologist observed more than 40 individuals and estimated the population at 100. White River spinedace exist in a 3-spring system within the Kirch Wildlife Management Area, but are restricted to a relatively unsuitable portion of the spring system due

to largemouth bass predation. Despite intensive efforts since 1991 to eliminate threats, this species may be on the verge of extinction. The Reno Field Office will brief the Regional Office and meet with the Nevada Department of Wildlife to determine a course of action.

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In cooperation with the Bureau of Land Management (BLM), the FWS Boise (Idaho) Field Office participated in a 2-week field survey to locate habitats of the Bruneau Hot Springsnail (*Pyrgulopsis bruneauensis*) and update the status of the

recently listed Endangered species. The FWS has contracted with Greg Mladenka, the researcher most familiar with the species and its habitats, to locate all thermal spring sites identified in his 1992 thesis; assist with field efforts to determine Global Positioning System (GPS) coordinates; mark each site for subsequent monitoring; determine springsnail presence or absence at each site; and measure the water's temperature, depth, and flow.

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Regional News

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Beginning in fall 1993, BLM intends to measure surface elevations at each identified thermal spring site along the Bruneau River and in Hot Creek. These efforts will initially target spring sites and springsnail habitats upstream of Hot Creek considered most at risk from further declines in the aquifer. Information gained from the survey will be useful in documenting declines of the geothermal aquifer and in completing future Section 7 consultations with BLM and Farmers Home Administration.

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After visiting one site of the Idaho douglasia (*Douglasia idahoensis*), a species of alpine primrose, staff from the FWS Boise Field Office and the Boise National Forest agreed that a monitoring program should be implemented in 1993 to assess the effects of sheep herding on this listing candidate, for which the FWS has a pending draft conservation agreement with the Forest Service.

* * *

Staff from the FWS Coeur d'Alene (Idaho) Field Office attended the International Mountain Caribou Technical Committee meeting at the Forest Service's Sullivan Lake Ranger District office on July 15-16. Among the issues discussed was a summary of the 1993 winter census effort, which revealed a total of 51 woodland caribou (*Rangifer tarandus caribou*), including 7 calves, in the Selkirk Ecosystem. This population represents an increase of 4 animals since the 1992 survey.

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Region 2 - The U.S. captive population of Mexican wolves (*Canis lupus baileyi*) increased from 39 to 63 following this year's breeding season. Of the 30 pups born to 5 mothers at 12 facilities, 24 survived (15 males and 9 females). Five pups in one litter died from a virulent bacterial infection, and another pup disappeared from its pen. The U.S. captive population of Mexican wolves has doubled in the past 3 years following a

decision to maximize reproduction of this Endangered species for proposed reintroductions. Seven more facilities will join the breeding project in the next year to accommodate the new pups.

* * *

A survey techniques workshop that Dr. Paul Joslin of Wolf Haven International conducted May 27, 1993, at La Michilia Biosphere Reserve in Durango, Mexico, marked the beginning of an initiative to determine the status of wild populations of Mexican wolves in that country. Survey results will help direct recovery planning efforts for the species in Mexico and the United States. Approved by the U.S.-Mexico Joint Committee on Wildlife Conservation, the survey is a joint private sector-public sector project, to which the FWS has committed \$15,000. Wolf Haven International is providing technical assistance, equipment, and matching funds, and at least three Mexican non-government organizations are also contributing funds and staff.

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Canadian and U.S. biologists picked up 25 viable whooping crane (*Grus americana*) eggs in Wood Buffalo National Park, Canada, on May 27, 1993. They took 9 eggs to the International Crane Foundation in Baraboo, Wisconsin, and the rest to the FWS Patuxent Wildlife Research Center in Laurel, Maryland. Meanwhile, these two breeding facilities produced 21 fertile eggs, providing a bumper crop of chicks for the guide bird research project in Idaho (an experiment to see whether captive-bred chicks will bond with wild birds held in captivity for ultimate release to the wild), additions to the Canadian Wildlife Service's captive flock at Calgary Zoo in Alberta, and another potential release in Florida. Patuxent also shipped 6 sub-adult whooping cranes to the Calgary Zoo, bringing to 10 the total number of birds in the captive flock that the Canadian Wildlife Service is developing.

* * *

As required by the District Court for the Southern District of Texas to settle a lawsuit on management of the Edwards

Aquifer, minimum springflow determinations for San Marcos Springs, Comal Springs, and Edwards Aquifer water levels have been established. The FWS Austin Field Office provided the determinations to the Department of the Interior's Office of the Solicitor for final presentation to the Court. Minimum springflow determinations will avoid impact to several Endangered and Threatened species, including the fountain darter (*Etheostoma fonticola*), Texas wild rice (*Zizania texana*), San Marcos salamander (*Eurycea nana*), San Marcos gambusia (*Gambusia georgei*), and Texas blind salamander (*Typhlomolge rathbuni*).

* * *

From July 28-30, in Phoenix, Arizona, a multi-agency group held a Symposium on Vegetation Management of Hot Desert Rangeland Ecosystems. The program examined the ecology and management of hot desert rangeland ecosystems in the southwestern U.S. and northern Mexico, including the Mojave, Sonoran, and Chihuahuan Deserts. Designed to provide a forum on the state of knowledge for managing hot desert vegetation, and to identify gaps in that knowledge, the symposium focused on research and expertise related to weather, fire, plant succession, recreation, riparian biodiversity, wildlife habitat, grazing, hydrology, soil erosion, wild horses and burros, Threatened and Endangered species, and revegetation of disturbed lands.

The symposium was sponsored by the Bureau of Land Management, Arizona Society for Range Management, and the University of Arizona. The FWS was a co-sponsor, along with the Arizona State Land Department, U.S. Soil Conservation Service, Cattlemen's Association, The Nature Conservancy, U.S. Forest Service, Arizona Association of Conservation Districts, and Arizona State University. For information on papers and other material, including posters, contact the Phoenix Ecological Services Field Office at 602/379-4720.

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Regional News

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Region 3 - Biologists conducting surveys for Kirtland's warblers (*Dendroica kirtlandii*) on the species' Michigan nesting grounds located 485 singing males, an increase from a 1987 low of 167. This year's number is the largest in Michigan since a 1961 survey located 502 singing males.

* * *

The FWS Columbia (Missouri) Field Office assisted the Missouri Department of Conservation in a search for the Endangered Curtis' pearly mussel (*Epioblasma florentina curtisi*). After several hours of work, the searchers finally found *one* live male. Extensive searching in the same pool where the male was discovered, and at other sites on the Little Black River where the species was common about 8 years ago, resulted in no additional finds.

* * *

The FWS Twin Cities (Minnesota) Field Office continues to collect herring gulls (*Larus argentatus*) and fish at Voyageurs National Park in Minnesota as part of a bald eagle (*Haliaeetus leucocephalus*) research. The study is attempting to determine the potential contaminant impact of avian and fish prey on the bald eagle. Eagle reproduction at the park has been low, and eaglet plasma has indicated elevated levels of PCBs, DDE, and mercury.

* * *

Region 4 - While surveying for the Alabama sturgeon (*Scaphirhynchus suttkusi*) in the lower Alabama and Cahaba Rivers, biologists from the Alabama Department of Conservation and Natural Resources (ADCNR) and the FWS have observed several rare or listing candidate species. In May, the Daphne, Alabama, Field Office netted an Alabama shad (*Alosa alabamae*)—the first confirmed record from the Alabama River in 15 years. The species was previously considered extirpated from the river.

Below Miller's Ferry lock and dam and Claborne lock and dam, paddlefish (*Polyodon spathula*), a listing candidate,

are seen almost routinely. This fact indicates that the fish are responding positively to the prohibited harvest imposed by the State. Observed paddlefish ranged from 2 to 5 feet (0.6 to 1.5 meters) in total length.

While biologists have found another candidate species, the blue sucker (*Cypleptus elongatus*), at a number of Mobile River basin sites, as of August, they had not located any Alabama sturgeon, a species proposed as Endangered on June 15, 1993. (See story in this edition.)

* * *

Region 5 - Biologists from the Virginia Natural Heritage Program extended the known range of Michaux's sumac (*Rhus michauxii*) into Virginia and discovered what may be the largest population of this Endangered plant, previously reported only in North Carolina, South Carolina, and Georgia. The Virginia scientists located several thousand plants on Fort Pickett in a controlled access area where artillery and small arms training is conducted. Frequent fires appear to be favoring the species' habitat. The Heritage Program is developing a Michaux's sumac management plan for Fort Pickett.

* * *

Restricting off-road vehicle (ORV) access to beaches or segments of beaches to protect nesting birds—roseate terns (*Sterna dougalii dougalii*), least terns (*Sterna antillarum*), and piping plovers (*Charadrius melodus*)—is a hot topic of discussion at seaside communities on Cape Cod, Martha's Vineyard, and Nantucket every summer. Combatting misinformation about beach access restrictions can be a challenging job.

* * *

The FWS New England Field Office (NEFO) is becoming increasingly active in public awareness initiatives about the Endangered Species Act, especially liability aspects of Section 9 and potential ORV beach access restrictions. Last winter, biologists participated in meetings with Martha's Vineyard officials and Congressional staffs to discuss the FWS position on protecting nesting piping plovers. This spring, because of the tourist-based economy of Martha's Vineyard,

biologists met with members of Edgartown's Chamber of Commerce, Board of Trade, and Board of Realty to dispel rumors that beaches might be closed to pedestrians as well as ORVs. All who attended expressed appreciation for the efforts to provide information and address the islanders' concerns.

The NEFO has established contacts to distribute Atlantic Coast Piping Plover Lesson Plans to teachers on both Martha's Vineyard and Nantucket, and a cooperative effort among the FWS, Massachusetts Division of Fish and Wildlife, and The Trustees of Reservations (a private conservation organization) resulted in the development of a fact sheet on beach access.

* * *

NEFO staff coordinated the development of a censusing protocol for an Endangered orchid, the small whorled pogonia (*Isotria medeoloides*). Extensively reviewed by New England botanists, this methodology is designed to generate consistent censusing of large populations. Using the new methodology should produce information that will allow for comparison of population trends throughout the range of this plant.

* * *

In May, the FWS Pennsylvania Field Office completed the final recovery plan for an Endangered plant, the northeastern bulrush (*Scirpus ancistrochaetus*). Copies of the plan will soon be available for distribution.

* * *

Staff from the FWS Long Island Field Office and FWS New York Field Office (NYFO) are involved in informal Section 7 consultations on more than 20 beach erosion repair and stabilization projects as a result of severe winter storms along the Long Island coast. These projects involve Army Corps of Engineers (Corps) emergency repairs and beach nourishment, Corps Section 10 and 404 permits, and Federal Emergency Management Agency disaster relief funded work at locations of

(continued on next page)

Regional News

(continued from previous page)

the Threatened piping plover and seabeach amaranth (*Amaranthus pumilis*), a plant also listed as Threatened. FWS staff members are working with the involved agencies to identify measures that can be incorporated into the projects to avoid potential impacts on these species.

* * *

NYFO staff joined the New York Natural Heritage Program, The Nature Conservancy, and the Minnesota Department of Natural Resources to inspect New York locations of Leedy's roseroot (*Sedum integrifolium* ssp. *leedyi*), a Threatened plant known at only six sites in New York and Minnesota. In New York, a viable population of the Leedy's roseroot grows on cliff faces along a lake shoreline; at the State's other location, the population consists of a single plant. The inspection group discussed protection and recovery strategies for the larger site, which could involve the cooperation of as many as 50 private landowners.

* * *

NYFO staff met with representatives of the Lower Hudson Chapter of The Nature Conservancy (TNC) to discuss its Bioreserve Strategy Plan for the Neversink River watershed. The meeting took place at the Neversink River near the New York population of the Endangered dwarf wedge mussel (*Alasmidonta heterodon*). The site supports what is believed to be the largest remaining healthy population of this mussel species. TNC has almost completed the Strategy Plan, featuring partnerships with local, State, and Federal agencies (including the FWS), as well as private organizations, industries, and landowners, to implement a comprehensive program of protection, management, research, and public education throughout the watershed.

* * *

Several projects to conserve the Endangered Karner blue butterfly (*Lycaeides melissa samuelis*) are under way or scheduled for New York. Activities include conducting surveys and monitoring populations, mapping and managing

habitat, and contacting landowners to negotiate conservation agreements. The New York State Department of Environmental Conservation, the New York Natural Heritage Program, and The Nature Conservancy are undertaking the work, with funds provided by the FWS under Section 6 of the Endangered Species Act.

* * *

The Maryland Department of Natural Resources has completed a follow-up status survey of 177 bog turtle (*Clemmys mühlenbergii*) sites originally studied during the mid-1970's. Of the 158 sites that biologists obtained permission to enter, 90 had bog turtles and 68 lacked turtles. Likely factors responsible for turtle extirpation include habitat succession, encroachment of exotic plants, and wetland draining, dredging and filling. Although some sites still had suitable habitat, they lacked turtles, possibly due to illegal collecting.

* * *

Region 7 - Biologists in Alaska initiated two satellite telemetry studies this summer to locate the molting and wintering grounds of the spectacled eider (*Somateria fischeri*) in the hope of gaining some insight into the causes—as yet unknown—for the decline of this Threatened species. Satellite transmitters used in these studies weigh less than 30 grams (1.0 ounce) and are expected to transmit 42-52 weeks.

