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ENDANGERED SPECIES

Technical Bulletin

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

Improved Status Leads to Reclassification Proposals for Two Plant Species

The status of two plant species currently listed as Endangered has improved enough that the Fish and Wildlife Service (FWS) recently proposed to reclassify them to the less critical category of Threatened:

Small Whorled Pogonia *(Isotria medeoloides)*

A small green orchid, this species is distinguished by the five or six leaves displayed in a whorl with a yellowish-green flower in the center. It grows in fairly young forests and in maturing stands of mixed-deciduous or mixed-deciduous/coniferous forests. Populations of the small whorled pogonia occur at sites from southern Maine through the Atlantic seaboard States to northern Georgia and southeastern Tennessee. Outlying colonies have been found in the western half of Pennsylvania, Ohio, Michigan, Illinois, and Ontario, Canada.

Concerns about habitat loss led to the listing of this species as Endangered in 1982. Among the recommendations contained in the 1985 Small Whorled Pogonia Recovery Plan were searches for additional populations, protection for a sufficient number of sites, and research into the plant's life history. Since 1985, botanists have located additional populations and sought to protect a number of sites. About 60 percent of the viable sites are now secure. Many of the protected populations are on public lands, though the voluntary cooperation of private landowners and conservation organizations continues to be vital to the recovery of the small whorled pogonia. Management will benefit from the increased knowledge of the species' habitat needs.

On November 29, 1993, in accordance with criteria in the 1992 revised recovery plan, the FWS proposed to reclassify the small whorled pogonia as Threatened. Although the species is no longer believed to be in imminent danger of extinction, complete delisting is not appropriate until additional sites are protected.

photo by Susanna von Oettingen

Habitat protection and landowner cooperation have helped improve the status of this woodland orchid, the small whorled pogonia.

Loch Lomond Coyote Thistle *(Eryngium constancei)*

Despite its common name, this plant is not a thistle but a perennial herb in the parsley family (Apiaceae). It occurs only on the floor of Loch Lomond, a vernal lake in California. Vernal lakes and pools are an unusual habitat type forming 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.

In 1985, after the lake bed was partially dredged and filled, and plans were made to fill the rest, the FWS listed the Loch Lomond coyote-thistle as Endangered. At the time, the plant's habitat was also threatened by off-road vehicles, hikers, highway maintenance, and trash dumping. Subsequently, the State of California purchased the lake and, with FWS assistance, installed a split-rail fence. Both of these actions greatly reduced the potential for disturbance of the lake floor.

Because the species is now believed to be more secure, the FWS proposed November 29 to reclassify the Loch Lomond coyote-thistle as Threatened. Complete delisting is not believed appropriate at this time due to occasional vandalism, the

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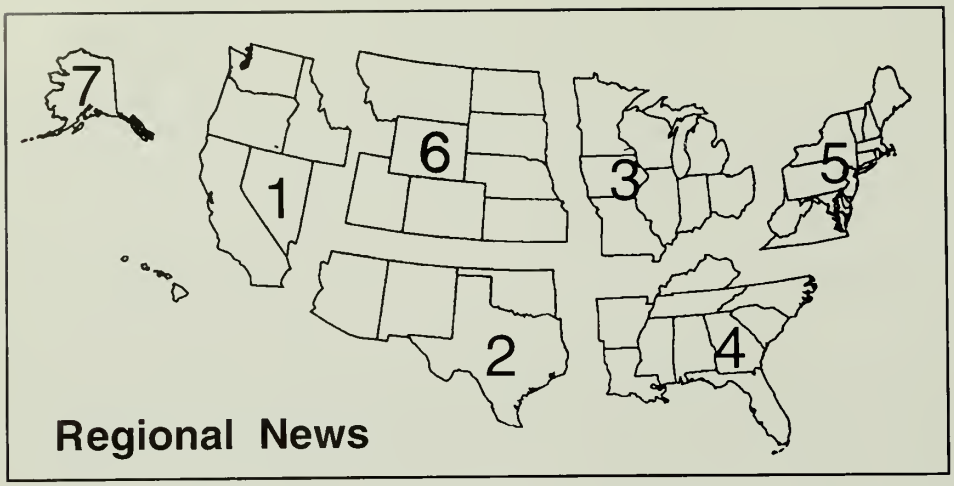

Regional News

Regional endangered species staffs have provided the following news:

Region 2 - Five parent-reared whooping cranes *(Grus americana)* are in quarantine in preparation for shipment and release in the Kissimmee Prairie of Florida, the site of 5 surviving cranes released in February 1993. (See *Bulletin Vol. XVII, No. 9-11.*) Two whooping cranes from the International Crane Foundation in Baraboo, Wisconsin, and 3 from the Fish and Wildlife Service's (FWS) Patuxent Wildlife Research Center in Laurel, Maryland, will join the 5 survivors in this effort to establish a nonmigratory flock in central Florida. Later this winter, biologists plan to release 14 "isolation-reared" young whooping cranes from Patuxent. The new arrivals are expected to join the experienced birds and learn survival techniques from them.

* * *

By December 20, 143 cranes, including 16 chicks, had reached their wintering grounds at Aransas National Wildlife Refuge on the Texas coast. This number is about the total anticipated to arrive. Biologists were unable to find six pairs that had a single chick each during surveys conducted in June at the species' breeding grounds in Wood Buffalo National Park, Northwest Territories, Canada.

* * *

The Captive Breeding Specialist Group of the International Union for the Conservation of Nature has published *A Whooping Crane Conservation Viability Assessment*, edited by Claire Mirande, Robert Lacy, and Ulysses Seal. Accomplished under contract with the FWS, the report includes priorities for research and management of wild and captive populations to maximize retention of genetic heterozygosity and minimize the risk of extinction. Estimates are that about 87 percent of the genetic diversity has survived since the population bottleneck of the 1940's.

If the annual 4.6 percent population growth of the last 50 years continues, the wild population at Aransas National Wildlife Refuge will reach 500 birds by about the year 2020. Biologists predict a very low probability of extinction (less than 1 percent) during the next 100 years. The whooping crane has the highest long-term recruitment rate—13.9 percent—of any North American crane population.

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Secretary Babbitt Addresses the Impact of Endangered Species Protection on Private Landowners

by Ken Burton

There is little evidence to support claims that the Endangered Species Act has worked widespread hardship on landowners, Interior Secretary Bruce Babbitt told the conference of the Society of Environmental Journalists at Duke University in October.

"Instead of attacking the law directly, the opponents have assembled under the banner of the Wise Use movement and concocted a new and radical concept," Babbitt said, "that any government action affecting the value of a property right automatically creates a right to compensation from the United States Treasury."

Babbitt said environmental regulations are no different in concept than planning and zoning regulations imposed across the United States virtually every day to serve various public purposes.

"And in fact, upon close examination, many planning and zoning regulations are environmental regulations — providing open space, preserving stream courses, limiting congestion and air pollution, and generally providing a more liveable environment," Babbitt said.

Babbitt noted that his hometown of Flagstaff, Arizona, has a city ordinance prohibiting property owners from cut-

For the 20 years the Endangered Species Act has been in place, and "despite the fact that more than 800 species throughout the U.S. are now protected by it," Babbitt said, not a single instance has occurred in which a landowner was so affected by the Act that he was awarded compensation for a governmental "taking" of his property through the claims court.

"Of course, the fact that, in 20 years, the Fish and Wildlife Service has never come close to a constitutional taking does not end the matter," Babbitt said. "I believe the government has a higher obligation to its citizens than simply staying out of court and away from a constitutionally protected taking. Government has an obligation to treat all citizens reasonably, to minimize the inconvenience, to apply regulations in the least instrusive and most thoughtful way."

The Secretary listed several approaches:

- The Department should use, whenever possible, public lands for the habitat necessary to protect an endangered species.
- Mitigation fees: a habitat conservation plan worked out with the City of Las Vegas provides that residential developers pay a mitigation fee which in turn goes into a fund to pay for conservation measures on lands used as tortoise reserves. "In concept," Babbitt said, "this mitigation fee is no different from a lot assessment to finance water, sewage or playgrounds."
- Sometimes, "a few thoughtful, constructive changes in our approach to land management will suffice," such as the Georgia Pacific Company's plan designed to protect the red cockaded woodpecker.
- In cases where a reasonable habitat conservation plan cannot be worked out, it may be appropriate to consider land exchanges or even outright purchase from willing sellers, Babbitt said.

Babbitt said he recognized that in some cases, delays have caused hardship

to some small landowners caught in the regulatory freeze. "It is these cases that one hears about in the press, and I am frankly very sympathetic to such complaints. At my direction, the Fish and Wildlife Service is beginning a review of this issue and is seeking improved methods... to provide more flexibility in responding to the needs of individual small landowners in the use and improvement of their property," Babbitt said.

"The Endangered Species Act is working. The well publicized 'train wrecks' that we read so much about illustrate, in most every case, not deficiencies in the Act, but the willful failure of public officials to explore and use the flexible provisions of the Act that are available to protect the incomparable biodiversity of the American landscape and to accommodate the reasonable use and development expectations of landowners," Babbitt said.

Ken Burton, a public affairs specialist with the Fish and Wildlife Service, attended the October meeting The organization Secretary Babbitt addressed, the Society of Environmental Journalists, was formed several years ago to promote professionalism in the reporting of environmental affairs. It has a membership of about 900 print, radio, and television journalists, as well as members in related field in government and the private sector.

IMPORTANT!

READER SURVEY CARD ENCLOSED

Taiwan and Peoples Republic of China are Warned Against Continued Trade in Rhino Horn and Tiger Parts

by Denise Henne

Pursuant to the Pelly Amendment to the Fisherman's Protective Act of 1967, Secretary Babbitt certified to President Clinton on September 7, 1993, that Taiwan and the People's Republic of China are engaging in trade of rhinoceros and tiger parts and products, thereby threatening these animals with extinction. This certification states that the trade also diminishes the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an agreement among 120 countries to prohibit trade in endangered wildlife species.

On November 8, in response to the Pelly certification, the President notified Congress that unless China and Taiwan demonstrate measurable, verifiable, and substantial progress in eliminating the trade by March 1994, the United States may impose import prohibitions against them as recommended by CITES.

Rhinoceros numbers have declined 90 percent within the last 23 years to the current level of fewer than 10,000 animals worldwide, and the tiger population has fallen 95 percent during this century to about 5,000. It is believed that wild populations of these animals may become extinct within 2 to 5 years if the trade in their parts and products, which includes rhinoceros horn and tiger bones, is not immediately eliminated. Although recent actions by Taiwan and the People's Republic of China indicate that some progress has been made in addressing their rhinoceros and tiger trade, neither government has fully implemented the international standards established by CITES for controlling the trade in these critically endangered species. Rhinoceros horn and tiger bone are used extensively in traditional Asian medicines.

photo by Dusty Wissmath, African Wildlife Foundation

According to the World Wildlife Fund, the number of black rhinos* (Diceros bicornis) *in Africa has plummeted from 65,000 in 1970 to fewer than 2,000 today, which would mean this species is declining faster than any other large land mammal in recent times.

photo © Environmental Investigation Agency, World Society for the Protection of Animals

This rhinoceros horn offered for sale in Hong Kong was photographed by hidden camera.

The Secretary made his announcement of the Pelly certification in Brussels, Belgium, where he attended the meeting of the CITES Standing Committee with Fish and Wildlife Service (FWS) staff. The Standing Committee acts on behalf of the CITES Parties between the biennial Conference of Parties. After the Secretary's announcement, the Standing Committee unanimously recommended that CITES parties consider implementing "stricter domestic measures up to and including prohibition in trade in wildlife species" against China and Taiwan for their trade in tiger and rhinoceros parts and products.

In his November 8 message to Congress, the President noted the good faith efforts made recently by China and Taiwan, but he added that these efforts have yet to effectively reduce the rhinoceros and tiger trade. Actions that would demonstrate China's and Taiwan's commitment to eliminating the trade in parts and products of these animals could include, at a minimum, (1) consolidation and control of stockpiles; (2) formation of a permanent wildlife conservation law enforcement unit with specialized train-

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In the Eye of the Beholder: Our Image of the African Elephant

by Holly Dublin

photo by Sven-Olof Lindblad, African Wildlife Foundation

No species of bird or mammal, extant or extinct, has elicited more human emotion than the African elephant *(Loxodonta africana)*. In a world where most species are still unknown to the average person, something about this enormous but seemingly dignified pachyderm evokes a vast array of feelings. The African elephant is characterized by the most extreme of attitudes, and these extremes often follow the classic "north/south" split. But there are reasons, good reasons, for the gamut of opinions surrounding the species.

It is a common mistake for people living in the northern hemisphere to believe that everyone everywhere finds the same mystique in elephants. People whose entire exposure comes through television screens associate serenity and kinship with elephants. Given the enormous publicity surrounding the species over the past 5 years, it is no wonder the animal has become the "sweetheart" of the north. Without a doubt, the African elephant possesses many admirable traits. These characteristics have never been brought to our attention more articulately and poignantly than through the writings and films of Cynthia Moss and Iain Douglas-Hamilton, both of whom have shared significant portions of their lives with elephants. These days, by simply taking the time to watch documentary television, even the average American can feel a connection with the species.

However, we must never lull ourselves into believing that all people feel the same empathy for elephants. Many neither revere elephants nor even care for them. Some people, in fact, fear and despise them. This is primarily the case for those who have to share their daily lives and often, involuntarily, their livelihoods with elephants. These individuals do not live among the elephants by choice but rather by circumstance. Today, in a growing proportion of the African elephant's range, people and elephants are coming into conflict—a conflict brought about by the very nature of their codependence on the land and the resources sustaining them.

For a decade or more, the killing of African elephants by humans dominated our thoughts, but today the tables are turning. In many parts of Africa, attention is being drawn to the increasing destruction brought about by elephants. While the initial recovery of several elephant populations from years of unsustainable and illegal take is often viewed as a conservation success, it is only one part of a much bigger and more complex story that may spell the eventual decline of the species. While people and elephants share many of the more endearing traits of social mammals, their competition for declining land space fuels problems for both species. There is a "land hunger" in Africa, and both humans and elephants are the victims.

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In the Eye of the Beholder

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As Africa's human population continues to grow, elephants will increasingly become limited to strictly protected areas. Their future will depend, in most cases, on their ability to survive in these restricted habitats and, to a lesser extent, to coexist in other areas with human populations wherever possible. The increasing confinement of elephants in areas set aside primarily to protect other wildlife and natural attributes presents yet another challenge: how can a loss in biodiversity be avoided as elephants fulfill their role as architects and agents of large-scale vegetation change?

The challenge is to chart a strategy that guarantees the survival of elephants while meeting the needs of people who inhabit the same region. Developing and implementing this strategy will neither be simple nor without controversy. One school of thought is that we must "use" elephants or "lose" them. Use in this case means the legal take of elephants, and the sale of their ivory, on a sustainable basis. This view is primarily associated with people who share their homelands with elephants and stand to profit directly from the sale or consumption of elephant products. Not surprisingly, this ideology is an anathema to many conservationists enjoying evenings with elephants by watching them on public television. There are also people with intermediate views that accept and promote limited use of the species through such activities as trophy hunting. So where does the solution lie?

There is an undeniable inequity in our world as it relates to elephants. The people who literally have to live with elephants are rarely seen or heard by an audience broader than the local wildlife management authorities mandated with solving their elephant-related problems. Those who "live among the elephants" vicariously, through books or television screens, have significant influence. There is a need to hear and address the concerns of both groups of people.

We have learned that the task of saving elephants is not a simple one. Although many had hoped the ban on the international sale of ivory and elephant products, effective January 1990, would ensure the conservation of African elephants, this has proven to be an oversimplified solution to a complex problem. As reports of illegal killing are on the increase again in many elephant range states in Africa, we must expand our horizon and look for longer-term solutions that encompass the complexity of issues confronting both elephants and humans.

These solutions will not be easy to find, as experience has shown. The most difficult task will be to reach a consensus on how to manage African elephants. Unfortunately, however, consensus is difficult to achieve. We must start small and move toward higher and higher levels of cooperation and collaboration. From now on, we must begin to hear one another's viewpoints and respect them. There has been far too much talking and not enough listening.

The reconstruction of the African Elephant Specialist Group (AESG), part of IUCN—The World Conservation Union, has provided at least the rudimentary beginnings of a forum for both giving and receiving technical information. The focus of the AESG is on prioritizing conservation issues facing the species and formulating technically sound ideas. Implicit in this approach has been an honest attempt to reconcile past differences between experts in elephant range states and those in other regions through open dialogue, with the freedom to agree or disagree on the basis of technical, rather than emotional, grounds.

The AESG has been assisted in its auspicious new mission by generous and timely funding from the U.S. Fish and Wildlife Service, the World Wide Fund for Nature (WWF), the European Community, and the government of Germany. This assistance enabled the AESG to hold a very productive meeting in Zimbabwe in late 1992. The meeting focused on the more technical aspects of the interaction between elephants and habitats, current elephant survey techniques, and future data needs for the conservation and management of elephants in Africa. At the next meeting, the AESG will address human/elephant conflicts, update information on elephant status and distribution, and debate any explicit technical matters that require consultation. In doing so, the AESG will lay the groundwork for further actions that may take place at the next Conference of Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which will be held in November 1994. Additionally, the AESG office in Nairobi, Kenya, has become a central repository for books, articles and current ideas; a think-tank for the review and generation of research proposals on key topics; the creative center for the compilation of AESG's newsletter, *Pachyderm;* and a meeting place for people who share an interest and concern in the fate of the African elephant.

The target is still moving, and there are many obstacles to be tackled. All solutions have a beginning, and we can only hope that—given productive dialogue and a willingness to hear one another—we are standing at the threshold of understanding the way forward. This truly magnificent species deserves our time, our concern, and our continued efforts on its behalf.

Dr. Dublin is the Co-chair of IUCN's African Elephant Specialist Group.

The opinions expressed by Ms. Dublin are not necessarily those of the Fish and Wildlife Service. Her article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 320 ARLSQ, Washington, D.C. 20240, or call 703/358-2166. See Bulletin Vol. XVIII, No. 4, for style guidelines.

Partnership for Pachyderms

by Mary Maruca

What do elephants and architecture have in common? If you answered with the word "keystone," you're right. The keystone — a wedge-shaped piece at the crown of an arch that holds the other pieces in place — has become an apt metaphor for elephant conservation. In an era increasingly concerned about the complex interrelationships shaping the natural environment, the elephant is conspicuous for its ability to terraform the landscape through which it moves, converting woodlands to grasslands, dispersing seeds, and creating waterholes. Innumerable species depend on the continuance of the elephant's biological patterns for the maintenance of habitat. They thrive in the elephant's shadow, so to speak.

However, the African elephant's ability to function as a keystone species became severely threatened during the decade of the 1980's. Wide-spread illegal ivory trade decimated populations. From an estimated 1.2 million, numbers dropped to fewer than 600,000. As the legislative body of the world's third largest consumer of ivory products, the United States Congress responded to this decline in 1988 by enacting the African Elephant Conservation Act, supporting the conservation programs of African countries and upholding CITES. In so doing, the Congress chose the quintessential animal through which to address biodiversity, creating keystone legislation for a keystone species.

Integral to the effectiveness of the African Elephant Conservation Act was the African Elephant Conservation Fund, established by the Act as a funding source to assist range countries with their elephant conservation priorities. Administrated by the Fish and Wildlife Service, through the Department of the Interior, a grant program supported by the Fund has proven to be an easily mobilized, on-the-ground operation capable of responding quickly to immediate needs. For relatively small sums of money, the program has enabled range countries to implement their highest priority projects aimed at maintaining the critical role of elephants as a keystone species.

Since its initial funding in 1990, the grant program has supported 33 projects in 11 of the 34 range countries with African elephant populations. Key criteria consistent throughout the program's several years of operation have helped identify viable projects and contributed to success. First, the host country must have demonstrated commitment to elephant conservation, expressed through (1) its establishment of local elephant management programs, (2) the dedication of its own economic resources, within budgetary constraints, to elephant conservation, and (3) its availability as a participant in elephant projects.

Photo by Linblad/African Wildlife Foundation

Secondly, to qualify for funding, projects must fit within the parameters established by a range country's elephant conservation plan. Early on, the Fund recognized the context this could provide for project planning, and dedicated resources to assist range countries wishing to develop such plans. All countries within the current range of African elephants have plans in place. This effort has given elephant conservation visibility at the highest levels of government, helped establish national priorities, and provided target goals against which individual projects can be evaluated.

It has also enabled the grant program to work in partnership with range countries, responding to their own priorities rather than intervening to set priorities for them. From the start, the intent of the program has been not to dictate conservation priorities, but to work within the priorities already established by host countries meeting African Elephant Conservation Act criteria. Elephant conservation plans have helped this to occur effectively. Also, the availability of the plans to other bilateral donors has made it possible for those interested in elephant conservation to become familiar with specific projects and coordinate assistance.