In May and June, FWS endangered species biologists attached six satellite transmitters to spectacled eiders (2 males and 4 females) using neoprene harnesses. As of mid-August, these birds were still on the North Slope. Alaska Fish and Wildlife Research Center (AFWRC) biologists implanted 15 satellite transmitters in the body cavities of Yukon-Kuskokwim (Y-K) Delta spectacled eiders (5 males and 10 females). As of mid-August, four males had been tracked to the coast of the Chukotka Peninsula, two females had moved to Norton Sound, and the remaining females were still near the breeding grounds.

AFWRC researchers also conducted preliminary investigations on the

Indigirka River Delta in Russia, identifying potential spectacled eider habitat. They concluded that the river delta has sufficient numbers of birds to initiate a study. Prospects for a joint study between the U.S. and Russia on eider nesting biology on the Indigirka River Delta are good.

The final rule listing the spectacled eider as Threatened was published in the May 10, 1993, *Federal Register*. In the U.S., the number of eider nests increased slightly this year—a reprieve from dramatic annual declines of the recent past.

* * *

Population surveys for the Steller's eider (*Polysticta stelleri*) continued this year, in the spring in southwest Alaska and in the summer on the North Slope. FWS biologists and North Slope Borough researchers jointly conducted nesting and productivity surveys near Barrow. The FWS Division of Migratory Birds will also track eiders during the emperor goose (*Chen canagica*) fall migration survey. Surveys of Steller's eiders on the Alaska peninsula to count the spring population and note incidental occurrences of other eider species and sea ducks will continue in April and May of 1994.

On May 8, 1992, the FWS published its finding that a proposal to list the Steller's eider was warranted but precluded by higher priority listing actions. This species no longer nests on the Y-K Delta, and no more than a few thousand nest in extreme northwestern Alaska.

* * *

On July 13, 1993, the FWS issued a negative finding in response to a petition to list the Alaska breeding population of the dovekie (*Alle alle*), also called the "little auk," as an Endangered species. The FWS concluded that scientists consider the Alaska dovekie a peripheral segment of the species' total population. The center of the dovekie's population is primarily in Greenland, Iceland, Russia, and Norway, where this small seabird totals more than 30 million pairs. While the FWS feels the dovekie's occurrence in Alaska is notable, this segment does not

(continued on page 24)

constitute a significant component of the species' overall population.

* * *

Field work for 1993 on the Aleutian Island breeding grounds of the Aleutian Canada goose (*Branta canadensis leucopareia*) included nesting surveys and color-marking of the little-known remnant population at remote Chagulak Island. Biologists counted 18 nests, indicating no change from 1990. As in the past, flightless adults and goslings were captured with great difficulty, and only 9 birds were fitted with green tarsus bands. Studies are ongoing to determine factors limiting the growth of the approximately 100-bird remnant population on Chagulak Island. Additional nesting habitat for the island geese is being restored after what appears to be a successful attempt this year to eradicate introduced arctic foxes from nearby Yunaska Island. The number of Aleutian Canada geese in Alaska is estimated at 10,000.

* * *

The long-established Eagle Management Program delivered a dozen bald eagle (*Haliaeetus leucocephalus*) chicks from nests in southeastern Alaska, where the species is plentiful, to California, where it is listed as Endangered. Their new home will be the Ventana Wilderness Sanctuary in Los Padres National

Forest. California joins Indiana, Missouri, New York, North Carolina, and Tennessee as yet another State to wel-

come these native Alaskans in an attempt to recover our country's symbol across the nation.

June–October 1993

Vol. XVIII No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

BOX SCORE LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	250	9	22	337	34
Birds	73	153	17	0	243	72
Reptiles	16	64	18	14	112	26
Amphibians	6	8	5	0	19	9
Fishes	58	11	37	0	106	59
Snails	12	1	7	0	20	26
Clams	51	2	5	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	15	4	9	0	28	14
Arachnids	5	0	0	0	5	0
Plants	324	1	78	2	405	167
TOTAL	627	494	187	38	1,346*	451**
Total U.S. Endangered	627	(303 animals, 324 plants)				
Total U.S. Threatened	187	(109 animals, 78 plants)				
Total U.S. Listed	814	(412 animals, 402 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, chimpanzee, 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.

** There are 347 approved recovery plans. Some recovery plans cover more than one species, 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.

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ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service



Following Steady Recovery, the Arctic Peregrine Falcon is Proposed for Removal from the List of Threatened Species

After 20 years of protection marked by steady progress toward recovery, the arctic peregrine falcon (*Falco peregrinus tundrius*) was proposed September 30, 1993, for removal from the list of Threatened species. Once a victim of DDT, this northern peregrine subspecies rebounded following the U.S. ban on pesticides that caused eggshell thinning and poor reproductive success. The delisting proposal applies to peregrine falcons that nest in arctic areas of Alaska, Canada, and Greenland but spend their winters as far south as Argentina. The arctic subspecies, one of two listed *Falco peregrinus* subspecies in North America, represents about 75 percent of the continent's peregrines.

Admired as skilled hunters whose diving flights may be as fast as 200 miles per hour, peregrine falcons declined in the 1940's and no longer nested in eastern North America by the early 1970's. Their population decline resulted from impaired eggshell production caused by an accumulation of pesticides ingested from contaminated prey. Populations began to recover after the 1972 ban of DDT. This increase was not limited to the arctic peregrine. Fish and Wildlife Service (FWS) biologists have noted that the status of the American peregrine (*F. p. anatum*) is also improving.

"Here is real evidence that the Endangered Species Act does what it was intended to do—bring species back from the brink of extinction," said FWS Director Mollie Beattie in announcing the proposal.

A final decision on the delisting proposal will be made by September 1994.

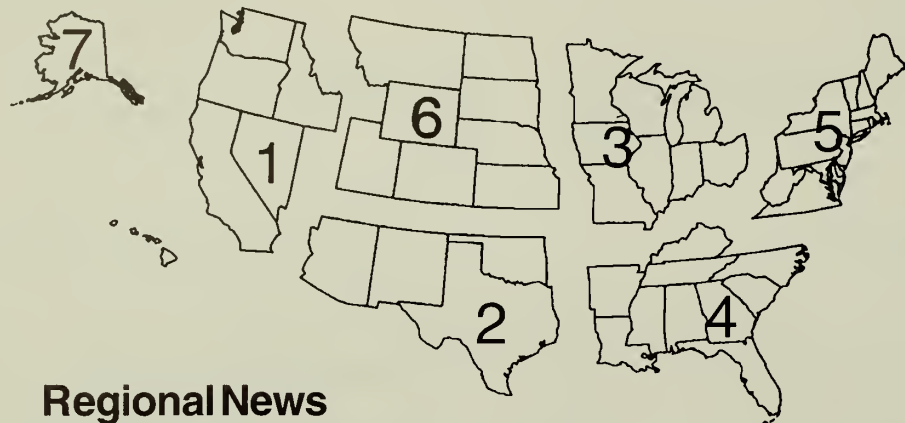


photo by William G. Mattox/Greenland Peregrine Falcon Survey

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Regional News

Regional endangered species staffers have reported the following news:

Region 2 - U.S. Fish and Wildlife Service and Texas Parks and Wildlife De-

partment biologists who conducted the 1993 spring count of adult Attwater's greater prairie-chickens (*Tympanuchus cupido attwateri*) found the population

index of 456 birds unchanged from 1992. However, 13 percent increases in 2 counties masked declines elsewhere. Attwater's greater prairie-chickens survive in only 3 populations—of 60, 24, and 372 birds—distributed in 5 counties in coastal Texas. The two smaller populations will be especially vulnerable in the next few years.

On and near the Attwater Prairie Chicken National Wildlife Refuge in eastern Texas, the number of birds declined 39 percent from 1992 levels. The decline was expected because of poor reproduction, as indicated by the brood survey. The ratio of young to adults was 0.27:1, but at least a 1:1 ratio is needed for a stable population. Heavy rains throughout last year's breeding season probably contributed significantly to poor numbers in the Refuge area by washing away the nests of these ground-nesting birds or interfering with their reproduction. Unfortunately, 1993 brood surveys indicate further population declines, attributable in part to excessive rainfall. On the Refuge, the ratio of young to adults was 0.18:1. A decline of 37 percent of the population is expected by the spring of 1994, with about 20 birds likely to survive on the Refuge.

Efforts to propagate Attwater's greater prairie-chickens for future reintroduction into the wild have had only limited success to date. Hatching rates are reasonably good, but chick survival is poor. The FWS provided Fossil Rim Wildlife Center with 43 fertile eggs in 1992. Although 42 hatched, only 5 survived to breeding age. In 1993, the five survivors—two cocks and three hens—produced 30 fertile eggs, from which 26 chicks hatched. Fossil Rim also received 14 fertile eggs collected from the wild, and 12 hatched. Unfortunately, only two of the chicks survive. Enteritis (diarrhea) accounted for 77 percent of the mortality, but the specific cause of the enteritis is unknown.

* * *

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

Mollie Beattie
Director
(202-208-4717)

Michael J. Spear,
Assistant Director for
Ecological Services
(202-208-4646)

Jamie Rappaport Clark, *Chief,
Division of Endangered Species*
(703-358-2171)

Marshall P. Jones, *Chief,
Office of Management Authority*
(703-358-2093)

John J. Doggett, *Chief,
Division of Law Enforcement*
(703-358-1949)

TECHNICAL BULLETIN
Editor, Michael Bender
Assistant Editor, Ann Haas
(703-358-2166)

Regional Offices

Region 1, Eastside Federal Complex, 911 N.S.11th Avenue, Portland, OR 97232-4181 (503-231-6118); Marvin Plenert, *Regional Director*; Dale Hall, *Assistant Regional Director*; Cindy Barry and Jim Bartel, *Endangered Species Specialists*.

Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director*; James A. Young, *Assistant Regional Director*; Steve Chambers, *Acting Endangered Species Specialist*.

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director*; John Blankenship, *Assistant Regional Director*; T.J. Miller, *Acting Endangered Species Specialist*.

Region 4, 1875 Century Blvd., Suite 200, Atlanta, GA 30345 (404-679-4000); James W. Pulliam, *Regional Director*; Tom Olds, *Assistant Regional Director*; David Flemming, *Endangered Species Specialist*.

Region 5, 300 Westgate Center Drive, Hadley, MA 01035 (413-253-8659); 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); Ralph O. Morgenweck, *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*.

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.



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The Lake Wales Ridge National Wildlife Refuge: Preserving a Treasure Trove of Biodiversity

by David Martin



photo by Reed Bowman

The Florida scrub jay is a crestless bird with a blue head, blue wings, and a large gray-brown patch on the back.

A new national wildlife refuge will soon be established by the Fish and Wildlife Service (FWS) to conserve a variety of endangered plants and animals endemic to a distinctive scrub vegetation community in central Florida. This area has the greatest concentration of Endangered and Threatened species in eastern North America. The refuge will include up to 19,630 acres (7,945 hectares) of undeveloped scrub habitat in as many as 12 parcels within 2 counties.

Scrub, a unique vegetation type, is restricted to coastal dunes on the Atlantic and Gulf coasts of Florida and Alabama, and on central Florida's inland ancient coastlines and their associated dunes. The most prominent ancient coastline, and the one with the most important scrub vegetation, is the Lake Wales Ridge, once the narrow southern tip of a much smaller peninsula. It has been above sea level for as long as 3 million years, and some of its sinkhole lakes have remained filled with water as long as 50,000 years, making it possible to analyze the ridge's vegetation history through pollen and macrofossil analysis. Sand dune and xeric (dry) shrubby temperate vegetation has been present the entire period, indicating

that the rich endemic flora and insect fauna have had ample time to evolve in place. Today, the endemic plants of the Lake Wales Ridge are effectively isolated from other uplands with similar habitats by many miles of poorly drained lowlands.

Florida scrub resembles shrublands of arid regions, and some of its plant and animal species have southwestern affinities. Among them are the Threatened Florida scrub jay (*Aphelocoma coerulescens coerulescens*), the Endangered *Ziziphus celata*, which is a relative of the Southwest's lotebushes, and *Nolina brittoniana*, an agave-like plant. The dryness of the sandy soils during Florida's winter drought contributes to the small stature of the vegetation, although extremely low-nutrient soil is at least as significant. The most important shrubs are usually evergreen oaks, although Florida rosemary (*Ceratiola ericoides*) dominates some of the most nutrient-deficient and biologically important sites. Sand pine (*Pinus clausa*), a short-lived species, may form a canopy above the shrubs. The endemic plant species listed as Endangered include herbs, small shrubs, and a lichen that occupy bare sand between larger shrubs.

Unfortunately for its endemic plants and animals, the southern Lake Wales Ridge is the heartland of Florida's citrus industry, an area vividly described by the writer John McPhee in his book "Oranges." Severe freezes in the 1980's left citrus groves intact, encouraging the planting of more groves in the two counties at the southern tip of the ridge, where most of the endemic plants occur. In these counties, approximately 84 percent of xeric upland habitat (scrub and upland longleaf pine-turkey oak) has been converted to other uses, according to recent studies at Archbold Biological Station, an independent research center located in the southern ridge. Some of the best remaining tracts of scrub habitat have survived relatively undisturbed only because they were subdivided and sold as unimproved lots with no roads or utilities. Many of the lots were sold to people in other countries. In at least one area, however, road building may soon begin. Construction of scattered houses in such subdivisions may make conserving the rest of the area impossible.

The FWS has been active in listing species from the Lake Wales Ridge: the

(continued on page 4)



photo © Tom Eisner, Archbold Biological Station

Dicerandra christmanii produces cream-colored flowers marked with purplish-red spots.

Lake Wales Ridge

(continued from page 3)

Florida scrub jay, two lizards, and 21 plants are classified as Endangered or Threatened (including *Cladonia perforata*, the first lichen to be federally listed). The listing process for plants and vertebrates is relatively complete in Florida scrub because it was feasible to carry out multi-species status surveys in this ecosystem.

If we are to conserve the Lake Wales Ridge biota, the different needs of Florida scrub animals and plants have to be met. To maintain a viable population of scrub jays, for example, scientists at Archbold Biological Station have shown that relatively large tracts of intact habitat are needed. The tracts should be located in a way that allows the birds to disperse among them. The Archbold scientists have also conducted successful censuses of the scrub jay. It appears that at least half of the ridge's remaining scrub jay habitat must be protected to ensure the jay's survival. Because scrub jays (and, by extension, the habitat they occupy) are protected from take by the Endangered Species Act, the FWS is working to develop habitat conservation plans for the Florida scrub jay throughout its range. Such plans must take into account other listed species in the tracts occupied by the scrub jay, including plants.

Virtually every listed plant species has its own, individual geographic distribution. Some of the distributions are extremely limited, making it essential to protect certain sites, even though doing so will not protect all of the plants. The best remaining sites for the scrub lupine (*Lupinus aridorum*) are so small that they may not be readily protected. Fortunately, most of the plant species can be effectively conserved if action is taken promptly at enough sites. Because land development is proceeding rapidly, the FWS (along with the State of Florida and private conservation organizations) have concluded that methods other than land acquisition, such as conservation easements, will not be adequate or timely in this case. The Lake Wales Ridge Na-



Liatris ohlinger flowers are a brilliant pink.

tional Wildlife Refuge was designed primarily to acquire the most important sites for plant conservation, while attempting to ensure that the tracts will be large enough for adequate management (including burning at infrequent intervals).

The beginnings of a biological preserve system for the Lake Wales Ridge species already exist, including Archbold Biological Station, small Nature Conservancy preserves, a new 13,000-acre (5,260-ha) State forest and park, and three other recently purchased State tracts. Further State land purchases are under way. The State of Florida's Preservation 2000 land acquisition program (with \$900 million of funding in 3 years) has placed a high priority on conserving the Lake Wales Ridge and its vicinity. The State is likely to acquire considerably more land than the FWS.

The proposed network of biological preserves, including State lands, private

preserves, and the new national wildlife refuge, has the potential to protect one of the most important centers of endemism in eastern North America. The preserves offer excellent opportunities for environmental education because of the area's proximity to the Tampa Bay and Orlando metropolitan areas, and the research and educational resources of Archbold Biological Station and Bok Tower Gardens, a botanical garden with an active endangered species program as well as two listed plants native to its grounds. A Scrub Appreciation Day staged in the fall of 1992 by the State and a county government drew a big crowd, and the Florida Native Plant Society's 1993 and 1994 annual meetings are featuring scrub vegetation.

David Martin is a botanist with the FWS Jacksonville, Florida, Field Office.

Bring Back the Natives: Restoring Native Aquatic Species on Public Lands

by Christopher A. Wood, Andrew P. Martin, and Jack E. Williams



Lahontan cutthroat trout

photo by Dennis Tol

"Bring Back the Natives" is a national campaign designed to improve the status of native aquatic species on public lands through riparian area rehabilitation, watershed restoration, and species reintroduction. This program emphasizes the application of ecosystem management principles to public lands managed by the Bureau of Land Management (BLM) and the Forest Service in order to conserve, restore, and maintain aquatic biological diversity. It was developed in 1992 by the BLM, Forest Service, and National Fish and Wildlife Foundation (Foundation).

Bring Back the Natives was developed in response to a decline in riparian and aquatic ecosystem health and concerns about the viability of many associated aquatic species. According to The Nature Conservancy, aquatic species in North America are becoming endangered and extinct at a much faster rate than terrestrial animals¹. Studies by the American Fisheries Society have documented that fully 33 percent of North American native freshwater fish species² and 70 per-

cent of the freshwater mussels³ are considered Endangered, Threatened, or of special concern.

The degradation of aquatic systems is manifested by localized and widespread extinctions of native flora and fauna across a broad range of ecosystems. In 1991, the American Fisheries Society reported that at least 106 populations of salmon (*Oncorhynchus* spp.), steelhead (*Oncorhynchus mykiss*), and sea-run cutthroat trout (*Oncorhynchus clarki*) were extirpated in the western United States.⁴ The report also identified 214 other anadromous salmonid populations at risk of extirpation. Many resident trout species are facing extinction because of habitat degradation and hybridization with hatchery-raised trout. For example, introgression with introduced brook trout (*Salvelinus fontinalis*) threatens the viability of native bull trout (*Salvelinus confluentis*) populations in the western U.S.

Public lands often provide the best, or sometimes last, remaining habitats for many imperiled aquatic species. The more than 461 million acres (187 million

hectares) of land managed by the Forest Service and the BLM provide habitat for almost 69 percent of the fish species in the U.S. listed as Threatened or Endangered and 61 percent of the fishes that are candidates for listing. Conservation efforts on public lands obviously can make a critical difference to the survival of listed aquatic species. In the western U.S., the Forest Service and the BLM often manage lands within the same watershed, with the forested lands in the headwaters and the BLM lands downstream. Historically, restoration efforts for aquatic species generally did not transcend administrative boundaries. *Bring Back the Natives*, however, is designed to facilitate inter-agency restoration efforts for aquatic species. The Foundation participates by providing challenge grants to both agencies.

Riparian and Watershed Approaches to Restoration

Riparian and aquatic ecosystems serve as excellent indicators for the ecological health of the land. A large percentage of species listed under the Endangered Species Act depend on rivers, streams, riparian areas, and wetlands for their survival. It does not bode well for imperiled species that aquatic ecosystems appear to be declining at an alarming rate. The 1982 National Rivers Inventory found that fewer than 2 percent of the streams in the conterminous 48 States remained at high natural quality. Habitat loss and alteration were the major contributors to the demise of approximately 75 percent of the 40 North American fish species that have become extinct since 1900⁵. Habitat degradation and loss were also identified as the leading factors in the decline of

¹ Master, L.L. 1990. The imperilled status of North American aquatic animals. *Biodiversity Network News*. 3:3.

² Williams, J.E., J.E. Johnson, D.A. Hendricksen, S. Contreras-Balderas, J.D. Williams, M. Navarro-Mendoza, D.E. McAllister, and J.E. Deacon. 1989. Fishes of North America endangered, threatened, or of special concern: 1989. *Fisheries* 14(6): 2-20.

³ Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. *Fisheries*. 18(9): 6-22.

⁴ Nehlsen, W., J.E. Williams and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. *Fisheries* 16(2): 4-21.

⁵ Miller, R.R., J.D. Williams, and J.E. Williams. 1989. Extinctions of North American fishes during the past century. *Fisheries* 14(6): 22-38.

(continued on page 6)

Bring Back the Natives

(continued from page 5)

salmon, steelhead, and sea-run cutthroat trout⁴.

Most of the campaign's projects involve some degree of riparian area restoration, along with improved land management practices within these critically important areas. In the 48 conterminous States, riparian areas represent a tiny percentage of the total land base, but they possess a greatly disproportionate ecological value. For instance, in the intermountain region of the western U.S., riparian areas are more productive in terms of plant and animal diversity and biomass per unit area than the remainder of the entire land base⁶. In another example, a recent report to Congress estimates that in the Blue Mountains of Oregon, 75 percent of the known terrestrial species either depend directly on riparian areas or use them more than other habitats. Properly functioning riparian areas provide such habitat features as good water quality, large woody debris input, reduced sediment loads, and increased bank stability. These areas also store water, reduce flooding, and provide for late season flows.

There are no quick or easy ways to repair degraded riparian and aquatic habitats. Traditional stream improvement and habitat enhancement strategies typically involve mitigation measures, such as placing log weirs or gabions (cylinders filled with earth or stone) into the stream channel or along the stream bank. Artificial structures are generally designed to mitigate the effects of increased sediment flow or loss of woody debris. In the past, many projects were designed with the belief that instream structures were capable of compensating for the effects on aquatic habitats of such land disturbing activities as logging and road building. Thus, Federal land management agencies devoted much of their energy



photo by Laura Gutzwiller



photo by Joe Viray

In 1987, this stretch of the Marys River, once important habitat for the Lahontan cutthroat trout, was almost devoid of streamside vegetation. By the summer of 1993, however, better management of livestock grazing had restored the riparian habitat.

and budgets to "improving" spawning and rearing areas through the placement of these structures. Although effective in some instances, the construction and placement of artificial structures only treat the symptoms of watershed degradation, not the causes, and typify a "band-aid approach" to watershed restoration. The *Bring Back the Natives* strategy seeks to intertwine habitat enhancement projects with revised land management practices to eliminate the causes as well as the symptoms of watershed degradation.

Many fish restoration efforts are unsuccessful because they are not undertaken from a watershed or basin perspective. The increasing rarity and loss of anadromous fish stocks indicate that the health and productive capacity of watersheds are diminishing. Successful watershed restoration must involve the protection and linkage of remaining healthy headwater

streams to riparian areas and floodplains. Many imperilled aquatic species depend on small creeks and tributaries for spawning and rearing habitat. First and second order streams, which often include non-fish bearing and intermittent streams, may represent more than 70 percent of the collective channel width of the Pacific Northwest⁷. As Sedell et al.⁸ point out, effective conservation and restoration strategies must protect aquatic ecosystem

⁷ Benda, L., T.J. Beechie, R.C. Wissmar, and A. Johnson. 1992. Morphology and evolution of salmonid habitats in a recently deglaciated river basin, Washington state. *Canadian Journal of Fisheries and Aquatic Sciences*. 49: 1246-1256.

⁸ Sedell J.R., G.H. Reeves and 20 others. Aquatic ecosystem assessment in Forest Ecosystem Management: An ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. 1993. V: 1-96.

⁶ Burton, T., and nine co-authors. 1992. Integrated riparian evaluation guide. Intermountain Region. Technical riparian work group. USDA Forest Service.

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Bring Back the Natives

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forms and processes at the watershed scale and recognize that land ownership patterns rarely coincide with distinct topographic boundaries.

The Bring Back the Natives Program

Riparian areas, small creeks, and tributaries often provide the last quality habitats for aquatic species. The *Bring Back the Natives* program uses these areas as the cornerstone for efforts to restore and maintain at-risk fish stocks and to rebuild the productive capacity of native fish populations. Preserving the biodiversity and ecological integrity of unique areas is an essential component of the restoration strategy. Most projects take place in habitats and watersheds that have a high "restoration potential." Restoration activities often involve the removal of exotic, introduced fish species that out-compete and introgress with native fish populations. By coupling restoration activities with improvements in land management, the program safeguards the genetic integrity and long-term viability of endemic aquatic species and the habitat upon which they depend.

Building partnerships is a critical component. The help and guidance of State fish and wildlife agencies is essential to many projects. For example, much of the labor necessary for fencing and revegetation efforts typically is accomplished through volunteers from local fishing, conservation, and school groups. More than 15 local chapters of Trout Unlimited contributed hundreds of hours of volunteer labor in 1993.

Nominations for projects are solicited from Forest Service and BLM field offices, and are evaluated by the following four criteria. Each project should identify:

1. an ecological approach to stream and watershed restoration, cooperative efforts with State and Federal agencies to reintroduce native aquatic species, and revised land management practices that eliminate the cause(s) of degradation;

2. a major segment of the habitat of a species, stock, or community complex so as to have a significant impact on the overall status of the species and the ecosystems on which they depend;

3. the participation of partners (e.g., State, local, Tribal, and non-governmental organizations, businesses, and indi-

viduals), particularly those that can contribute non-federal dollars and non-federal professional services and/or materials to match a National Fish and Wildlife Foundation grant; and

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	1992	1993
Number of <i>Bring Back the Natives</i> Projects	20 in 8 States	34 in 13 States
Joint Forest Service / BLM Projects	9	15
National Fish and Wildlife Foundation contributions	\$250,000	\$400,000
Non-federal contributions	\$250,000	\$420,000 (est.)
BLM <i>BBN</i> contributions	\$ 96,975	\$488,150
Forest Service <i>BBN</i> contributions	\$ 62,000	\$329,550

Project and Financial Summary for the First 2 Years of the Bring Back the Natives Campaign

The Marys River Project

The Marys River Project is an ambitious undertaking directed at restoring more than 180 miles (290 km) of habitat for a Threatened fish, the Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), in Nevada on the Humboldt National Forest and the BLM's Elko District. The Marys River and its tributaries are part of the Humboldt River drainage. Historically, more than 2,210 miles (3,555 km) of the drainage were occupied by Lahontan cutthroats. Currently, however, only 313 miles (503 km) of the entire Humboldt drainage provide suitable habitat. Lahontan cutthroats survive only as remnant populations scattered throughout the upper tributaries of the Marys River. The middle and lower portions of the Marys River system are only in poor to fair condition.