Third, the Fund's capability to generate contributions from the private sector, other governments, non-government organizations, and the host country remains one of its greatest assets. Money donated from various sources is pooled to improve opportunities for key elephant populations. More than $2 million have been generated as matching funds. Although there is not enough money to fund every project, the program attempts to balance the needs of elephant conservation throughout the species' range. With partners, the Fund cooperates on projects from Senegal in the west to Tanzania in the east and Namibia in the south.

Recognizing that conservation needs expressed in elephant conservation plans

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Partnership for Pachyderms

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far exceed available funding, the grant program has sought to supply the operational needs of projects capable of continuing their work once set-up funds have been provided. This has translated into financial support for anti-poaching activities and status surveys requested by range countries. Recently, however, as elephant populations have begun to stabilize, the focus has shifted somewhat — from requests to fund anti-poaching efforts to projects addressing human/elephant conflicts as elephants begin to return to parts of their former range. One priority for the current allocation is the selection of projects that concentrate on elephant conservation while benefiting rhinoceros populations. Once again, inherent in this effort is recognition of the elephant's role as a keystone species upon which the well-being of other species depends.

Perhaps one of the most complicated and most innovative projects funded by the program to date has involved the translocation of an estimated 1,000 elephants in Zimbabwe. During the drought of 1991-1992, the government of Zimbabwe determined that elephant population levels in Gonarezhou National Park exceeded the carrying capacity and, if left unmanaged, could lead not only to species decline in that area but also to significant habitat loss. The demise of local sheep and cattle during the drought provided the Zimbabwean wildlife department with an opportunity to negotiate with ranchers for the benefit of native species. The result was agreement to work cooperatively, creating tracts of open rangeland to meet the needs of translocated elephants and other species.

Once again, the grant program responded in conjunction with other matching funding sources, doubling the benefits to the species. The grant covered such essentials as helicopters and other equipment needed to herd and tranquilize the animals. The ranchers receiving the animals provided transport costs.

The successful Zimbabwean translocation effort holds promise as an management approach to herd reduction when numbers exceed an area's normal carrying capacity, and may serve as a model for other countries within the species' range. It also leaves open the possibility that populations on the decline in some countries feasibly may be restocked with translocated groups. Although not all the results are in, this creative use of funding not only has made the future brighter for the Gonarezhou elephants but also for the other species that depend on them.

All in all, the African Elephant Conservation Fund has become an important vehicle through which money for the conservation of a keystone species reaches on-the-ground projects that take into account not simply the elephant but also the complex environment it shapes. The grant program is proving to be an effective partnership, one acknowledging Aldo Leopold's injunction that "the first precaution of intelligent tinkering" is keeping all the pieces — especially when one of the major piece happens to be elephants.

Mammoth or Elephant Ivory? Forensics Provides the Key

by Edgard O'Niel Espinoza and Mary-Jacque Mann

Due to threats posed by habitat loss and overexploitation, importation of African elephant (*Loxodonta africana*) ivory was prohibited in 1989. Imports of ivory from Asian elephants (*Elephas maximus*) had already been banned for similar reasons. Immediately after the 1989 ban took effect, U.S. ports began receiving large shipments of carved "mammoth" or "mastodon" ivory instead of the usual African elephant ivory.

Although U.S. Fish and Wildlife Service (FWS) wildlife inspectors at ports of entry strongly suspected that these shipments were actually illegal elephant ivory, there was no analytical technique available to test the importers' claims. The FWS Division of Law Enforcement therefore requested the assistance of the newly established Clark R. Bavin National Fish and Wildlife Forensics Laboratory in Ashland, Oregon. Scientists at the facility were asked to develop a reliable, non-destructive method to differentiate the ivories of mammoths and modern elephants.

Mastodons, mammoths, and modern elephants are all members of the Proboscidea order of mammals. Mammoths lived during the Pleistocene Epoch and have been extinct for approximately 8,000 to 10,000 years. Mastodons coexisted with mammoths for part of the Pleistocene, occupying a different niche before becoming extinct themselves. Although there were several species of mammoth, the "woolly" or "hairy" mammoth (*Mammuthus primigenius*) from the Alaskan and Siberian tundras is the only known source of commercially significant extinct proboscidean ivory. Despite occasional claims that mastodons have contributed to the ivory trade, mastodon ivory has not survived the millennia with enough preservation for commercial uses.

The woolly mammoth roamed Siberia and other parts of northern Asia, Europe, and North America. Early humans probably pursued the mammoth and other game across the Bering land bridge to the new world. Published descriptions of frozen mammoth carcasses found in Siberia date back to the eighteenth century. These frozen remains portray a powerful animal about 12 feet in height weighing up to 15,000 pounds (slightly larger than an African bull elephant), bearing deeply curved tusks that measured as much as 16 feet in length. The wooly mammoth

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Mammoth or Elephant Ivory?

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was well protected from its frigid tundra environment by extra fat reserves and two thick layers of hair.

Woolly mammoth ivory has been in significant commercial demand for centuries, and the trade may have existed as early as the Roman era. From 1809 to 1910, 6,000 metric tons of ivory were "mined" from the Siberian tundra, the equivalent of tusks from an estimated 46,000 mammoths. Over the last 350 years, approximately 7,000 tons of mammoth ivory have been imported into China. Current predictions estimate that 550,000 tons of mammoth tusks have yet to be recovered from a single 1,000-kilometer coastal strip between the Yana and Kolyma rivers in Siberia.

Contrary to popular opinion, most commercially significant mammoth ivory is preserved rather than fossilized (*i.e.*, petrified). This preservation is credited to the frozen tundra environment in which the ivory has been buried for thousands of years. Carved and polished mammoth ivory is nearly indistinguishable from carved and polished elephant ivory. Both ivories have a creamy color and a unique "texture" or pattern of stacked chevron-like lines in cross-section. This pattern of lines, called the Schreger Pattern, is found only in proboscidean ivories. Analysis of the Schreger Pattern is the basis of a method developed by FWS Forensics Laboratory scientists to distinguish mammoth from modern elephant ivory.

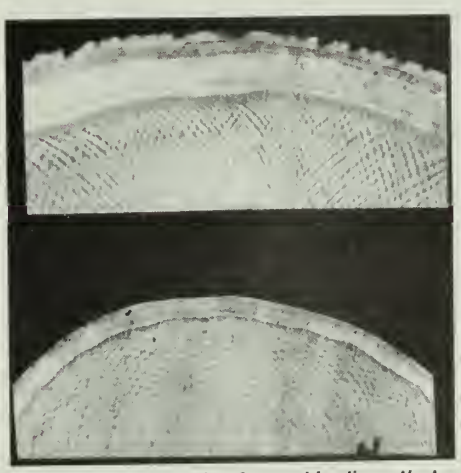
Proboscidean tusks are actually modified maxillary incisors (front upper teeth). Like any mammalian tooth, tusks are permeated by microscopic structures called dentinal tubules. Proboscidean dentinal tubules are unique because they are sinusoidal (wavy). The Schreger Pattern is actually an illusion of crossing shadow lines created by the wavy underlying microscopic dentinal tubules. When examined by scanning electron microscopy, the dentinal tubules are shown to be more tightly packed in mammoth ivory than in elephant ivory.

photo from the National Museum of Natural History, Smithsonian Institution

The woolly mammoth abounded in northern latitudes during the Pleistocene. This mount is a composite from several sets of skeletons uncovered near Fairbanks, Alaska, during the gold-mining days at the turn of the century. Mammoth tusks weighed up to 600 pounds per pair.

The angles that appear at the intersections of the Schreger lines in mammoth ivory are therefore consistently smaller (more acute) than those of elephant ivory. Using a protractor, FWS Forensics Laboratory scientists measured hundreds of Schreger Pattern angles from known samples of elephant and mammoth ivories. Statistical analysis of these measurements revealed that mammoth ivory angles averaged 73 degrees while the angles of elephant ivory averaged 124 degrees.

As soon as the Schreger Pattern angle method for differentiating mammoth and elephant ivories became available, incoming shipments of carved "mammoth" ivory were shunted to the FWS Forensics Laboratory by FWS wildlife inspectors. The first shipment originated from Hong Kong and contained 500 carved objects. FWS Forensic Laboratory scientists identified all 500 objects as being modern elephant in origin. The next Hong Kong shipment contained 400 "mammoth" pieces, 200 of which had actually been carved from elephant ivory. The following shipment of 600 items contained 597 mammoth ivory carvings and only three elephant ivory carvings. The other 1989 shipments were genuine mammoth in origin.



National Fish and Wildlife Forensics Laboratory photo

Measuring the angles formed by lines that make up the Schreger Pattern allows wildlife inspectors to distinguish mammoth ivory (top) from elephant ivory (bottom).

A booklet outlining the simple, non-destructive Schreger Pattern angle measurement method was written by FWS Forensics Laboratory scientists and published by the World Wildlife Fund in 1991. This booklet also contains methods for the identification of the other types of natural and man-made materials appearing in the ivory trade.

It is interesting to note that since reliable identification methods have been applied to the ivory trade, FWS Forensics Laboratory scientists and wildlife inspectors have observed that the legal commerce in carved "ivory" objects has gradually shifted from mammoth tusks to include bone, warthog tusks, and hippopotamus teeth.

Edgard Espinoza and Mary-Jacque Mann are with the Clark R. Bavin National Fish and Wildlife Forensics Laboratory.

Recovery of the Black-footed Ferret: Looking Back, Looking Forward

by Jerry Godbey and Dean Biggins

One of the rarest mammals in the world, the black-footed ferret (*Mustela nigripes*) is a small, secretive, nocturnal carnivore that depends on prairie dogs (*Cynomys* spp.) for 90 percent of its diet and shelter. In 1967, the ferret was one of the first animals listed as an endangered species in the United States. During the more than 25 years since that time, government agencies, the private sector, conservation organizations, companies, and zoos have helped advance ferret recovery. Nevertheless, the future presents several challenges. Thus, from time to time, there is value in stepping back, reviewing the past, evaluating the lessons learned, and planning for the future.

History

The decline of the black-footed ferret is tied to the decline of the prairie dog. Because of persecution by humans and the effects of a presumably introduced disease (sylvatic plague), prairie dogs, the primary food source for black-footed ferrets, have declined in number by about 98 percent since the early 1900's. As the prairie dogs diminished, so did the ferrets. Small populations were studied from 1964 to 1974 in South Dakota and at the Fish and Wildlife Service's Patuxent Wildlife Research Center in Laurel, Maryland, but they eventually disappeared. Many people feared the species was extinct until 1981, when a population of ferrets was discovered near Meeteetse, Wyoming. In 1985, however, canine distemper — a disease fatal to ferrets — nearly wiped out the population. During the following 18 months, only 18 of the original 127 black-footed ferrets were taken in for captive breeding.