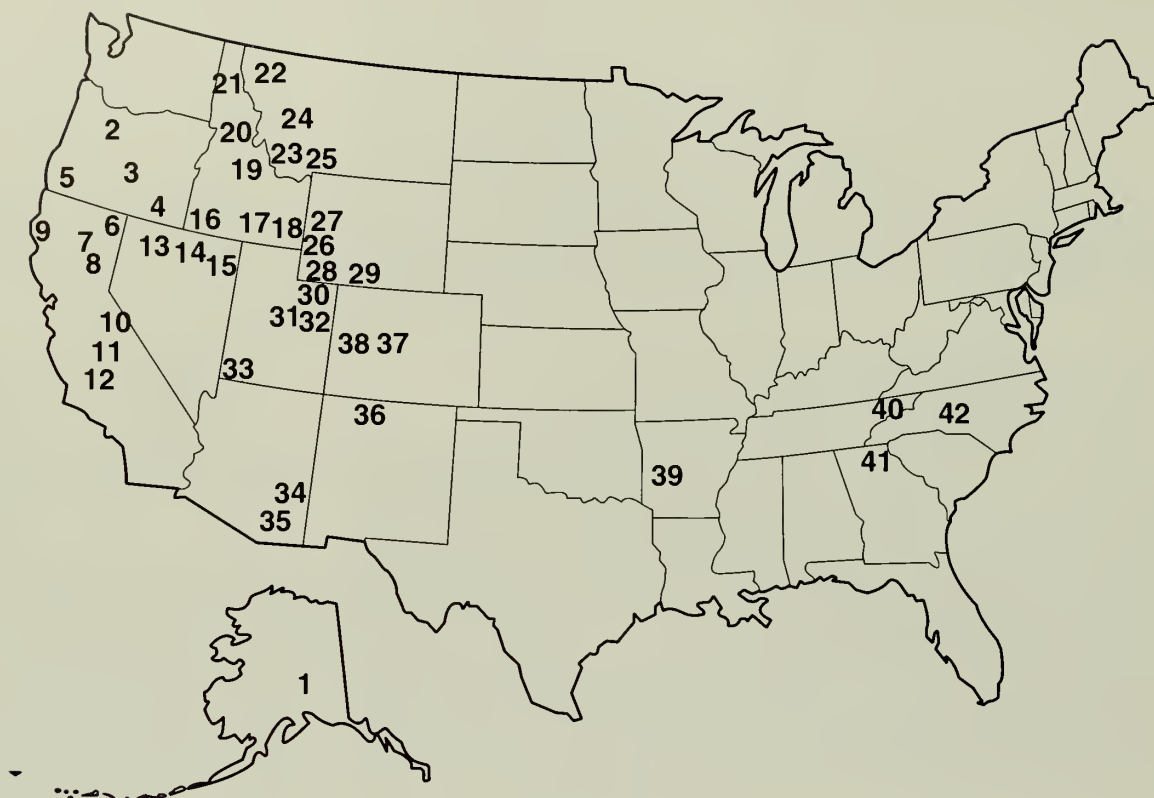
The Marys River project incorporates all four primary *Bring Back the Natives* criteria. Its master plan outlines an ecological approach to restoration with the main emphasis placed on improving land use practices. Intensive management of livestock through fencing, exclusion, pasture rest, and rotation should allow the recovery of riparian ar-

reas. A significant increase in the amount of available Lahontan cutthroat habitat should result, contributing to eventual recovery. The Marys River restoration project is a joint Forest Service/BLM venture that involves a host of other cooperators, including the National Fish and Wildlife Foundation, American Forestry Association, Nevada Department of Wildlife, Northeastern Nevada Chapter of Trout Unlimited, Barrick-Goldstrike Mines, Nevada Mining Association, Newmont Gold Company, and Coors Brewing Company.

The Marys River Project will continue through the end of the decade. Activities scheduled for 1994 include: continued fencing of riparian areas, spring protection in grazing areas, implementation of new grazing and recreation plans to lessen adverse impacts, construction of stockwater wells to provide livestock water sources away from riparian areas, installation of thermograph stations to monitor water temperatures, and improvements to the macroinvertebrate monitoring program.

Bring Back the Natives

1992 and 1993 project locations



Project Name	Project 1992	Year 1993	Project Name	Project 1992	Year 1993
1. Resurrection Creek (AK)		X	22. Rogers Lake (MT)		X
2. Crooked River Watershed (OR)		X	23. Big Hole River (MT)		X
3. Wickiup Creek (OR)	X		24. Blackfoot River (MT)		X
4. Borax Lake (OR)		X	25. Madison River (MT)	X	
5. Jenny Creek (OR)		X	26. LaBarge Creek (WY)	X	X
6. Upper Pit River (CA)		X	27. Thomas Fk. Watershed (WY)		X
7. Dutch Flat Creek (CA)	X		28. Currant/Sage Creeks (WY)		X
8. Sierra-Cascade-Great Basin (CA)		X	29. Littlefield Creek (WY)	X	X
9. Mattole River (CA)		X	30. West Fk. Smith River (UT)	X	
10. Cottonwood Creek (CA)		X	31. Nebo Creek (UT)		X
11. Kern River (CA)		X	32. Bitter Creek (UT)		X
12. South Fork Kern River (CA)		X	33. Boulder/Bunker Creeks (UT)	X	
13. Eightmile Creek (NV)	X	X	34. West Fk. Black River (AZ)		X
14. Bruneau River (NV)	X	X	35. Arnett Creek (AZ)		X
15. Marys River (NV)	X	X	36. Agua Caliente (NM)	X	X
16. Southern Idaho Trout (ID)	X	X	37. Apache Creek (CO)		X
17. Midnight/Crystal Creek (ID)		X	38. Beaver Creek (CO)		X
18. Fish Haven Creek (ID)	X		39. Arkansas Darters (AR)	X	
19. Wet Creek (ID)	X		40. Tennessee Madtoms (TN)	X	
20. McComas Meadows (ID)		X	41. Little Rock Creek (GA)		X
21. Coeur d'Alene Basin (ID)		X	42. Little River Watershed (NC)		X

Threatened, endangered, and other rare aquatic species known from "Bring Back the Natives" project areas in 1992 and 1993

Taxonomic Group	Number of Species	Species
Trouts, Salmonidae	20	Apache trout, <i>Oncorhynchus apache</i> (T); golden trout, <i>O. aguabonita</i> (SL); Little Kern golden trout, <i>O. a. whitei</i> (T); Kern River rainbow trout, <i>O. mykiss gilberti</i> (C2); Eagle Lake rainbow trout, <i>O. mykiss</i> ssp. (SL), Goose Lake redband trout, <i>O. mykiss</i> ssp. (C2), Interior redband trout, <i>O. m. gibbsi</i> (C2); steelhead, <i>O. m. irideus</i> (S); Bonneville cutthroat trout, <i>O. clarki utah</i> (C2); Colorado River cutthroat, <i>O. c. pleuriticus</i> (C2); greenback cutthroat, <i>O. c. stomias</i> (T); Lahontan cutthroat, <i>O. c. henshawi</i> (T); Paiute cutthroat, <i>O. c. seleniris</i> (T); Rio Grande cutthroat, <i>O. c. virginialis</i> (T); Westslope cutthroat, <i>O. c. lewisi</i> (SL); Snake River chinook salmon, <i>O. tshawytscha</i> (T); eastern brook trout, <i>Salvelinus fontinalis</i> (S); bull trout, <i>S. confluentus</i> (C2); Montana Arctic grayling, <i>Thymallus arcticus montanus</i> (C1).
Minnows, Cyprinidae	12	Hardhead, <i>Mylopharodon conocephalis</i> (SL); Lahontan Creek tui chub, <i>Gila bicolor obesa</i> (C2); Eagle Lake tui chub, <i>G. bicolor</i> ssp. (SL); Gila chub, <i>G. intermedia</i> (C2); roundtail chub, <i>G. robusta</i> (C2); pit roach, <i>Lavinia symmetricus mitrulus</i> (C2); longfin dace, <i>Agosia chrysogaster</i> (SL); speck led dace, <i>Rhinichthys osculus</i> (SL); loach minnow, <i>Tiaroga cobitis</i> (T); Gila topminnow, <i>Poeciliopsis occidentalis</i> (E); spikedace, <i>Meda fulgida</i> (T).
Suckers, Catostomidae	5	Wall Canyon sucker, <i>Catostomus</i> sp. (C1); Modoc sucker, <i>C. microps</i> (E); Goose Lake sucker, <i>C. occidentalis lacusanserinus</i> (C2); Jenny Creek sucker, <i>C. rimiculus</i> ssp. (C2); flannelmouth sucker, <i>C. latipinnis</i> (C2).
Catfishes, Ictaluridae	2	Smokey madtom, <i>Noturus baileyi</i> (E); yellowfin madtom, <i>N. flavipinnis</i> (T).
Perches, Percidae	2	Duskytail darter, <i>Etheostoma</i> sp. (C2); longnose darter, <i>Percina nasuta</i> (C2).
Lampreys, Petromyzontidae	1	Goose Lake lamprey, <i>Lampetra tridentata</i> ssp. (C2).
Sculpins, Cottidae	1	Malheur mottled sculpin, <i>Cottus bairdi</i> ssp. (C2).
Mussels, Unionidae	3	Brook floater, <i>Alasmidonta varicosa</i> (C2); Savannah lilliput, <i>Toxolasma pullus</i> (C2); Atlantic pigtoe, <i>Fusconaia masoni</i> (C2).

Key to Status Abbreviations: E - Federally endangered; T - Federally threatened; C1 -Category 1 listing candidate; C2 - Category 2 species; SL - listed as endangered, threatened, candidate, sensitive, or species of special concern by the State; S - Bureau of Land Management/Forest Service sensitive.

Bring Back the Natives

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4. rivers, streams, and watersheds managed by both the Forest Service and the BLM. Exceptions are made in areas where adjacent ownership does not exist.

The Marys River project, one of the campaign's showcases, incorporates all four of the criteria (see box).

Thirty-four *Bring Back the Natives* projects were deemed eligible for funding by the Foundation in fiscal year 1993, when the Forest Service and BLM received an \$800,000 challenge grant to perform aquatic habitat restoration and species reintroduction on public lands. In order to receive Foundation funding, non-federal sources (i.e., private, corporate, and State sources) must contribute

an equal amount of money to the individual projects. In FY 1993, the BLM and the Forest Service also budgeted \$488,150 and \$329,550, respectively, toward the projects. The linkage to State and private groups is critical to the program's success and acceptance. Non-federal participation in aquatic habitat restoration efforts instills a sense of ownership in local communities and States toward individual projects and accountability for the condition of aquatic resources on public lands. Conservation groups, State fish and wildlife agencies, private landowners, school districts, and corporations are among the many participants and contributors. Some of these groups include Trout Unlimited, Coors Brewing Company, and even local school districts, such as Oregon's Crook County

School District. In 1993, over 70 private and State groups participated in the program's projects.

* * *

In 1993, *Bring Back the Natives* projects have benefitted over 44 Threatened, Endangered, and special-concern species. Some projects contribute to recovery, while other projects may help prevent the need to list species. Equally important, cooperative efforts such as these will help to safeguard the long-term productivity and diversity of aquatic ecosystems as a whole on public lands.

C.A. Wood, A.P. Martin, and J.E. Williams are with the Bureau of Land Management, 1849 C Street NW, Washington, D.C. 20240.

Fish and Wildlife Service Reviews Comments on "Intentional Introductions" Policy

The Fish and Wildlife Service (FWS) is reviewing comments on its proposed report to Congress on the intentional introduction of non-native species to U.S. rivers and lakes and other aquatic ecosystems. The report was prepared by an interagency task force established to carry out requirements of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.

"Resolving the extremely complicated problems caused by non-native aquatic species is of utmost urgency," said Gary Edwards, the FWS Assistant Director for Fisheries and Co-Chair of the Aquatic Nuisance Species Task Force that conducted the policy review.

Nonindigenous species, whether introduced intentionally or not, threaten aquatic life by upsetting the natural balance within the ecosystem and ultimately reducing biological diversity. For example, two accidentally introduced species—the zebra mussel (*Dreissena polymorpha*) and the ruffe (*Gymnocephalus cernuus*), a small fish in the perch family—are spreading quickly through U.S.

lakes and rivers, competing with native species for food and living space. In addition, interbreeding with non-native trout introduced for sport fishing contributed to the Endangered or Threatened status of species such as the greenback cutthroat trout (*Oncorhynchus clarki stomias*), Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), Little Kern golden trout (*Oncorhynchus aguabonita whitei*), and Paiute cutthroat trout (*Oncorhynchus clarki seleniris*). Also, the introduction of the sheepshead minnow (*Cyprinodon variegatus*) into the Pecos River in Texas and New Mexico led to a hybridization problem with the native Pecos pupfish (*Cyprinodon pecosensis*). As a result, populations of the Pecos pupfish have declined to the point that the species is now a category 1 candidate for listing protection under the Endangered Species Act.

For these reasons, while many local economies rely on funds generated by sport fisheries for intentionally stocked non-native fish, some introduced species are factors in the decline or even extinc-

tion of many aquatic wildlife species. The proposed report to Congress recommends that decisions on whether or not to introduce non-native species be based on ecosystem and biodiversity considerations that transcend State or national boundaries and identify the need for close cooperation among Federal agencies, the States, industry, and private organizations.

Announced in the *Federal Register* on August 27, 1993, the comment period closed on October 25. The Aquatic Nuisance Species task force will release its findings when the final Report to Congress is published in the coming months. Other members of the task force included the National Oceanic and Atmospheric Administration, Animal and Plant Health Inspection Service, Environmental Protection Agency, Army Corps of Engineers, Coast Guard, and Department of State. For more information contact the FWS Fisheries Office at 703/358-1718.