Plague also worked to destroy the ferret's habitat at Meeteetse by reducing the prey base. By 1992, plague had caused a 90 percent decline in Meeteetse prairie dogs and stopped any plan to reintroduce black-footed ferrets there. However, the last Meeteetse ferrets did provide stock for a successful captive breeding program. There are now more than 250 breeding adults in the program at various facilities throughout the country. During 1991-1993, the captive population supplied 187 "surplus" animals for reintroduction in Wyoming's Shirley Basin. Although some animals released in the Shirley Basin lived through the winter each year of the reintroduction, overall survival has been low due to wide dispersal and predation.

Wyoming Game and Fish Department photo

black-footed ferret

It's Difficult To Be A Black-Footed Ferret

Tests conducted during the 1991-1992 releases indicated that ferret predation by coyotes *(Canis latrans)*, badgers *(Taxidea taxus)*, and other predators was high. The 1991 release indicated an 86 percent loss of introduced animals within 90 days for the Shirley Basin population, compared to a 17 percent loss for a similar 90-day period in the wild Meeteetse population. In 1992, 26 percent of the released animals were lost to predation in just 18 days.

Dispersal from the release site also was recognized as a problem. Individuals that disperse far away from the release areas not only leave the best prairie dog habitat and expose themselves to predation, but are possibly lost to future mates. Wide variability in dispersal appears characteristic of cage-raised ferrets. In 1992, animals raised in prairie dog burrows within outdoor pens remained at the release site 4 to 6 times longer than cage-raised animals.

Problems Facing Ferret Recovery

Genetic variability in the current black-footed ferret population is known to be low, and additional loss of variation

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Reaching Out in Wyoming: A Black-footed Ferret Success Story

by Mary Maruca

Amigo is a children's book about a boy named Francisco, whose family cannot afford to own a dog. Francisco finds unexpected companionship in the company of a prairie dog, whose own family has warned him against forming an attachment to a human child. But the boy and the prairie dog do hit it off and, contrary to the advice of all their favorite relations, they become fast friends.

Moral of the story? From at least one perspective, it epitomizes the complementary relationship possible in nature—animals of different sorts finding ways to accommodate each other. However, in the adult world most of us are familiar with, such accommodation can be more difficult to come by, and may indeed require more negotiation skills than those needed by a small boy and a friendly prairie dog eager for companionship.

photo © Wendy Shattil / Bob Rozinski

Prairie dogs are the main food source for black-footed ferrets. These young black-tailed prairie dogs were photographed at the Rocky Mountain Arsenal, Colorado.

Take the case of the black-footed ferret. This member of the weasel family has suffered by its close association with prairie dogs. At different times during their long history of contact with humans, prairie dogs have been regarded as akin to weeds. Perceived as competitors for forage, these burrowing rodents have been shot, trapped, poisoned, and dispossessed of habitat until the "towns" that once covered millions of acres from Canada to Mexico have been reduced to approximately 2 percent of their original range. Indeed, since passage of the Endangered Species Act, two out of the five prairie dog species have been listed as Threatened or Endangered. All in all, this has spelled bad news for ferrets, which take more than 90 percent of their diet from the ranks of their prairie dog neighbors.

As prairie dogs declined, so did ferrets. What was thought to be the last population of ferrets came to light in South Dakota in 1963. When that population died out in the late 1970's, the species was thought to be extinct. Then, in 1981, a ranch dog killed a black-footed ferret near Meeteetse, Wyoming. Research subsequently documented a population of more than 120 animals nearby. However, after an outbreak of canine distemper almost wiped out the Meeteetse ferret population, the last 18 were captured between 1985 and 1987 for the captive breeding program. Captive ferrets now range in number between 240 and 350 animals.

If one were simply to look at the numbers, it might appear that the hero of the story would be the captive breeding program. Yes, the ferret population has surged in this artificial environment, but a captive breeding facility offers nothing like the wild natural attractions of Meeteetse. If ferrets were truly to recover, they would have to be reestablished in the wild. But more than sound biology and a protective law were required to make that particular effort a success, especially in a part of the country where prairie dog towns were regarded as a sure sign of deteriorating rangeland, and where private landowners seldom felt comfortable with Federal intervention in their ranching practices. So what was the next step for ferrets and ranchers? Was it conceivable that "Feds" and landowners, potentially facing each other from opposite sides of the fence, could find a way to meet at the same fence post and become amigos after all?

The Black-footed Ferret Advisory Team provided the model, representing not only the Fish and Wildlife Service, which has responsibility for ferret recovery, but State, local, and private interests also. The Wyoming Game and Fish Department served as the mediator at the local level. Representatives went door to door, contacting landowners, alerting them to developing plans, and sharing ideas. The presence of the well respected Game and Fish Department forestalled some of the potential for tension. Jack Turnell, manager of the Pitchfork Ranch near Meeteetse, also did yeoman's work as the spokesperson for local interests on the Advisory Team. He was a central presence as long as Meeteetse was considered a possible reintroduction site. But when a

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Reaching out in Wyoming

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bout of sylvatic plague struck the prairie dog population that otherwise would have supported the ferrets, the reintroduction site shifted to Wyoming's Shirley Basin, where local rancher Bill Ellis became an influential part of the Shirley Basin/Medicine Bow Working Group.

According to Bill Ellis, if the Endangered Species Act had not been a factor in the ferret issue, anyone could have come into the community with "a sack of black-footed ferrets and asked if they could have been dumped out on people's lands, and the ranchers would have said 'yes.'" The Endangered Species Act made the difference in attitude, according to Ellis. Even though ranchers held no hard feelings toward the ferrets, the authority of the Act made them feel the government could step in, impose changes on their lives, and give them no voice in the reintroduction process. Contributing to the Shirley Basin/Medicine Bow Working Group as a spokesperson for ranching interests helped Ellis change that perception. He decided to get involved early on when the switch to Shirley Basin was made, because getting involved not only made him part of the process on his own terms, but also part of the solution. Although he represented landowner interests, he spoke from his own perspective. "I had to make decisions and stand by them," he observed, explaining that he provided input based on what he thought livestock owners could live with.

His main concern about the process of reintroduction was that it not interfere either with the business of ranching or the lifestyle of the ranchers. To protect both of these, he and others attending the meetings wanted the management plan guiding ferret reintroduction to specify the maximum number of ferret workers that could be in the field at any one time. "People here are used to a solitary life," Ellis said. "Even if agencies have people out every day doing their jobs and not bothering anybody, we still know they're out there. It wears on nerves." Six people at any one time was the maximum eventually specified in the plan.

Developing the management plan took approximately a year from start to finish—all in all, a quick timetable for creating such a document, considering the number of interests involved and the variety of individuals consulted. Oil, gas, coal, recreation, and livestock interests were all involved in the decisionmaking process. Ellis believes it was "the quality of people in the meetings that made them work." Common sense and sensibility helped resolve most conflicts. "Nothing remains to be worked out," Ellis said. "It's all running smoothly." Part of the plan's smooth functioning may have had to do with the team's efforts to foresee the possibility of future problems. A process for amending the plan was included in the completed document.

Steve Brockmann, who works with the ferret reintroduction program in the Fish and Wildlife Service's Cheyenne, Wyoming, Field Office, indicated that the designation of reintroduced ferrets as a "nonessential experimental population" allayed ranchers' concern that accidentally killing a ferret would result in Federal prosecution. The experimental population provision of the Endangered Species Act promotes public acceptance of reintroduction by authorizing additional flexibility in the management of released animals and their habitat. Essentially, the reintroduced population's status as "nonessential" made all existing land practices acceptable. It took away much of the concern associated with the provisions of the Endangered Species Act. This was the message that Bill Ellis shared with his fellow ranchers — that compromise was possible, and that ranchers in conjunction with the Federal government could accomplish what they needed to accomplish without sacrifice.

Ferret reintroduction probably won't stop with Wyoming. Proposals to establish experimental populations in South Dakota and Montana have already appeared in the *Federal Register.* Bill Ellis even has a few thoughts on how the process of reintroduction might go more smoothly in these States. "Get involved," he advises other ranchers. "That's the best way to watch out for your interests."

"This works," he says, referring to the management plan he helped develop and the reintroduction process that resulted. "It's a great example of Federal, State, and local groups sitting down and successfully hammering something out."

Wyoming Game and Fish Department photo

Wearing masks while handling ferrets minimizes the risk of transmitting disease to the animals.

Mary Maruca is Chief of the Branch of Correspondence and Information, Office of Administration, Fish and Wildlife Service, Washington, D.C.

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in the future is unavoidable. Only 8 of the 18 original animals captured at Meeteetse for the captive breeding program were believed unrelated enough to be considered genetic founders. Abnormal physical features (including webbed feet, kinked tails, short tails, oddly formed teeth, and internal hemorrhaging in kits) have been seen in some captive-born animals. Characteristics that favor survival and reproduction in captive animals may be different from those contributing to fitness of free-ranging ferrets.

Captivity can affect animals in other ways, too. The unnatural cage environment may not help develop critical behavioral skills, a problem currently receiving research attention. Behavior is determined by environmental and genetic influences, but behaviors can be altered if a critical influence is absent or distorted.

Diseases also pose threats to the ferret recovery program. The potential effect of canine distemper is evident from the Meeteetse experience. Currently, only short-term vaccine is available, and no protection exists for young born in the wild. Plague in prairie dog populations may be equally serious as a loss of prey, but little is known about the direct effects of plague on black-footed ferrets.

Although some potential ferret reintroduction sites have been identified, few suitable areas that are large enough still exist. Past and ongoing prairie dog poisoning programs, conversion of prairie dog towns to agricultural or urban uses, and the introduction of sylvatic plague have greatly reduced the prairie dog's geographic distribution. Unfortunately, nearly 130 other grassland animal species are associated with the prairie dog and may suffer related declines.

The Human Factor

The human dimensions of the ferret recovery program are as complex as any other facet. Philosophies and personalities of professionals working within the ferret program vary widely, and lively debates have been common. Identifying problems and re-examining mistakes can help us avoid repeating them, both in the ferret program and in other programs focusing on endangered species. In our opinion, the following are some of the most important lessons to emerge from the past 25 years of ferret conservation efforts:

First, avoid "putting all your eggs in one basket." Captive breeding and translocation of ferrets from the Meeteetse population should have begun earlier. Reintroductions also need to be in various locations.

Second, don't "re-invent the wheel." In several cases involving both research on free-ranging ferrets and management of captive ferrets, too little attention was paid to failures and successes during previous work at South Dakota and Patuxent.

Third, resist "preservation paralysis." At Meeteetse, realization that the small ferret population might be the last in existence motivated a protectionist attitude that restricted aggressive management options and decreased the options now available for the ferret program.

Finally, it is important to address the concerns of all parties involved in endangered species recovery. Federal agencies are required by the Endangered Species Act to do everything they can to ensure the survival of the species. State agencies, communities and individuals may not agree with this. Discussion, understanding, and compromise are of paramount importance.

Conclusion

A great deal of agency cooperation and teamwork has been expended in the ferret recovery effort. No single agency or group of individuals has the expertise or resources to be successful on its own. Within the ferret program, outstanding examples of cooperation have been demonstrated in the private sector, including ranchers, conservation organizations, companies and zoos. We hope this cooperation not only continues but grows. We remain grateful to the many cooperators and contributors for their support.

photo by Jerry Godbey, National Biological Survey

Ferret training facilities in Pueblo, Colorado: Formerly implement sheds where the U.S. Army stored large machines, these 5000 square-foot buildings have been converted to prairie dog towns, where captive-bred black-footed ferrets—which may not recognize their prey—learn to hunt.

Jerry Godbey and Dean Biggins are with the National Biological Survey, National Ecology Research Center, in Fort Collins, Colorado.

Listing Proposals — October/November 1993

photo by Kenneth Heil

The Winkler cactus is a small, globose species that produces attractive pink or peach-colored flowers. It was described and named by Dr. Kenneth Heil in honor of Agnes Winkler, who discovered the cactus in the early 1960's.

Eleven species — seven plants and four animals — were proposed by the Fish and Wildlife Service during October and November 1993 for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Six California Chaparral Plants

Protection for six plant taxa associated with southern maritime chaparral, a distinctive plant community found only along the coast of southern California and northern Baja California, Mexico, was proposed October 1. The four plants most vulnerable to extinction were recommended for listing as Endangered:

- **Del Mar manzanita** *(Arctostaphylos glandulosa ssp. crassifolia)* - a shrub in the heath family (Ericaceae) with white flowers and dark red bark;
- **Encinitas baccharis** *(Baccharis vanessae)* - a fall-blooming shrub in the aster family (Asteraceae);
- **Orcutt's spineflower** *(Chorizanthe orcuttiana)* - a low-growing, yellow-flowered annual in the buckwheat family (Polygonaceae); and
- **short-leaved dudleya** *(Dudleya blochmaniae ssp. brevifolia)* - a low-growing, white-flowered succulent in the stonecrop family (Crassulaceae).

Because the danger to the other two plants is not as immediate, they were proposed for listing as Threatened:

- **Del Mar sand aster** *(Corethrogyne filaginifolia var. linifolia)* - an erect perennial herb bearing flowers containing violet ray florets and yellow disk florets; and
- **big-leaved crown-beard** *(Verbesina dissita)* - a low-growing shrub with yellow flowers, and another member of the aster family.

Southern maritime chaparral is a low growing, relatively open plant community frequently restricted to sandy coastal terraces, and has high species diversity. Approximately 85 percent of this habitat has been lost to agriculture and urbanization. Most of the remaining 15 percent is on private property in San Diego County, and is subject to further habitat modification or fragmentation. The situation facing southern coastal chaparral in northern Baja California is much the same.

Winkler Cactus *(Pediocactus winkleri)*

Thought to be one of the rarest cacti in the U.S., this species is known from 6 populations totalling about 3,500 plants on 200 acres (800 hectares). All of the sites are in south-central Utah on habitat administered by the Bureau of Land Management (BLM) and at a site on the adjacent Capitol Reef National Park.

Because of its rarity and attractive appearance, the Winkler cactus is prized by many hobbyists. In one area, an estimated 80 percent of the plants have been taken by collectors in the past 10 years. Additionally, off-road vehicles and livestock have destroyed many cacti and degraded their habitat. Cattle grazing is allowed within the park as well as on the BLM land. In light of these threats, the FWS proposed October 6 to list the Winkler cactus as Endangered.

Flat-tailed Horned Lizard *(Phrynosoma mcallii)*

One of seven species of horned lizards in North America, *P. mcallii* is distinguished by its long, slender head spines, a dark vertebral stripe, and — as its common name indicates — a flattened tail. It is found in sandy flats and valleys of the western Sonoran Desert from the Coachella Valley south through the Imperial Valley, California, and in the vicinity of the Colorado River delta, the Gran Desierto, and Bahia de San Jorge in Mexico and Arizona.

Approximately 40 percent of the lizard's habitat in California has been converted to agricultural or urban uses, or was inundated by the creation of the Salton Sea in 1905-1907. Over 20 percent of the habitat in Arizona and Mexico has been lost to similar uses. Most of what remains is fragmented and degraded. An estimated 95 percent of the current suitable habitat in California and 35 percent in Arizona is threatened

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Listing Proposals

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by further agricultural and urban development, off-road vehicle use, geothermal energy development, sand and gravel mining, road construction, and construction of utility corridors, as well as pesticide spraying of ant populations — the primary prey of the flat-tailed horned lizard. Because of these threats, the FWS proposed November 29 to list the species as Threatened.

Two Georgia Fishes

Two small, colorful fishes endemic to the Etowah River system in northern Georgia were proposed October 18 for Endangered Species Act protection:

• **Etowah darter** ***(Etheostoma etowae)*** - a small, brown or grayish-olive fish with small, dark spots just below the lateral line. Breeding males have a greenish-blue breast. This species was proposed for listing as Endangered.

• **Cherokee darter** ***(Etheostoma sp.)*** - a white to pale yellow fish with olive-black lateral bars and a row of small, dark dorsal saddles. Once confused with another fish, the Cherokee darter is now recognized as a distinct taxon, and a formal scientific description is being prepared. Believed to be in somewhat less danger than the Etowah darter because of a wider distribution, the Cherokee darter was proposed for listing as Threatened.

Both fishes inhabit clean, free-flowing streams with rocky substrates, and neither can survive in impoundments.

The Etowah River system once supported a significant diversity of aquatic wildlife, but many of its animals are now rare. Species from this system already listed as Endangered or Threatened include one fish and five mussels. Another nine species from the system — one mussel, five fishes, and three aquatic snails — are candidates for listing. Much of the historical habitat has been modified or degraded by impoundments, siltation, and pollution. Dams not only block the river flows but also fragment populations and alter downstream water temperatures. The degradation of water quality comes from municipal and industrial discharge sites, and non-point sources such as runoff from agricultural and silvicultural operations.

photo by E.D. Cashatt

Hine's Emerald Dragonfly *(Somatochlora hineana)*

Bright emerald-green eyes, a metallic green thorax, and creamy-yellow lateral stripes make this wetland insect a distinctive species. It once occurred in Indiana and Ohio, but the only currently known populations are in three counties in the Chicago, Illinois, metropolitan area and in Door County, Wisconsin.

The primary threat to Hine's emerald dragonfly is the loss or degradation of its habitat. This species occurs around shallow, springfed streams with associated wet meadows and cattail marshes. Within its limited range, the insect's wetland habitats are subject to: draining or filling for agricultural, recreational, and industrial development; pesticide drift and runoff; and ground water contamination from a wide variety of sources.

Because of the species' restricted range, low numbers, and vulnerability, the FWS proposed October 4 to list Hine's emerald dragonfly as Endangered.

* * *

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 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 posses, 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.

Nile Crocodile Reclassified from Endangered to Threatened

by Ann Haas

Recognizing the improved status of the Nile crocodile *(Crocodylus niloticus)* in response to conservation measures, the Fish and Wildlife Service (FWS) reclassified the species throughout its range from Endangered to Threatened, effective October 21, 1993. The special rule for the Zimbabwe population of the Nile crocodile, already classified as Threatened, remains in effect, allowing the importation of trophies and skins directly into the United States.

The Nile crocodile is the largest of the three African species of crocodiles and among the largest worldwide, reaching a length of up to 7 meters (23 feet). Its upper surface ranges from yellow to dark olive, and its lower surface is usually uniformly light and without dark blotches. Unlike the other African species, the African slender-snouted crocodile (*Crocodylus cataphractus*) and the dwarf crocodile (*Osteolaemus tetraspis*), the Nile crocodile either completely lacks or has only small bony plates in the belly scales (Brazaitis, personal communication). Thus, the skin of the Nile crocodile is utilized to produce a high quality leather and has historically been one of the mainstays of the commercial crocodile leather trade (Brazaitis, 1973).

The Nile crocodile lives in a range of aquatic habitats, including rivers, lakes, and swamps. It may even occur in salt water. A major predator and opportunistic feeder, the Nile crocodile occupies many niches on land and in water (Cott, 1961.) It is a significant component of the food web and ecology of the region it inhabits, first feeding on insects and crustaceans, then fish and small mammals, and finally, as an adult, killing and consuming large mammals, thereby helping to control populations of herbivores such as antelopes, waterbucks, lechwes, zebras, and warthogs. The crocodile may take domestic goats and cattle, and, as a scavenger, it also eats carrion. Because of its large size, the Nile crocodile has been known to attack humans, generally after learning to associate them with sources of food (such as fish-cleaning stations) or by mistaking people for prey, if they bathe in the early evening or morning when the reptile hunts (Brazaitis, personal communication).

The Nile crocodile's intricate food web shows, in part, interspecific competition and reciprocal predation (Cott, 1961). In particular, the Nile monitor lizard (*Varanus niloticus*) preys heavily on the eggs of Nile crocodiles and, presumably, African pond or mud turtles (*Pelusios*). In turn, the crocodile preys on both species, and all compete for freshwater crabs. Further, the crocodile and monitor take frogs, while the turtle takes tadpoles (Cott, 1961).

The Nile crocodile is ecologically important in benefiting commercially valuable fish. Crocodiles take *Clarias* (airbreathing or "walking" catfish), which prey on desirable *Tilapia* (mouthbrooder fish), including its fry and eggs. By controlling these predator fish, the Nile crocodile helps ensure the survival of *Tilapia* as food for people.

A species whose ancestors date back more than 200 million years, the Nile crocodile once occurred throughout Africa and as far north as Syria. According to Dr. Roy McDiarmid of the National Museum of Natural History, the Nile crocodile has also been reported to occur in the Comoros and Seychelles Islands. It is now confined mainly to the upstream regions of the Nile, tropical and southern Africa, and Madagascar.

Early this century, bounties were paid for Nile crocodile hides, and in the 1950's and 1960's, wholesale slaughter of the animals for the commercial hide business threatened many accessible populations with extinction (Hutton, 1988). Nile crocodile numbers also declined because of habitat alteration — such as clearing forests and draining wetlands — and killing to eliminate threats to humans, livestock, and the fishing industry. In 1970, the species was listed as Endangered. In 1975, when the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) came into force, the Nile croco-

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drawing by Handelsman © 1991 *The New Yorker Magazine*

"Tell us again about Bogie and Hepburn coming up the river."