Court Upholds Controls on Imports of Argali Trophies

by Ron Nowak

Fish and Wildlife Service (FWS) regulations to protect the argali (*Ovis ammon*), a large wild sheep of Asia, were upheld August 12 by the U.S. District Court in Midland, Texas. Federal attorneys, primarily Chrissy Perry of the Justice Department and Mike Young of the Interior Department, successfully represented the FWS in a lawsuit brought by Safari Club International and several supporting plaintiffs that sought to overturn the regulations. A second suit, filed with the U.S. District Court for Washington, D.C., primarily by a group known as Putting People First, was dismissed August 19.

The argali, a relative of the North American bighorn sheep (*Ovis canadensis*), is among the world's most prized big game trophies. It occurs in parts of southern Siberia, Mongolia, northern and western China, Tibet, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan, northern India and Pakistan, and Nepal. Within most of its range, the species has declined drastically through excessive hunting, habitat degradation, and competition with domestic livestock. In the June 23, 1992, *Federal Register*, the FWS classified the argali as Endangered throughout its range, except in Mongolia, Kyrgyzstan, and Tajikistan, where it was placed in the somewhat less critical category of Threatened. At the same time, special regulations were issued requiring acceptable information on argali status and management before trophies could be imported from these countries without FWS-issued permits.

The development of the argali listing and regulations had been a lengthy effort, formally beginning with a November 24, 1989, notice of review on the species' status. Throughout the process, the FWS emphasized that permits to import argali



photo by FWS Forensics Laboratory

The massive horns of the argali, as shown in a mounted specimen, help explain the appeal of this wild sheep to some trophy hunters.

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trophies from populations listed as Threatened could be allowed if enough data were available showing that importation was beneficial to the conservation of the species overall. The benefit presumably would come from license and guide fees paid by trophy hunters, which could give the countries enough economic benefits to manage the argali on a sustainable basis.

Although the FWS solicited data on argali status and management from appropriate foreign governments and many other concerned parties, additional information on management programs was needed before imports of trophies could be allowed from Threatened populations. Even upon publication of the June 23, 1992, final listing rule, the effective date was delayed more than 6 months to avoid interfering with the next hunting season and to allow still further opportunity for comment. Moreover, the FWS funded its own survey to collect data on the status and management of certain argali populations.

Notwithstanding these efforts to accommodate hunting interests, on January 4, 1993, just after the final rule became effective, the two lawsuits were filed. The plaintiffs contended, among other things, that the argali did not warrant classification as Endangered or Threatened throughout its range, that the FWS had failed to give adequate notification of the listing proposal, and that a clause of the Endangered Species Act precluded the FWS from restricting the importation of trophies.

Citing various parties, most of whom had a professional interest in sheep hunting, the plaintiffs argued that the argali is generally well-managed and that the new FWS regulations would eliminate conservation incentives. They also contended that the species is relatively common in much of its range, with numbers approaching 250,000. Based on information provided by such authorities as inter-

national conservationist George Schaller and the Caprinae Specialist Group of the World Conservation Union, the FWS countered that current argali management generally is questionable at best and that the species has declined seriously over most of its range, with numbers probably below 100,000. The Court upheld the FWS position, and ruled that the listing process had been carried out properly.

Much interest centered on the legal basis for importation from the three countries where the species was classified under the Endangered Species Act as Threatened. The Act generally gives total protection for species listed as Endangered. However, for species listed as Threatened, a special regulation may be issued that allows importation of sport trophies, provided that the special rule is "necessary and advisable for the conservation of such species."

Although the FWS and the plaintiffs essentially agreed that some regulated argali hunting and importation could be allowed, there was a difference relative to section 9(c)(2) of the Endangered Species Act, which refers to species on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Appendix II presumes a lesser degree of threat than does Appendix I. Importation of an Appendix II species requires only a CITES export permit from the country of origin, whereas Appendix I requires CITES permits from both the exporting and importing countries. Section 9(c)(2) of the Act generally provides that non-commercial importation of species that are on Appendix II and not listed as Endangered shall be presumed to be in compliance with the Act. Except for one subspecies in the Himalayas and parts of China, the argali is on Appendix II of CITES.

The plaintiffs argued that, since argali populations in Kyrgyzstan, Mongolia, and Tajikistan were on Appendix II and listed as Threatened, trophies could be brought into the United States simply with a CITES export permit, and without an Endangered Species Act permit or other additional regulation. However,

the FWS pointed out that the legislative history of the Act supports biologically required restrictions on the importation of sport trophies of Threatened species and that the section 9(c)(2) presumption of compliance (see above paragraph) is rebuttable under certain circumstances. The Court accepted the FWS interpretation, thereby not only allowing the argali import regulations to stand but establishing a precedent for more flexibility in future control of foreign wildlife importation.

Prior to the court judgment, there was concern that if the FWS interpretation of section 9(c)(2) were set aside, adequate regulation of argali importation might not be possible. This concern gave increased weight to one of the Act's legal factors for listing, "the inadequacy of existing regulatory mechanisms." Citing this situation and the other problems facing the argali, the FWS issued a new proposal in the April 27, 1993, *Federal Register* that would classify *all* argali populations as Endangered and eliminate the special regulations providing for trophy importation. Although the litigation has concluded, the FWS continues to review new information received during the rulemaking process. It will assess the best available scientific and commercial data on the status of argali populations and management conditions in the three countries where the species is listed as Threatened before reaching a decision on the April 27 proposal.

Dr. Nowak is a mammalogist with the FWS Office of Scientific Authority.

Listing Proposals — August/September 1993

During August and September 1993, 6 animals and 25 plants were proposed by the Fish and Wildlife Service (FWS) for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Arroyo Southwestern Toad (*Bufo microscaphus californicus*)

A riparian species, the arroyo southwestern toad historically occurred in streamside wetlands of southern California, mainly west of the Mojave Desert from San Luis Obispo County, California, to northwestern Baja California, Mexico. Its specific habitat requirements include rivers with shallow, gravelly pools adjacent to sandy terraces with a nearby closed canopy of cottonwoods (*Populus* spp.), willows (*Salix* spp.), and oaks (*Quercus* spp.).

Widespread habitat loss has eliminated this small, buff-colored amphibian from at least 75 percent of its former range. Only 6 of the 15 remaining populations south of Ventura are known to comprise more than a dozen adults. Because of continuing threats, the FWS proposed August 3 to list the arroyo southwestern toad as Endangered.

Two Aquatic Snails

Two freshwater snails were proposed August 5 for listing as Endangered:

- **royal snail** (*Pyrgulopsis oregonensis*), a small species endemic to springs in the Sequatchie River system in Tennessee; and

- **Anthony's riversnail** (*Athearnia anthonyi*), a larger (1-inch, or 2.5-centimeter) species known from the Sequatchie River in Tennessee and Limestone Creek in Alabama.

Both snails are threatened by a general deterioration of water quality resulting from siltation and other pollutants contributed by logging; road construction; cattle grazing; vandalism; improper trash dumping; and agricultural, municipi-



arroyo southwestern toad

photo by B. "Moose" Peterson/WRP

pal, industrial, and mining runoff. Increased logging to supply wood chip mills proposed for the area could have further impacts on the aquatic ecosystem. In addition, the once wide distribution of the Anthony riversnail, which depends on shallow, free-flowing habitat, has been reduced significantly by impoundments.

Appalachian Elktoe (*Alasmidonta raveneliana*)

Another freshwater mollusk, the Appalachian elktoe is a small, kidney-shaped mussel or clam. This species is endemic to the upper Tennessee River system in the mountains of western North Carolina and eastern Tennessee. Historical records indicate that the elktoe once was fairly widely distributed, but most of its clean, free-flowing habitat has been degraded or destroyed by impoundments, siltation, and pollution.

Populations of the Appalachian elktoe survive in short stretches of two upper Tennessee River tributaries: the Little Tennessee River in North Carolina and the Nolichucky River in Tennessee and North Carolina. Because both are vulnerable to further water quality degradation, the FWS proposed the Appalachian elktoe on September 3 for listing as Endangered.

Lake Erie Water Snake (*Nerodia sipedon insularum*)

The Lake Erie water snake, a nonvenomous subspecies, is predominantly gray

in color and can reach up to 43 inches (110 cm) in length. As its name implies, this snake is native to an archipelago of limestone islands in Lake Erie and adjacent mainland areas of Ohio and Ontario, Canada. It was once abundant and widespread, but has declined dramatically over the past 50 years, and the FWS proposed August 18 to list the subspecies as Threatened.

Most of the islands inhabited by the Lake Erie water snake have been developed or platted for future development, such as marinas and summer homes. Construction has accelerated in recent years, with corresponding habitat losses. In addition, residents often kill the snake in the mistaken belief that it is poisonous.

Northern Copperbelly Water Snake (*Nerodia erythrogaster neglecta*)

A more colorful subspecies, the northern copperbelly water snake has a dark back but a bright orange-red underside. It, too, is nonvenomous. For most of the year, this snake inhabits lowland swamps or other warm, quiet waters. Adjacent wooded cover is needed to provide corridors to upland hibernation sites. Its historical range is described as a region stretching from south-central Michigan and northwestern Ohio, southwestward through Indiana, to extreme southeastern Illinois and adjacent areas of Kentucky. The snake once may also have occupied parts of Tennessee, Wisconsin, Pennsylvania, and West Virginia. Today, however, it survives only in scattered, isolated pockets where suitable habitat remains.

Clearcutting of lowland forests, draining of wetlands, brush clearing, surface mining, road construction, and other land disturbing activities have fragmented or destroyed much of the snake's habitat. Because of continuing losses, the northern copperbelly water snake was proposed August 18 for listing as Threatened.

(continued on page 14)

Listing Proposals

(continued from page 13)



Solanum incompletum



Plantago princeps



Hibiscus brackenridgei



Coccoloba rugosa

drawing by Yevonn Wilson-Ramsey, reprinted from Manual of the Flowering Plants of Hawaii, courtesy of University of Hawaii Press



drawing by Yvonn Wilson-Ramsey, reprinted from *Manual of the Flowering Plants of Hawaii*, courtesy of University of Hawaii Press

Spermeopsis hawaiiensis



photo by Eugenio Santiago-Valentin

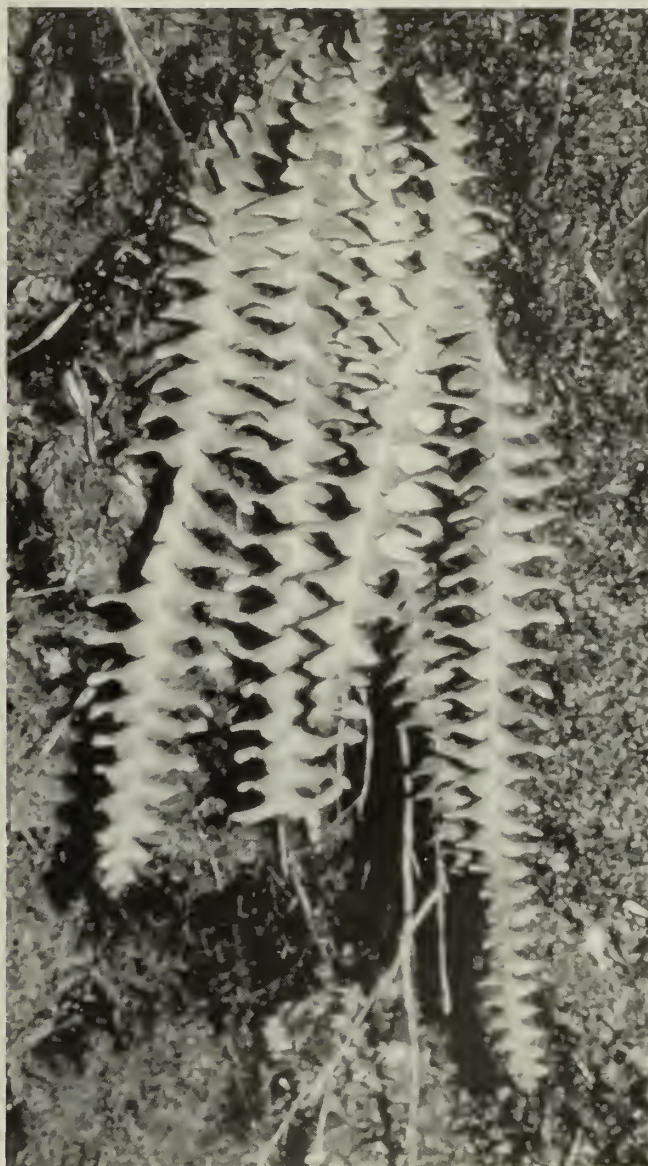


photo by Charles H. Lamoureux

Adenophorus periens

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Listing Proposals

(continued from page 15)



Sesbania tomentosa

photo by Loyal A. Mehrhoff

Twelve Hawaiian Plants

On September 14, the FWS proposed the Endangered classification for 12 plants native to the Hawaiian Islands:

- *Adenophorus periens*, or **pendant kihi fern** - a small, pendant, epiphytic (not rooted in the ground) fern in the grammitis family (Grammitidaceae);
- *Bonamia menziesii* - a vine in the morning-glory family (Convolvulaceae) with white to greenish funnel-shaped flowers;
- *Diellia erecta* - a fern in the spleenwort family (Aspleniaceae);

- *Flueggea neowawraea*, or **mehamehame** - a large tree in the spurge family (Euphorbiaceae);

- *Hibiscus brackenridgei*, or **ma'o hau hele** - a shrub or small tree in the mallow family (Malvaceae) bearing yellow flowers with maroon centers;

- *Mariscus pennatifolius* - a perennial in the sedge family (Cyperaceae);

- *Neraudia sericea* - a tall, densely hairy shrub in the nettle family (Urticaceae);

- *Plantago princeps*, or **laukahi kuahiwi** - a small shrub or robust peren-

nial herb in the plantain family (Plantaginaceae);

- *Sesbania tomentosa*, or **'ohai** - a sprawling shrub or small tree in the pea family (Fabaceae);

- *Vigna o-wahuensis* - a sprawling annual or perennial herb in the pea family;

- *Solanum incompletum*, or **popolo ku mai** - a shrub in the nightshade family (Solanaceae); and

- *Spermolepis hawaiiensis* - an annual herb in the parsley family (Apiaceae).