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dile was listed on Appendix I in view of its widespread decline.

CITES is an international conservation treaty, now signed by 120 countries, to regulate trade (import, export, and re-export) in animal and plant species listed on its three appendices, using a system of permits. While allowing sustainable trade, CITES is designed to prevent trade from threatening the survival of species. Trade in Appendix I species is most strictly regulated because their biological status in the wild is most precarious; trade for primarily commercial purposes is prohibited. Trade in Appendix II species is allowed if both the exporting and importing countries have issued the proper permits.

Nile crocodile populations have generally recovered to the point at which they are increasing or at least stabilized, thanks to years of protection and additional habitat created by impoundments. Zimbabwe's protection of the Nile crocodile and the U.S. import restrictions under the Endangered Species Act have helped the species recover. Range countries have recognized the value of the crocodile to the riverine ecosystem and as a source of sustainable economic benefit, especially through ranching for controlled harvest of skins.

Crocodile Ranching and Export Quotas

Zimbabwe was the first country to develop data about its wild populations of Nile crocodiles and the first to have its proposal for managing the species by ranching accepted by CITES. In ranching operations, some eggs are taken from the wild and reared in captivity. In turn, some of the hatched young are returned to the wild. Ranching has been successful for the Nile crocodile because the animals grow quickly in captivity, particularly during their early years.

In 1984, CITES officials meeting in Belgium devised a quota system as an alternative to ranching, allowing countries to utilize wild populations of Nile crocodiles. Under the quota system, Nile crocodile populations in nine African countries — Cameroon, Congo, Kenya, Madagascar, Malawi, Mozambique, Sudan, Tanzania, and Zambia — were transferred from Appendix I to Appendix II, subject to export quotas established by agreement of the Parties. In 1986, the Botswana population was added.

In 1987, export quotas were renewed for all 10 countries, and the CITES Secretariat began its species survey in eastern and central Africa and Madagascar. Also in 1987, the FWS reclassified Zimbabwe's ranched and wild populations of Nile crocodiles under the Endangered Species Act from Endangered to Threatened.

At the 1992 CITES Conference of Parties in Kyoto, Japan, Nile crocodile populations in Botswana, Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe were listed on Appendix II under ranching provisions. Populations in Madagascar and Somalia remained on Appendix II under the quota system, although the quota for Somalia is zero at least through 1994. Populations in South Africa and Uganda were transferred from Appendix I to Appendix II with export quotas.

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Final Listing Rules

Final rules extending Endangered Species Act protection to four species —two plants and two animals — were published in October and November 1993:

• **Star Cactus** (*Astrophytum asterias*) - a small, strikingly attractive plant native to subtropical grasslands and shrublands of the Lower Rio Grande Valley. Habitat modification and collecting for the cactus trade have reduced this cactus to two known sites, one in Starr County, Texas, and one in Tamaulipas, Mexico. Because of continuing threats, the species was listed October 18 as Endangered.

• **Beach Jacquemontia** (*Jacquemontia reclinata*) - a perennial vine in the morning-glory family (Convolvulaceae) endemic to coastal barrier islands in southeast Florida from Miami northward to Palm Beach County. The vast majority of its habitat has been destroyed by urban development. The remaining populations are small, fragmented, and vulnerable to invasions of exotic plant species. On November 24, the beach jacquemontia was listed as Endangered.

• **Giant Garter Snake** (*Thamnophis gigas*) - a non-venomous snake restricted to wetland habitats in portions of Califomia's Central Valley. Due to extensive habitat loss and fragmentation, and the effects of introduced predators, the species is extirpated, or nearly so, throughout two-thirds of its original range. The potential for further habitat loss led the Fish and Wildlife Service to list the giant garter snake on October 20 as Threatened.

• **Oregon Chub** (*Oregonichthys crameri*) - a small fish that historically inhabited sloughs, overflow ponds, and other backwater habitats throughout the Willamette River drainage in Oregon. Habitat modification resulting from dam construction has eliminated the species from 98 percent of its former range. The remaining populations are reduced to an 18.5-mile (30-kilometer) stretch of the Middle Fork Willamette River system. Because of continuing threats, the Oregon chub was listed October 18 as Endangered.

New Plan Outlines Steps to Recover Endangered Fishes of the Colorado River System

by Connie Young

Four Endangered fish species endemic to the Colorado River system are expected to benefit from a new 5-year Recovery Action Plan completed October 15, 1993, by the Fish and Wildlife Service (FWS). The plan calls for protecting river flows, building fish passageways around dams, and releasing limited numbers of hatchery-reared native fish into the wild. It was the result of a multi-agency program to recover the Colorado squawfish (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) while allowing for future water development.

Along with the plan is an agreement among State and Federal agencies, environmental groups, and water user organizations clarifying how section 7 of the Endangered Species Act will be applied to new and existing water development projects in the upper Colorado River Basin. Completion of actions identified in the plan will be considered by the FWS in its review of new and existing water projects that require a Federal permit.

"Research has shown us what needs to be done; we're now going to begin aggressively implementing actions needed to recover the fish," said John Hamill, an FWS biologist who directs the Recovery Program for Endangered Fish of the Upper Colorado River Basin (Recovery Program). "We will use the Recovery Action Plan to keep the Recovery Program accountable for actions that need to be accomplished to recover the fish."

Highlights of the plan include the following:

• In-stream flows will be targeted for protection in the Colorado, Gunnison, Dolores, Green, Yampa, White, Little Snake and Duchesne Rivers. The most significant changes are in the Green River downstream of Flaming Gorge Dam, and in the Gunnison River below Blue Mesa Dam. On a trial basis, water from these two dams is being released to mimic historical high spring flows and lower, more stable flows the rest of the year. State and Federal biologists are monitoring effects on endangered fishes.

• Selected dikes, levees, and other barriers to critical wetlands or flooded bottomlands will be removed or altered, making the sites available for use by Endangered fish. Young native fish that use these nutrient-rich areas grow rapidly and become large enough to then fend for themselves in the river. Wetlands targeted for enhancement include the Ouray National Wildlife Refuge on the Green River in northern Utah, a site on the Colorado River near Moab, Utah, and the Escalante State Wildlife Area on the Gunnison River downstream from Delta, Colorado.

• Fish ladders and other passageways will be built to allow Endangered fish to reach more of their historical range. For example, construction is set to start in 1995 on a fish ladder at Redlands Diversion Dam on the lower Gunnison River and on passageways around agricultural diversion structures on the Yampa River.

• Guidelines are being developed by the FWS and the States of Colorado, Utah, and Wyoming to address the stocking of non-native fish in upper Colorado River Basin lakes and reservoirs. These guidelines will be aimed at minimizing the risks to Endangered fish from predation, competition, and disease associated with non-native species while providing sport-fishing opportunities.

• Recovery Program participants will assist agencies outside the program in evaluating and reducing potential harm to Endangered fish from such environmental contaminants as selenium, petroleum derivatives, heavy metals, and uranium.

• Raising limited numbers of Endangered fish in hatcheries to be stocked in the wild will be evaluated. In 1994, for example, razorback suckers will be stocked in some of the species' historical habitat in the Gunnison River, where

(continued on next page)

Fish and Wildlife Service photo

Three boys pose with a 17-pound Colorado River squawfish they caught in the Green River in the early 1920's. Colorado squawfish once grew to lengths of nearly 6 feet and were called "white salmon" by early settlers. Now endangered, these fish are found nowhere but in parts of the Colorado River Basin.

New Plan

(continued from previous page)

none has been found in recent years. Biologists will evaluate the results of this action over the following 2 years. Also, a plan to reintroduce bonytail chubs throughout the upper Colorado River Basin will be developed by 1995. Bonytails are nearly extinct in the wild.

The viability of the stocking approach is uncertain, however. Hatchery-raised Endangered fish previously stocked in the Colorado River downstream of Lake Powell have not survived. Biologists want to ensure that stocking will be successful before continuing.

Addressing the Impacts of Federal Actions

Section 7 of the Endangered Species Act prohibits Federal agencies from taking actions likely to harm listed species or adversely modify any designated Critical Habitat. If a Federal agency finds that an activity it plans to authorize, fund, or carry out may affect a listed species, that agency must consult with the FWS. After consultation, the FWS renders a Biological Opinion on the proposed activity. If it finds that the action would likely jeopardize the listed species or adversely modify Critical Habitat, the FWS must identify any possible "reasonable and prudent alternatives." The FWS is responsible for assessing the impacts on Endangered Colorado River fishes from any water projects that require section 7 consultation. In the January 29, 1993, *Federal Register*, the FWS proposed to designate Critical Habitat for the four Endangered Colorado River fishes (see *Bulletin, Vol. XVIII, No. 2*), and a final decision is expected by March 1994.

Under the new agreement, the FWS will determine if enough progress has been made toward restoring the Endangered fish to allow implementation of the Recovery Action Plan to serve as a reasonable and prudent alternative in any jeopardy Biological Opinion. If not enough progress is being achieved, Biological Opinions for new and historic projects will identify which actions in the Recovery Action Plan must be completed to avoid jeopardy.

Without this section 7 agreement, operators of existing water projects would have sole responsibility to offset any harm their projects could cause Endangered fish.

"The agreement represents a significant departure from the traditional approach to section 7 consultation on water development projects," Hamill said. "Instead of relying on project sponsors to offset the impacts of a project, the Service will consider the accomplishments of the Recovery Program. This approach has benefits both for water developers and Endangered fishes."

Recovery Program participants are the Fish and Wildlife Service; U.S. Bureau of Reclamation; Western Area Power Administration; States of Colorado, Utah and Wyoming; Colorado River Energy Distributors Association; water developers; and environmental organizations.

For more information, call the FWS Denver Regional Office at (303) 236-2985.

Connie Young is the Information and Education Coordinator for the Colorado River Recovery Program in the FWS Denver Regional Office.

Diseases Cited in California Sea Otter Deaths

Concerned that the growth rate for the California population of the southern sea otter (*Enhydra lutris nereis*) was not achieving the success of the species elsewhere, the recovery coordinator enlisted the expertise of the National Wildlife Health Research Center to determine the cause of death for the 22 marine mammals found dead during 1992.

"Despite the small sample size, we found the frequency of fatal infectious disease unusually high in comparison with other endangered or threatened species," said Dr. Nancy Thomas, veterinary pathologist at the Madison, Wisconsin, health laboratory. "The deaths of 10 animals were attributable to infectious or parasitic diseases."