These 12 species of Hawaiian plants have relatively wide but scattered distributions across the island chain, and most survive in very small numbers. They grow in a wide range of vegetation communities (grasslands, shrublands, and forests), elevational zones (coastal to subalpine), and moisture regimes (dry to wet).

All 12 of the recently proposed Hawaiian plants have been severely reduced in numbers and range due to widespread habitat modification and the effects of introduced animals and plants. Specific causes include one or more of the following: competition from exotic plants for light, nutrients, and living space; habitat degradation from wild, feral, or domestic animals (deer, cattle, goats, sheep, and pigs); agricultural and recreational activities; human-caused fires; and predation by non-native animals (rats, insects, goats, and cattle). Most of these factors continue to threaten the remaining plants.

Eight California Vernal Pool Plants

A proposal to protect eight plant taxa endemic to vernal pool habitat in California's Central Valley was published August 5. The four at greatest risk, all annual grasses in the family Poaceae, were proposed for listing as Endangered:

- **San Joaquin Valley Orcutt grass** (*Orcuttia inaequalis*);

- **hairy Orcutt grass** (*Orcuttia pilosa*);

- **Sacramento Orcutt grass** (*Orcuttia viscida*); and

- **Greene's tuctoria** (*Tuctoria greenei*).

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Listing Proposals

(continued from previous page)

Because the danger to the other four plants is not as great, they were proposed for the slightly less critical category of Threatened:

- **fleshy owl's-clover** (*Castilleja campestris* ssp. *succulenta*) - an annual herb in the snapdragon family (Scrophulariaceae);
- **Hoover's spurge** (*Chamaesyce hooveri*) - an annual herb in the family Euphorbiaceae;
- **Colusa grass** (*Neostapfia colusana*) - another annual grass; and
- **slender Orcutt grass** (*Orcuttia tenuis*).

All eight of these plants are endemic to vernal pools, an unusual habitat type that forms in areas with Mediterranean climates where slight depressions underlain with an impervious soil layer fill with water after fall and winter rains. These seasonal wetlands then dry slowly during the spring and summer. The cyclic wetting and drying create an unusual ecological situation supporting a unique biota. Many plants and animals are adapted specifically to this environment and cannot survive outside the temporary pools.

Vernal pools are not only unusual but also fragile and easily disturbed. Many of the vernal pools in the Central Valley have already been destroyed or degraded by urban and agricultural development, mowing and livestock overgrazing, off-road vehicle use, trash dumping, flood control projects, and invasions of weedy, non-native plants.

The Army Corps of Engineers is responsible under section 404 of the Clean Water Act for regulating the discharge of fill material into wetlands, including vernal pools. If the listing proposal is approved, the Corps will be required to ensure that any section 404 permits it grants will not jeopardize the survival of the plants.



Pleodendron macranthum

Three Puerto Rican Trees

Three species of trees native to the Commonwealth of Puerto Rico were proposed September 24 for Endangered Species Act protection. The two in greatest danger were proposed for listing as Endangered:

- **uvillo** (*Eugenia haematocarpa*) - a small tree in the myrtle family (Myrtaceae) with leathery leaves and tiny light-pink flowers; and
- **chupacallos** (*Pleodendron macranthum*) - an evergreen in the canella family (Canellaceae) bearing small white flowers and aromatic, purplish-black fruit.

The third species, which is believed to be in less immediate danger, was proposed for listing as Threatened:

- **ortegón** (*Coccoloba rugosa*) - an evergreen in the buckwheat family (Polygonaceae) producing inflorescences with numerous crimson flowers.

Habitat alteration is the main threat to these species, which are already very limited in numbers and range. Although two populations of *C. rugosa*, four populations of *E. haematocarpa*, and all *P. macranthum* sites are on Federal or Commonwealth lands, they are vulnerable to any management practices that do not take their well-being into account. Additionally, 10 *C. rugosa* sites and one *E.*

haematocarpa colony are on private lands subject to intense urban, agricultural, and tourist development.

Two Texas Plants

Two species of plants native to southern Texas were proposed August 5 for listing as Endangered:

- **Texas ayenia** (*Ayenia limitaris*) - a pubescent shrub in the cacao family (Sterculiaceae), with a population reduced to a single individual at a site in Hidalgo County; and
- **South Texas ambrosia** (*Ambrosia cheiranthifolia*) - an herbaceous perennial in the aster family (Asteraceae) with seven currently known populations in Kleberg and Nueces Counties.

The Texas ayenia grows in dense subtropical woodland communities along Lower Rio Grande floodplains and terraces, and the South Texas ambrosia occurs in open prairies and savannas. Historically, both species were distributed over a region that included other parts of southern Texas and northeastern Mexico. Widespread habitat loss has reduced the plants in range and numbers, and continues to threaten the surviving populations. Approximately 95 percent of native South Texas brushlands, woodlands, and prairies have been converted to agricultural fields, improved pastures, and urban areas, or cleared for urban water development and flood control. Most native Texas Gulf Coast prairies have been developed for agriculture. The habitats that remain are vulnerable to fragmentation, contamination from agricultural chemicals, and invasion by non-native grasses introduced for cattle grazing.

* * *

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from adverse effects of Federal activities; restrictions on

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California Condors Moved to New Breeding Facility in Idaho

Twelve California condors (*Gymnogyps californianus*) took the longest flight of their lives on September 23 when they were transported from southern California to the World Center for Birds of Prey in Boise, Idaho. They are part of a captive breeding program directed by the Fish and Wildlife Service in cooperation with the Los Angeles Zoo and the San Diego Wild Animal Park to recover this critically endangered bird. The birds were moved from the two facilities to form the nucleus of a third captive breeding flock, the first outside California.

Seven condors began their journey in San Diego, where they were driven to Miramar Naval Air Station and loaded aboard an Air Force C-141 Starlifter, which was scheduled for a routine training flight to Idaho. Meanwhile, five condors from the Los Angeles Zoo were carried to Los Angeles International Airport and put on a specially equipped Boeing 727 provided by Federal Express, one of the world's largest express shipping companies. A team of zoo and Army veterinarians, along with special condor handlers, accompanied the birds on each flight.

"We owe a special thanks to the Air Force at Edwards Air Force Base for allowing us to take advantage of their training operations and to Federal Express for donating the use of its plane to transfer these condors. Their participation is an essential component to make this cooperative effort a success," said Marvin Plenert, FWS Pacific Regional Director.

Among those welcoming the condors to Boise was Dr. Bill Burnham, President of The Peregrine Fund, which operates The World Center for Birds of Prey. The Fund was selected to operate the third captive breeding facility because of its record of success in propagating other endangered birds of prey. Funds for the Center's new 17,000-square-foot condor breeding facility were provided by the FWS and private contributors (Peter and Connie Pfendler and the Boise Water Corporation).

The 12 birds — 6 males and 6 females — were selected to maximize genetic diversity in the captive breeding population. Biologists hope one of the pairs may breed as early as 1995. Several areas of Arizona and New Mexico are being evaluated as potential release sites for the progeny of the Boise flock. Some condors also could be sent to California to join the birds that have been released there. California condors, the largest birds in North America, once ranged along the entire Pacific coast from British Columbia to Baja California and as far east as Florida. More recently, however, they were confined to an area north of Los Angeles.

There are now 75 California condors, up from a low of 27 in 1987. Four of the

eight captive-produced condors released last year in Los Padres National Forest have died, one from ingesting leaked radiator fluid and the others from collisions with power lines. After the death of the fourth condor, the remaining four were captured and moved to a site in Lion Canyon, a more remote (and hopefully safer) area of the national forest. They were joined there by another five captive-produced condors, and all nine birds were released between December 8 and 10. The other 66 California condors are in captive breeding flocks at the World Center for Birds of Prey, San Diego Wild Animal Park, and Los Angeles Zoo.

Listing Proposals

(continued from page 17)

take and trafficking; a requirement that the FWS develop and carry out recovery plans; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments with cooperative endangered species agreements. Listing also lends greater recognition to a species' precarious status, encouraging other 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 any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable

and prudent alternatives," such as project modifications or rescheduling, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to possess, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant 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 more restrictive laws specifically against the take of State or federally listed plants and animals.

Young North Dakotans Get Tubs Full of Endangered Species Education

by Dan Licht



photo by Dan Licht

The contents of this "endangered species tub" include a peregrine falcon wing, a gray wolf hide, piping plover eggs in a plexiglass cube, and species "building blocks."

Endangered species staff in the Fish and Wildlife Service's (FWS) North Dakota Ecological Services Office believe in the adage, "An ounce of prevention is worth a pound of cure." As a result, the staff has put together two endangered species "tubs" to respond to requests for presentations about species in danger of extinction. Reaction by teachers and scout troop leaders has been enthusiastic.

Inside each of the plastic tubs is an assortment of endangered species artifacts, games, videotapes, and brochures. Wildlife items came from various FWS offices and programs, such as Ecological Services, Fish Hatcheries, and Law Enforcement. For example, one of the tubs features a least tern (*Sterna antillarum*) nest diorama created by using addled tern eggs in a nest bowl made of sand. The entire scene was fixed with acrylic spray and enclosed within a plexiglass container. The contents of the egg had been carefully removed for contaminants analysis. In the same tub is a plexiglass

tube containing a small pallid sturgeon (*Scaphirhynchus albus*) preserved in alcohol. The sturgeon came from a recent hatchery effort and was expendable for educational purposes. Other contents of the tub are the wing of a peregrine falcon (*Falco peregrinus*), a pressed western prairie fringed orchid (*Platanthera praeclara*), and the tanned hide of a gray wolf (*Canis lupus*) shot in the Dakotas.

In addition to the artifacts, the tub includes a game of blocks that represent different species of flora and fauna. Younger students use the blocks to form a pyramid that collapses when too many blocks become "extinct." Other items include plaster casts of tracks from black-footed ferrets (*Mustela nigripes*) and wolves, a wooden ecosystem puzzle, and videotapes about ferrets and bald eagles (*Haliaeetus leucocephalus*). The tub also contains an endangered species book—a three-ringed binder that holds a variety of crossword puzzles, coloring pages, mazes, species fact-sheets, clip-art (computer-

generated drawings of wildlife such as plovers and wolves which, when cut out, can be used as book markers or in collages or games), and even multiple-choice tests about North Dakota's endangered species. The binder approach makes it easy for teachers to duplicate the items they want to use with each class.

Finally, to leave a lasting impression with the students, the tub contains posters and brochures they can keep. There is enough diversity in the tub that grades K-12 can find something of use.

According to Mark Dryer, FWS endangered species senior staff biologist in North Dakota, "One shortcoming of many endangered species outreach efforts, from our perspective, is that they do not discuss species close to home. It's important that North Dakotans, especially children, take pride in their own natural heritage." Adds Kathy Martin, endangered species staff biologist, "The tub was the only way we could efficiently reach the far corners of the State. We typically mail it out on a Friday, the school uses it the following week, and then mails it back."

The cost of materials for each tub is about \$300, mostly for the plastic tubs, packing foam, games, and videos. The remaining items were obtained from other FWS offices or created by Ecological Services staff. It took approximately 5 weeks to put together the 2 tubs, but additional tubs should take considerably less time because of the ease in duplicating many items.

The use of tubs for outreach has been so successful that the North Dakota Office is starting a wetland tub and considering others, such as a native prairie tub. Hopefully, an ounce of prevention will indeed be worth a pound of cure.

Dan Licht is a wildlife biologist in the Fish and Wildlife Service's North Dakota State Office in Bismarck.

Final Listing Rules Approved for Eight Species

Final rules adding eight species—six plants and two animals—to the U.S. List of Endangered and Threatened Wildlife and Plants were published by the Fish and Wildlife Service during August and September 1993. These plants and animals now receive Endangered Species Act protection, and plans for their recovery will be developed. A list of the newly added taxa, with their legal classification and *Federal Register* publication dates, follows:

- **Four California Vernal Pool Species**—An August 3 rule listed as Endangered four species endemic to vernal pools in southern California: the **Riverside fairy shrimp** (*Streptocephalus woot-*

toni) and three annual plants—**Otay mesa mint** (*Pogogyne nudiusscula*), **California Orcutt grass** (*Orcuttia californica*), and **San Diego button celery** (*Eryngium aristulatum* var. *parishii*).

- **Two California Marsh Plants**—A separate August 3 rule listed as Endangered two species of perennial herbs native to the coastal freshwater marshes of San Luis Obispo County, California: the **marsh sandwort** (*Arenaria paludicola*) and **Gambel's watercress** (*Rorippa gambellii*).

- **Pima Pineapple Cactus** (*Coryphantha scheeri* var. *robustispina*)—This attractive, hemispherical cactus native to

southern Arizona and northern Sonora, Mexico, was listed September 23 as Endangered.

- **Delhi Sands Flower-loving Fly** (*Rhaphiomidas terminatus abdominalis*)—With its long, tubular proboscis and ability to hover in flight, this nectar-feeding fly in some ways mimics hummingbirds. Unlike pest species, the Delhi Sands flower-loving fly cannot survive in developed areas. It needs natural habitat characterized by fine, sandy soils of a specific type, very little of which remains. This insect, the only remaining subspecies of *R. terminatus*, was listed September 23 as Endangered.

Louisiana Pearlshell Reclassified as Threatened

The Fish and Wildlife Service (FWS) determined September 24 that the Louisiana pearlshell (*Margaritifera hembeli*), a freshwater mussel previously known only in the Bayou Boeuf drainage in Rapides Parish, Louisiana, warrants reclassification under the Endangered Species Act from Endangered to Threatened. The FWS made this change because of improvements in habitat management, a re-

duction in the threats to the mussel, and the discovery of new populations in the Red River drainage in Grant Parish. Listed in 1988 as Endangered, the species was proposed for reclassification to Threatened on February 26, 1993.

In addition to documenting a larger range than known at the time of listing, recent surveys found evidence of successful reproduction in most, if not all, popu-

lations. Management initiatives at Kisatchie National Forest to benefit the pearlshell have included the control of beavers (whose dams had fragmented the mussel's range and flooded its free-flowing habitat) and the establishment of streamside zones to minimize sedimentation during logging operations.

Proposed Reclassifications

No longer believed to be in imminent danger of extinction, three species—a fish, a bird, and a plant—were proposed recently for reclassification from Endangered to the less critical category of Threatened. Although their status has improved, these species are not yet fully recovered, and therefore would retain Endangered Species Act protection:

Pahrump Poolfish (*Empetrichthys latos latos*)

One of the original taxa listed as Endangered in 1967, this small desert fish,

also known as the Pahrump killifish, was proposed August 18, 1993, for reclassification. Its improved status is due to cooperative recovery efforts in Nevada by Federal and State agencies and university biologists. The Pahrump poolfish is the sole remaining member of the genus *Empetrichthys*, which as recently as the 1940's included three other subspecies.

Although ground water pumping dried up its only historic location, Manse Spring, the Pahrump poolfish has been released into three other Nevada springs with secure water sources. Each self-sus-

taining population is comprised of several thousand fish. Two of these populations are on Federal land—Corn Creek Springs on the Fish and Wildlife Service's Desert National Game Range, and Shoshone Ponds on land managed by the Bureau of Land Management. The third population is at Spring Mountain State Park.

Hawaiian Hawk (*Buteo solitarius*)

Another of the original species listed in 1967 as Endangered, the 'io or Hawaiian

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Proposed Reclassifications

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hawk was proposed for reclassification on August 5, 1993, as a result of improved survey techniques and better knowledge of its ecology and life history. In 1967, Hawaiian hawks—which are restricted to the Island of Hawai'i, or the "Big Island"—were thought to number only a few hundred. Today, although the species still faces threats from human disturbance, shooting, contaminants, and some predators, the hawks probably number between 1,400 and 2,500 birds.

Unlike species that exist only in undisturbed areas, the Hawaiian hawk can nest in a variety of habitats, including those modified by humans, such as agricultural lands and exotic forests. Hakalau National Wildlife Refuge and Hawaii Volcanoes National Park are managed to provide habitat for various native birds, including the hawk.

MacFarlane's Four O'clock (*Mirabilis macfarlanei*)

This wildflower, a perennial found in Idaho and Oregon canyonlands, was proposed August 26, 1993, for reclassification to Threatened. MacFarlane's four o'clock is characterized by strikingly large magenta flowers atop stems that have oppositely arranged succulent leaves. In 1979, when the species was listed as Endangered, only 25 to 30 plants in 3 colonies were known. Today, thanks to improvements in grazing management, the discovery of 15 additional colonies, and the stable status of these colonies, the species is estimated to number 8,600.

Regional News

(continued from page 2)

In Texas, Phillips Petroleum has donated four 4-wheel-drive trucks to cooperators assisting with Region 2's sea turtle programs and desert tortoise (*Gopherus agassizii*) studies in Mexico. Formerly used for travelling between West Texas oil fields, the trucks will now support turtle projects, primarily in Mexico, by carrying people and supplies to remote field sites and patrolling beaches, fulfilling the need for transportation on rough, unimproved roads. Three of the vehicles are destined for the International Sea Turtle Program, a cooperative effort sponsored by the FWS. Recipients include the Gladys Porter Zoo in Brownsville, Texas, which is working on the Kemp's ridley sea turtle (*Lepidochelys kempii*) project on Mexico's Gulf Coast; the Universidad de Michoacan, which runs the black sea turtle (*Chelonia agassizii*) project on Mexico's Pacific Coast; and PRONATURA Peninsula de Yucatan, which operates the important hawksbill sea turtle (*Eretmochelys imbricata*) projects in Yucatan with the FWS. The fourth truck will go to Centro Ecologico de Sonora, which works with the FWS on a desert tortoise project in the Sonoran Desert of Mexico.

A transfer ceremony at Gladys Porter Zoo on September 28, 1993, brought together Phillips Petroleum officials, Mexican cooperators, and media representatives, along with FWS staff. Speaking at the ceremony, H. Lindsay Patterson, Phillips' manager of exploration and production, said, "Our people take great care to preserve the sea turtles that live around our offshore platforms in the Gulf of Mexico. With this donation, we become part of a larger effort that is working across international borders to protect shared sea turtle populations." He added that the company would like to continue its cooperative efforts with the FWS. Phillips supports a number of conservation initiatives with the FWS, including wetlands restoration in the Playa Lakes and Gulf Coast Joint Ventures, and (with

the Houston Audubon Society) coastal woodlots protection along the Gulf Coast of Texas and Louisiana. Joint Ventures are private and public partnerships to protect and enhance habitat under the North American Waterfowl Management Plan. Phillips has also toppled a petroleum production platform and converted it into an artificial reef as part of its Rigs-to-Reefs program, an initiative with the State of Texas to create new fishing habitat for recreational and commercial purposes.

* * *

On August 23, 1993, the FWS delivered a "no jeopardy" Biological Opinion to the Forest Service in response to a request for a programmatic Section 7 consultation on projects affecting the Mexican spotted owl (*Strix occidentalis lucida*). The Forest Service proposed 88 projects dealing primarily with timber harvest and management on 10 national forests in New Mexico and Arizona. Preparing the biological opinion was a team effort by staff from the FWS New Mexico and Arizona State Ecological Services Field Offices and the Regional Office's Division of Endangered Species/Permits. In addition, personnel from other FWS field offices were detailed to help with the effort.

* * *

Winter crop depredation by sandhill cranes (*Grus canadensis*), particularly on alfalfa and chilies in the Middle Rio Grande Valley, New Mexico, was the concern of farmers and State and Federal wildlife biologists who met recently to explore means of alleviating the problem without harm to whooping cranes (*Grus americana*) that also pass through the area. Representatives from the New Mexico Game and Fish Department, Bosque del Apache National Wildlife Refuge (NWR), and the FWS Albuquerque Regional Office attended.

The result was an extension in the sandhill crane hunting season, which previously ended November 1, a date before most whooping cranes from the experimental Rocky Mountain flock migrate

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Contributing to the *Endangered Species Technical Bulletin*

The *Endangered Species Technical Bulletin* was created in 1976 to meet the growing demand for news of developments in the endangered species program. The *Bulletin* is the primary means by which the Fish and Wildlife Service disseminates information on rulemakings (listings, reclassifications, and delistings), regulatory changes, section 7 interagency consultations, recovery plans and activities, changes in species' status, research developments, new ecological threats, and a variety of other issues.

The *Bulletin* has an increasingly diverse audience and a current circulation of about 8,500. The Service is authorized to provide this publication to:

- biologists, other natural resource managers, and administrators in a wide variety of Federal, State, and local agencies. The *Bulletin* is of interest not only to natural resource agencies but also to other agencies that may be affected by endangered species program activities.
- members of Congress and staff directors of major committees.
- conservation groups and other interested organizations.
- scientists with whom the Service regularly works.
- major public and university libraries.

In response to demand from teachers, consulting firms, concerned citizens, and others, the Service set up an agreement with the University of Michigan in 1982 to make the *Bulletin* available to anyone who is interested. Under this arrangement, the University reprints the *Bulletin* as part of its own publication, the *Endangered Species Update*. The *Update* is sold on a not-for-profit basis (currently \$23 per year) and has about 1,200 subscribers.

We Need Your Help!

Because of its increasingly diverse audience, the *Bulletin* is seeking to diversify and expand its coverage of endangered species issues. With the Endangered Spe-

cies Act due for reauthorization, the *Bulletin* also will become more important as a means of public outreach. We need your help in bringing broader coverage of the endangered species program to the public.

Material on a wide range of topics relating to endangered species is welcome, and it may be technical or popular in nature. We are particularly interested in news about recovery (both the development of new recovery plans and their implementation); interagency consultations (including biological opinions rendered, reasonable and prudent alternatives identified, etc.); Habitat Conservation Plans; other cooperative ventures with Federal and State agencies, conservation organizations, business, and private landowners; changes in a species' status; and significant new threats.

Before preparing a manuscript, please contact the *Bulletin* Editor (703/358-2166) to determine the proper length, focus, and timing of proposed articles. Although we welcome submissions, we cannot guarantee their publication in the *Bulletin*. (Authors will be notified if their material is not used.) Manuscripts may be circulated to reviewers for technical content and consistency with Fish and Wildlife Service policies. They may also be edited for length, style, and clarity. The *Bulletin* editorial staff will consult with authors on changes that may affect the content of a manuscript, and authors will have an opportunity to review edited material before publication. Credit will be given for all articles and illustrations used.

Style

When preparing a manuscript, follow the *GPO Style Manual*. Keep in mind the diversity of the *Bulletin* audience. People from many different backgrounds are added to the mailing list each month, and discussing the context of an issue is an important aid to new readers. Foot-

notes and references are acceptable for technical articles.

Contributions need not be technical; there is also a need for material of wider interest. Feature articles are particularly welcome. We encourage authors to adopt a popular, general audience style with an attention-grabbing opening. Indulge your creative impulse, and have fun!

As a general rule, feature articles should be between three and nine double-spaced pages in length. Shorter items can be sent to the appropriate Regional endangered species specialist for inclusion in the Regional News column. Notices and announcements may be mailed directly to the Editor.

Because the *Bulletin* recipients include many scientists and foreign subscribers, please include in all material:

- scientific as well as common names of all species mentioned (non-listed as well as listed species).
- metric equivalents for all measurements (including area and volume).
- Celsius and Fahrenheit equivalents for temperatures.
- complete names or terms to accompany the first use of all abbreviations and acronyms.

Submissions should always include the author's name, position, duty station, address, and telephone number.

Illustrations

Photographs and/or line drawings are very important, and should be submitted with all articles as available. Photographs are particularly welcome, and can be provided as transparencies, prints (black-and-white preferred), or negatives. Include the photographer's name and material for a caption. Material will be returned upon request. Please obtain in advance the necessary permission for the *Bulletin* to publish the illustrations.

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Contributing to the Bulletin

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Submission Format

Manuscripts for the *Bulletin* can be submitted several ways. We prefer to receive computer files in Wordperfect 5.1 format. Please transmit them via CC:MAIL (send to R9FWE_OA.BCI). You may also mail DOS-formatted diskettes to Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 320 ARLSQ, Washington, D.C. 20240. Submissions by FAX can be sent to 703/358-1872 (703/358-2166 to confirm). In all cases, please mail a double-spaced hard copy.

Printing Schedule

The *Bulletin* is converting to a bi-monthly printing schedule, with six issues per year and an index. To achieve this goal, the following schedule has been established for the upcoming year:

1994 ISSUE DATE	COPY DUE DATE
February	December 1, 1993
April	February 1, 1994
June	April 1, 1994
August	June 1, 1994
October	August 1, 1994
December	October 1, 1994

We welcome contributions at any time, but material not received by the "Copy Due" date will be held for the next issue.



The second poster of a new series on the theme "Endangered Means There's Still Time" depicts six animals and plants native to desert regions of the United States: the desert tortoise, Devil's Hole pupfish, black lace cactus, Sanborn's long-nosed bat, jaguarundi, and California condor. Future editions of the series will feature endangered species from a variety of habitats. These posters are designed to raise public awareness of lesser known types of rare wildlife.

The full-color, 16-by-22-inch desert poster can be purchased by writing the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, or by calling 202/783-3238. The price is \$5.50; ask for product number 024-010-00698-6. Copies of the first poster in the series, which illustrates coastal species, are still available for \$4.95; ask for product number 024-010-00693-5.