During the 1980's, southern sea otter recovery efforts focused on developing the recovery plan and implementing the highest priority tasks—minimizing threats and risks of oil spills and minimizing incidental take in fishing gear. Through Region 1, the recovery program coordinator recommended standards of operation for offshore oil development and coastal tanker traffic and initiated the sea otter translocation program as the cornerstone task to minimize oil spill risk. California State legislation prohibited gillnet fishing in waters 30 fathoms and less, reducing the level of incidental take to nearly zero. In 1989, a new recovery team was established to review and revise the 1982 southern sea otter recovery plan. Despite these initiatives, the growth rate of the California sea otter population has been well below that of most of the populations in Washington, Alaska, and Canada.

Infectious diseases identified in southern sea otters included coccidioidomycosis, aberrant acanthocephalan parasite migration, and protozoal encephalitis.

Three sea otters from San Luis Obispo County were diagnosed as dying from coccidioidomycosis, also known as San Joaquin Valley fever, which is caused by the fungus *Coccidioides immitis*. The organism grows in its vegetative (hyphal) form in the soil, infecting humans and animals most commonly via windblown spores. Animal-to-animal transmission is a rare event. Endemic to certain areas of the southwestern United States, particu-

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Diseases Cited in Sea Otter Deaths

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larly the Central Valley of California, this disease is only sporadically reported in other areas of the State. Every year since 1971, a few cases of human coccidioidomycosis were reported in San Luis Obispo County; however, there were dramatic increases in such cases in 1978 and 1992. One sea otter found in San Luis Obispo County in 1976 had this disease, although as far as we know it is not a common diagnosis as a cause of morbidity or mortality in the animals.

Five sea otters—1 adult and 4 immature—were diagnosed as dying from aberrant acanthocephalan parasite migration into the abdominal cavity. While certain species of acanthocephalans are normal inhabitants of the intestinal tract of sea otters, the aberrant migrating acanthocephalans are larval stages that have passed through the intestinal wall and attached to many abdominal organs. Parasitologists at the University of Nebraska have tentatively identified the migrating acanthocephalans as belonging to a group that usually infects birds—primarily gulls or scoters—and may be transmitted through ingestion of anomuran sand crabs. Although this problem has rarely been cited in individual sea otters in the past, it may be emerging as a potentially significant population health problem.

Two sea otters found convulsing on a beach in San Luis Obispo County were found to have encephalitis caused by a protozoal parasite, not definitely identified to date. This is a newly identified problem in the otters.

Causes of death in 12 sea otters included emaciation or mating wounds or both (7), various types of trauma (4), and intestinal perforation with twisting of the intestine (1). These causes of mortality have been reported in sea otters in the past.

"When monitoring the status of Endangered, Threatened, or candidate species, we are constantly challenged with early detection of insidious threats," said Carl Benz, wildlife biologist at the Ventura, California, field office. "Because of the support of the National Wildlife Health Research Center, the Service can be attentive to the problem of infectious and parasitic diseases and their threat to the recovery of the southern sea otter and the health of the nearshore ecosystem."

Necropsies of southern sea otters at the National Wildlife Health Research Center in 1993 have documented some of the same disease problems, including coccidioidomycosis, acanthocephalan peritonitis, and protozoal encephalitis. The Center will continue comprehensive necropsies in order to provide important information to aid the recovery of this Threatened species.

Material for this article was provided by Dr. Lynn Creekmore, Wildlife Disease Specialist, and Dr. Nancy Thomas, Endangered Species Pathologist, both of whom are with the National Wildlife Health Research Center in Madison, Wisconsin. The Center is a unique Federal research facility dedicated to research, diagnosis, and prevention of disease in free-ranging wildlife. Carl Benz, the FWS Southern Sea Otter Recovery Program Coordinator from 1979 to 1993, also provided material. Mr. Benz is now executive secretary to the recovery team and Assistant Supervisor of the FWS Ventura, California, Office.

Reclassification Proposals

(continued from page 1)

possibility of erosion from logging within the lake watershed, and the potential damage or destruction of the single population from chance events.

* * *

The reclassification proposals recognize the improved status of these plants. Even if reclassified, however, both species will continue to receive Endangered Species Act protection until they are fully recovered. With the continued cooperation of Federal and State agencies, conservation organizations, and concerned landowners, the FWS will work to restore both plants as secure, self-sustaining members of their ecosystems.

Taiwan and China Warned

(continued from page 4)

ing; (3) development and implementation of a comprehensive law enforcement and education action plan; (4) increased law enforcement penalties; and (5) prompt termination of amnesty periods for illegal holding and commercialization.

The FWS is participating in two CITES delegations to China and Taiwan, as well as to Korea. The first is to provide technical assistance, and the second is to evaluate their progress between now and the upcoming March 1994 CITES Standing Committee meeting. In addition, the United States is sending its own delegation, consisting of FWS CITES and law enforcement experts, and staff from the Department of Justice, to help these countries make progress in ending the trade. The FWS is also participating with the Department of Interior's Office of Policy Analysis in an interagency task force led by the National Security Council to assist China and Taiwan in eliminating their illegal wildlife trade and to evaluate their progress by the March 1994 deadline.

Denise Henne is with the Branch of Correspondence and Information, Office of Administration, Fish and Wildlife Service, Washington, D.C.

(continued from page 2)

Fish and Wildlife Service photo

whooping cranes at Aransas National Wildlife Refuge, Texas

The report is available for $35 from the Captive Breeding Specialist Group, Species Survival Commission, IUCN—the World Conservation Union, 12101 Johnny Cake Ridge Road, Apple Valley, Minnesota 55124.

* * *

Region 3 - The FWS East Lansing, Michigan, Field Office met recently with the Michigan Department of Natural Resources to provide input to the State's lake sturgeon (*Acipenser fulvescens*) conservation plan. Before the plan is implemented, several issues need to be addressed, including stock translocation policy, egg viability studies, and the collecting and analyzing of contaminant data. A wildlife ecosystem risk assessment will also need to be developed. The FWS has considered the lake sturgeon a category 2 listing candidate since 1982.

* * *

The FWS Bloomington, Indiana, Field Office participated in developing a Memorandum of Understanding (MOU) for the construction of transportation projects within the karst region (a limestone region with sinkholes, underground streams, and caves) in the State of Indiana. This issue was prompted by potentially harmful impacts of highway construction on the environment of karst fauna, particularly the northern cavefish (*Amblyopsis spelaea*), a category 2 listing candidate. Signatories to the MOU are the Indiana Department of Transportation, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and FWS.

Under the MOU, all sinkholes, caves, underground streams, and other karst features in the area will be located, and surface and subsurface drainage patterns will be identified, prior to the design phase of any transportation project. The data will be used as a tool to plan project alignments that avoid as many karst features as possible. Any drainage directed to these features will be filtered using a variety of techniques currently being tested. Hazardous materials traps will be installed on all projects. Water quality entering a karst feature will be monitored and maintained at an established standard. Finally, strict erosion control specifications for the construction phase of each project will be established.

* * *

Researchers from the FWS National Fisheries Research Center in LaCrosse, Wisconsin, found many freshly-dead mussels buried under sand on the bottom and along the shoreline of the Mississippi River near LaCrosse. Two Endangered Higgins' eye pearly mussels (*Lampsilis higginsi*) were among the dead found. It is possible the mussels were killed by massive sedimentation and substrate disturbance from the 1993 floods.

Fish and Wildlife Service photo

The Higgins' eye pearly mussel is one of several endangered mollusks affected by the 1993 midwest flood.

* * *

Region 4 - Biologists conducting a status survey of the flatwoods salamander (*Ambystoma cingulatum*) in Florida found only one population east of the Suwannee River. Although historical records for this listing candidate exist for 5 counties in northeast and north-central Florida, the Osceola National Forest was the only locality outside the Florida panhandle where the species was found during the survey. Biologists from the Florida Natural Areas Inventory observed flatwoods salamanders at 39 of 111 wetlands they examined. Using estimates of

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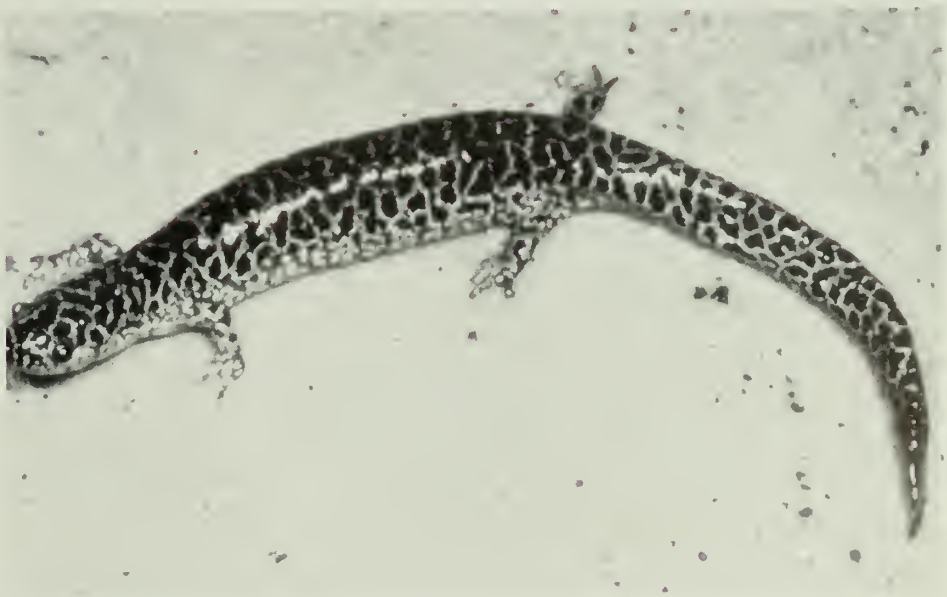

photo © John G Palis

gravid female flatwoods salamander captured at an ephemeral pond breeding site

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potential migration distances from breeding ponds as a means of defining population limits, the survey verified the presence of 34 breeding populations.

Flatwoods salamanders historically occurred in low, wet, pine flatwoods and grass-dominated savannas of the southeastern coastal plain from Alabama to southern South Carolina. Rangewide status surveys continue. These surveys target breeding ponds because they represent discrete locations that can be sampled efficiently. The typical breeding pond in Florida was found to be a small, shallow, ephemeral pond with an open canopy composed primarily of pond cypress (*Taxodium ascendens*) and slash pine (*Pinus elliottii*), with an occasional blackgum (*Nyssa sylvatica* var. *biflora*). These ponds generally filled with water in late autumn or early winter, and began to dry in April and May with the onset of the growing season. Pond bottoms were firm and relatively devoid of leaf litter but covered by a combination of grasses, sedges, rushes, and herbaceous vegetation. Crawfish burrows were common, but large, predatory fish were absent due to the isolation and ephemeral nature of the ponds.