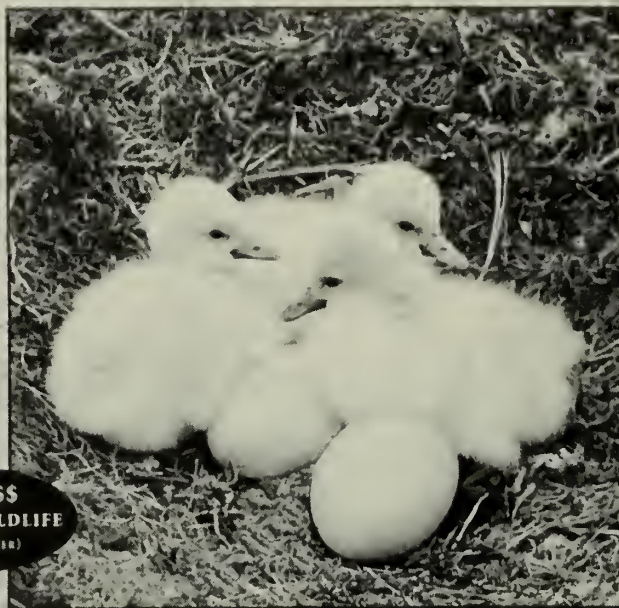
New Publications

1994 Refuge Calendar

Our *National Wildlife Refuges*, a new full-color calendar for 1994, features 28 of our nation's natural treasures. Created by photographers John and Karen Hollingsworth, the calendar focuses on the diversity of habitat and species within the National Wildlife Refuge System, and includes an educational text to invite further exploration. The calendar also includes a list of refuge events nationwide, highlighting special activities, festivals, and wildlife migratory routes.

For every calendar purchased, the Hollingsworths will donate 50 cents to the National Wildlife Foundation, which will match their donation. The funds will be directed by the Foundation to habitat restoration and/or environmental education projects on national wildlife refuges. To order, send \$11.50 (shipping and handling included) to Reflections of Nature, P.O. Box 235, Bellvue, Colorado 80512-0235.

OUR NATIONAL WILDLIFE REFUGES



**YOUR \$\$\$
BENEFIT WILDLIFE**
(SEE BACK COVER)

1994 CALENDAR

Updated Endangered Species List Available

A new U.S. List of Endangered and Threatened Wildlife and Plants, updated through August 23, 1993, is now available. For a copy, write the U.S. Fish and Wildlife Service, Publications Unit, 130 WEBB, Washington, D.C. 20240.

Biodiversity on Private Lands: An Initiative of the President's Commission on Environmental Quality describes how 16 corporations began integrating biodiversity conservation into the management of private lands. By developing partnerships with government agencies, private organizations, and academic institutions, corporate land managers assessed conservation opportunities,

then planned and implemented projects to combine biodiversity with economic uses of land. The 24-page color booklet, made possible by a challenge grant from the National Fish and Wildlife Foundation, is available from International Paper, Route 1, Box 421, Bainbridge, Georgia (telephone 912/246-3642; FAX 912/243-0766).

New Publications

California—Vanishing Habitats and Wildlife, a 144-page softbound volume with text and photographs by B. "Moose" Peterson, explores California's deserts and grasslands, fresh and salt water marshes, old growth and riparian forests, mountains and valleys, Sacramento

Delta, and San Francisco Bay. It features over 90 full-color photographs of the State's rare wildlife and its habitats, and includes a foreword by Roger Tory Peterson.

See below for an excerpt from the book.

To order, write the Beautiful America Publishing Company, P.O. Box 646, Wilsonville, Oregon 97070, or call toll-free at 1-800-874-1233. The price is \$21.95 (shipping not included).

LoKern



A San Joaquin kit fox family.

LoKern could be called the Carrizo/Elkhorn's sister in that they share much of the same habitat. Butting up against the Elkhorn Hills west of Buttonwillow, the four thousand acres of the LoKern are a small fraction of its once greater whole. Though the Temblor Mountains divide the Carrizo/Elkhorn from the LoKern, many species live in both areas. The one feature that does distinguish them is that LoKern is located within the San Joaquin Valley, tucked away on its southwestern edge. Because of this, LoKern protects a couple of

other native endangered species not found over the hill.

The LoKern is the last significant intact remnant of native San Joaquin saltbush and alkali sink scrub habitat. A major plant of the grasslands is the alkali-tolerant saltbush. It in turn supports other smaller plants that take advantage of its shade and of the nutrients the dead plant material adds to the soil. The endangered California jewel-flower, Hoover's wooly-star, and Kern mallow all reside in this plant community. In fact,

the entire world population of Kern mallow lies in the safety of LoKern.

The saltbush also provides homes and cover for many bird species; the most notable is the LeConte's thrasher. Like so many birds and animals, much of its specialized, desert-grassland habitat has been lost and LoKern is the only stronghold left to it in the valley.

This diverse habitat also supports a number of birds under consideration for listing as endangered—the mountain plover, long-billed curlew, and ferruginous hawk. They are winter visitors to LoKern, depending on its unique features to supply them with the needed food reserves for their return migration north.

This rich plant life also supports the short-nosed, Tipton, and giant kangaroo rats, San Joaquin pocket mouse, blunt-nosed leopard lizard, and San Joaquin antelope squirrel. These in turn support the San Joaquin kit fox. The web of life in this "desert" community staggers the imagination. And LoKern supports some of the largest known concentrations of these endangered wildlife and plants, an island unto itself.

photo by B. "Moose" Peterson/WRP

Listed Species By State/Territory As of November 30, 1993

(Omits "similarity of appearance" and some extirpated species)



Regional News

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into New Mexico. The surviving members of the cross-fostered flock spend the winter primarily on Bosque del Apache NWR and State game areas that are not open to sandhill crane hunts.

New Mexico will have seven 2-day sandhill crane hunts during October, December, and January to diminish crop depredations. Hunts for another whooping crane "look-alike" species, the snow goose (*Chen caerulescens*), in the Middle Rio Grande Valley have occurred without known harm to whooping cranes. Measures taken to protect whooping cranes will be similar to those used in the past, including distributing educational mate-

rials, training hunters in bird identification and requiring them to pass a written examination, and immediately closing any hunt zone if a whooping crane enters the area.

* * *

Region 3 - Region 3 biologists have taken the lead in the section 7 consultation with the Environmental Protection Agency for the proposed Great Lakes Water Quality Guidance, an initiative to ensure consistent water quality standards among all States within the Great Lakes watershed. The Chicago Metro Wetlands Office had an introductory meeting to discuss the consultation process and expects to convene a second meeting soon.

* * *

Staff from the FWS Region 3 Office and Green Bay Field Office joined staff

from the Forest Service in searching for the goblin fern (*Botrychium mormo*), a Category 2 listing candidate, in the Chequamegon National Forest in Wisconsin. Although this population numbered about 1,000 plants when it was discovered in 1979, researchers located only 24 plants this year. The reason for the decline is unknown; the habitat has not been disturbed. Weather conditions may affect the goblin fern on a delayed basis.

* * *

A September 15 pipeline break caused diesel fuel to spill into the only place in the world the Endangered white cat's paw pearly mussel (*Epioblasma obliquata perobliqua*) is known to exist, Fish Creek in northeast Indiana and northwest

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Ohio. The ruptured pipeline discharged an estimated 30,000 gallons of #2 diesel fuel in a crop field in DeKalb County, Indiana. Spilled fuel made its way to a small drainage ditch that discharges into Fish Creek. Fish Creek is also home to two other Endangered mussel species, the northern riffleshell (*Epioblasma torulosa rangiana*) and the clubshell (*Pleurobema clava*), as well as the salamander mussel (*Simpsonaias ambigua*), a listing candidate. The area provides habitat for migratory birds including passerines, waterfowl, wading birds, piscivorous birds, and raptors.

While response action probably limited potential damage, it did not prevent injury and will not address residual effects. Fuel has accumulated along the banks and in detrital organic matter and sediment. Staff from the FWS Bloomington, Indiana, Field Office, Indiana Department of Natural Resources, and Ohio Department of Natural Resources are assessing the damage to the mussel community of Fish Creek.

* * *

Interagency cooperation characterized a September 8 meeting of the Niangua Darter (*Etheostoma ninguae*) Recovery Team at Lake of the Ozarks, Missouri. Agenda items featured current research on this State endemic fish, monitoring surveys, artificial propagation, problems associated with gravel dredging, water quality issues, increased coordination among agency staffs, an improved public education program, and funding needs. In addition to biologists from the FWS Columbia, Missouri, Field Office, participants included staff from the Missouri Department of Conservation, the U.S. Army Corps of Engineers, the Missouri Highway and Transportation Department, the University of Missouri's Cooperative Fish and Wildlife Research Unit, and the Sierra Club.

* * *

Region 5 - From July 6 to 8, 1993, the FWS, the IUCN/SSC Captive Breeding

Specialist Group, and The Nature Conservancy sponsored a Population and Habitat Viability Assessment (PHVA) for the sandplain gerardia (*Agalinis acuta*), an Endangered plant. Held at The Nature Conservancy's Mashomack Preserve on Shelter Island, New York, the 3-day workshop brought together experts from throughout the species' range to assess recovery efforts during the last 5 years and formulate plans. The PHVA uses computer simulation models to test management scenarios and population dynamics assumptions.

* * *

The FWS Virginia Field Office recently completed a no-jeopardy Biological Opinion on impacts to the bald eagle (*Haliaeetus leucocephalus*) from five proposed shoreline facilities as described in applications for U.S. Army Corps of Engineers construction permits. The projects would allow private boat access within the largest summer concentration of eagles in the eastern United States—a 7-mile stretch of the James River in Virginia. Although the Corps has agreed to the Biological Opinion terms and conditions that include no private boat-ramp building, the local government on one side of the river continues to pursue construction of a public boat-ramp. The FWS maintains that such a ramp within or adjacent to this concentration area is likely to result in serious impacts to bald eagle use. Migrant and resident eagles forage and loaf along the shoreline during the day and roost in the James River National Wildlife Refuge at night. Eagles use this segment of the river because it is undisturbed, has extensive flats and shallow water areas for feeding, and offers a large food base. Human disturbance is increasing, mainly through development and boat traffic.

* * *

Recently, the FWS and the Environmental Protection Agency drafted an interagency agreement that provides funding to the FWS to implement watershed protection in the Upper Tennessee River Basin of southwestern Virginia. This basin includes the Clinch, Powell, and Holston Rivers, which have a high

concentration of federally listed species, including 14 mussels and 3 fish. At least 30 other State and Federal agencies and private conservation groups have also recognized the importance of this biologically rich ecosystem and are actively implementing a wide variety of conservation measures and ecological research. To date, more than 5 miles of riparian habitat have been restored under a cooperative agreement between the FWS and The Nature Conservancy (TNC). In addition, the Virginia Department of Game and Inland Fisheries cooperated with the Virginia Water Resources Research Center, TNC, and the FWS to obtain a grant from the National Fish and Wildlife Foundation to expand public outreach activities in the Basin, restore degraded riparian habitats, and reintroduce native mussels into these recovered habitats. Grant activities are scheduled to begin this year.

* * *

Winter 1992-93 bat surveys by the West Virginia Division of Natural Resources tallied 85,374 bats in 35 caves and one limestone mine. Hellhole Cave, West Virginia's most significant hibernaculum, contained 75,204 bats, including 5,618 Indiana bats (*Myotis sodalis*) and 4,965 Virginia big-eared bats (*Plecotus townsendii virginianus*). Researchers found seven species.

In June 1993, biologists using night-vision equipment to census 12 *P. t. virginianus* summer colonies, including a new one discovered late in the summer of 1992, counted 5,943 adults.

* * *

The discovery of a new bald eagle nest in West Virginia brought the State total to five. Four of these nests fledged two chicks each, and the fifth appears to have fledged at least one eaglet.

Intensive searches failed to locate any nesting peregrine falcons (*Falco peregrinus*) in the State. Biologists did find eight breeding pairs of loggerhead shrikes (*Lanius ludovicianus*), a Category 2 listing candidate.

* * *

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Between July 1, 1992, and June 30, 1993, researchers with the West Virginia Division of Natural Resources (WVDNR), the Monongahela National Forest, and West Virginia University captured 47 Endangered northern flying squirrels (*Glaucomys sabrinus fuscus*) during spring and fall monitoring for species population and distribution in the State. The 18 capture sites included 2 new ones. While the flying squirrels were "in hand," WVDNR researchers conducting a food habits study analyzed 66 fecal samples, which showed that the animals' diet consists of lichens, pollen, and fungi.

* * *

WVDNR researchers discovered a new population of the Endangered clubshell mussel (*Pleurobema clava*) in Hackers Creek, a tributary of the West Fork River in the Monongahela River drainage. They also found new populations of two other mussels that are Category 2 listing candidates—the green floater (*Lasmigona subviridis*) in Clover Lick Creek, a tributary to the Greenbrier River, and the brook floater (*Alasmidonta varicosa*) in Patterson Creek, which flows into the North Branch of the Potomac River.

* * *

Surveys for the Threatened Cheat Mountain salamander (*Plethodon nettingi*), a West Virginia endemic, have

helped to define the overall range of the species. Dr. Thomas Pauley of Marshall University in Huntington, West Virginia,

found only one new population at the edge of its range.

November/December 1993

Vol. XVIII No. 4

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

BOX SCORE LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	55	251	9	22	337	36
Birds	72	154	17	0	243	73
Reptiles	17	63	18	14	112	27
Amphibians	6	8	5	0	19	9
Fishes	59	11	39	0	109	60
Snails	12	1	7	0	20	26
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	15	4	9	0	30	15
Arachnids	4	0	0	0	4	0
Plants	326	1	77	2	406	176
TOTAL	629	495	189	38	1,351*	466**
Total U.S. Endangered	629		(303 animals, 326 plants)			
Total U.S. Threatened	189		(112 animals, 77 plants)			
Total U.S. Listed	818		(415 animals, 403 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, chimpanzee, 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.

** There are 369 approved recovery plans. Some recovery plans cover more than one species, 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 CITES Party Nations:

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ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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