Threats to the salamander include habitat conversion for agriculture, silviculture, and real estate development; herbicide and fertilizer application; erosion resulting from road construction; and bait harvesting. The elimination of native ground cover vegetation and the ditching and draining of breeding ponds may have extirpated the flatwoods salamander from many private timberlands. Native ground cover has been eliminated by fire suppression and the resultant shrub invasion, the establishment of pine plantations with dense stocking rates and closed canopies, and soil alteration during mechanical site preparation.

* * *

Region 5 - Staff from the FWS regional and field offices are continuing their participation in the New England Plant Conservation Program (NEPCoP), a voluntary alliance of 68 private institutions and government agencies, organized in 1991 to promote the survival and recovery of New England's endangered flora. NEPCoP is a prototype for a nationwide tier of regional programs to bridge the gaps between national, State, and local plant protection programs.

With the goal of protecting plants and their natural habitats, NEPCoP aims to develop consistent approaches in different States regarding such issues as taxonomy, habitat management, status determinations, and reintroduction. A Regional Advisory Council, including FWS staff, oversees these policies and all regional elements. State task forces, the heart of the program, survey plant populations, suggest management strategies, and collect seed for banking and propagation.

The need for plant conservation on a national and regional level has been highlighted by the fact that about 50 percent of the species listed under the Endangered Species Act are plants. Of New England's 2,000 native plant species, about 500 may be in trouble. Because

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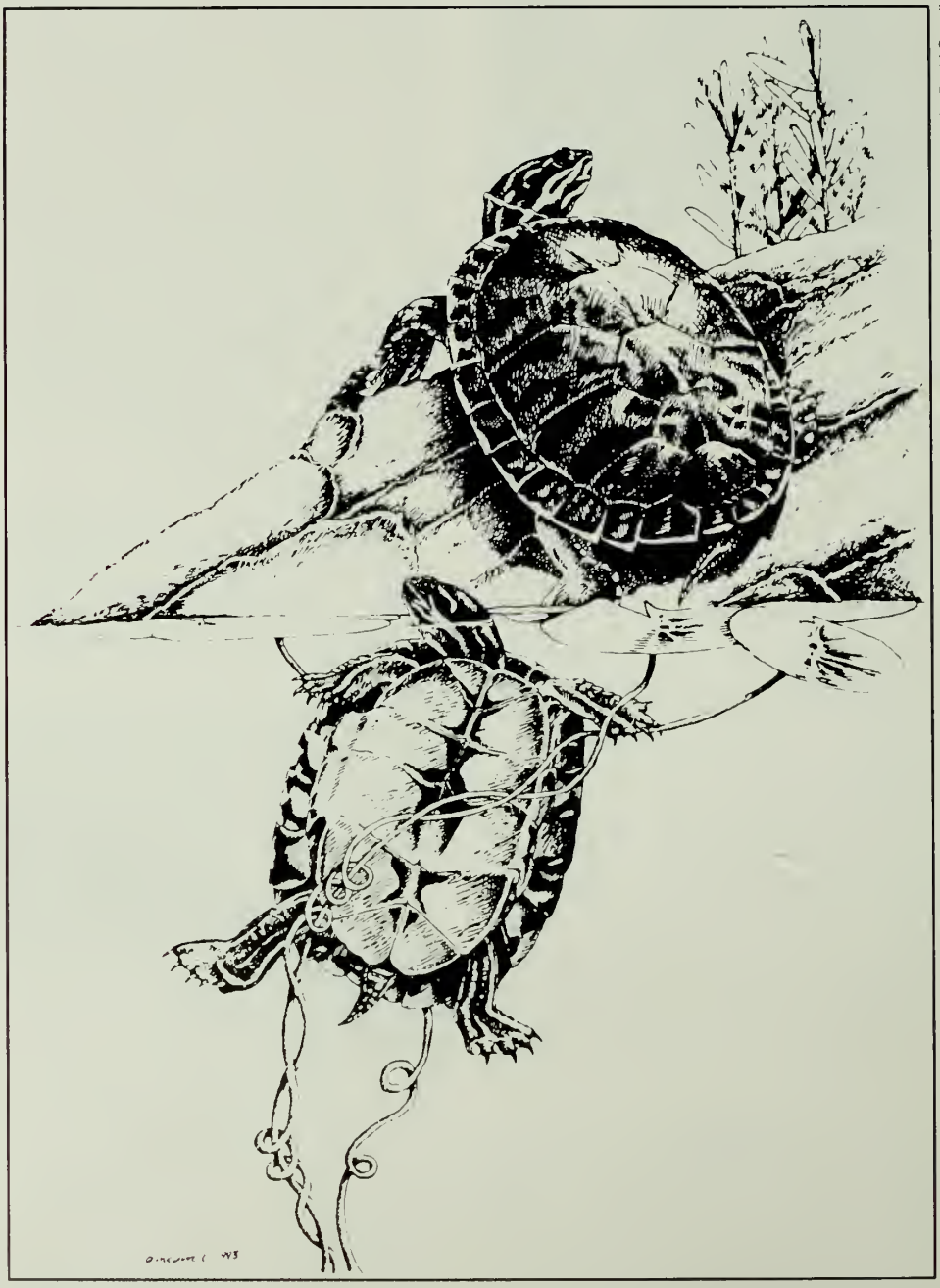

drawing by David Carroll

Plymouth redbelly turtles

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And then how would you know what was going on with the Peters Mountain mallow, the Kootenai River white sturgeon, the Last Chance townsendia, the spectacled eider...

Regional News

(continued from previous page)

listed plants on privately owned lands do not receive the same protection under the Act as listed animals, voluntary cooperation for plant protection is essential.

Public education will play an increasingly important role in enlisting voluntary cooperation for plant conservation. The New England Wild flower Society, an affiliate of NEPCoP, has begun a 10-year project to create the New England Garden of Rare and Endangered Plants at its botanical garden in Framingham, Massachusetts. In addition to providing the public an opportunity to see rare plants, the Society will begin an intensive education effort regarding habitat conservation and the importance of maintaining plant diversity. The FWS New England field offices anticipate assisting with this education and outreach effort.

* * *

The Plymouth redbelly turtle (*Pseudemys rubriventris*) was the first freshwater turtle in the United States

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listed as an Endangered species. Since its listing in April 1980, extensive research and recovery actions have greatly changed the status of the species, located only in Massachusetts. Once considered a separate subspecies (*P. r. bangsi*), the Plymouth redbelly is now regarded instead as a disjunct population, isolated by more than 250 miles from other redbelly turtles in seven coastal plain States to the south.

Measures being taken to increase hatching success include finding the nests and protecting them with wire screens. In 1993, Dr. Terry Graham (a professor who has been studying the Plymouth redbelly since 1969) and two Worcester State College biology students located and protected 71 redbelly nests. A total of 675 hatchlings emerged from the nests in August, September, and October. Dr. Graham and his students marked most of the hatchlings and released them into the nearest pond. Continuing a tradition begun in 1985, these recovery cooperators retained a number of hatchlings (153 in 1993), which they provided to a host of volunteer organizations for "head-starting" over the winter. The head-started turtles should grow rapidly and be less vulnerable to predation when they are released next June. Since 1985, 810 head-started hatchlings have been released into 16 Plymouth County ponds and one river. If these young turtles eventually enter the breeding population and nest successfully, the prognosis for recovery appears bright. A revised recovery plan will be available by spring 1994.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	55	251	9	22	337	37
Birds	73	153	17	0	243	73
Reptiles	17	63	18	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	61	11	39	0	111	62
Snails	12	1	7	0	20	26
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	17	4	9	0	30	15
Arachnids	4	0	0	0	4	0
Plants	326	1	78	2	407	178
TOTAL	632	494	190	38	1,354*	474**

Total U.S. Endangered 632 (306 animals, 326 plants)
Total U.S. Threatened 190 (112 animals, 78 plants)
Total U.S. Listed 822 (418 animals, 404 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 377 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: 120

February 2, 1994

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ENDANGERED SPECIES

Technical Bulletin

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

March/April 1994 Vol. XIX No. 2

ENDANGERED SPECIES

Technical Bulletin

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

Endangered Species Protection in the National Parks

by Napier Shelton

photo by Ted Simons

These red wolf pups were reared at Gulf Islands National Seashore in preparation for release at Great Smoky Mountains National Park.

Congress established the National Park Service (NPS) in 1916 to conserve the natural and cultural resources in the national parks and similar areas, and to provide for public enjoyment of these areas in ways that leave them unimpaired for the enjoyment of future generations. Today, the 80-million-acre (34-million-hectare) National Park System encompasses more than 360 national parks, monuments, preserves, memorials, historic sites, recreational areas, seashores, and other units spread from Alaska to the U.S. Virgin Islands to American Samoa. In addition to preserving habitats that range from arctic tundra to tropical rainforest, the System protects representatives of more than half of North America's plant species and a large proportion of the continent's animal species.

The NPS has a long history of giving special attention to species in trouble. In the early decades of this century, Yellowstone National Park and several other western parks helped to build up depleted populations of such animals as the bison *(Bison bison)*, elk *(Cervus elaphus)*, and pronghorn *(Antilocapra americana)*. Protection of nesting and wintering trumpeter swans *(Olor buccinator)* at Yellowstone helped bring this species back from the edge of extinction. During the 1950's through the 1970's, the focus shifted to protecting and restoring gray wolves *(Canis lupus)* at Isle Royale National Park, grizzly bears *(Ursus arctos)* in Glacier and Yellowstone, and Hawaiian geese *(Nesochen sandvicensis)* at several of the Hawaiian parks.

With passage of the Endangered Species Act in 1973, the NPS intensified its efforts to inventory and protect Endangered species in the parks. Like all Federal agencies, the NPS is required by the Endangered Species Act to conserve Endangered and Threatened species and their Critical Habitats, and to avoid any actions that might jeopardize their survival. The NPS extends this responsibility to protecting Federal listing candidates and to State-listed and candidate species.

Endangered species protection fits well with the NPS mission. Native ecosystems and natural processes in parks are preserved to the extent possible. Natural areas are managed to control the adverse effects of human influence, which are a factor in the declines of many listed species. The NPS is also working with other Federal, State, and local agencies to take whatever steps are available to minimize air and water pollution entering parks. Exotic, or non-native, species that are a clear threat to a park's native species are removed or suppressed wherever feasible.

Systemwide Inventory

The NPS initially focused its endangered species efforts on animals of special interest to the public in the parks, although many of the less conspicuous species, such as plants, clams, and fishes, also came under close scrutiny. However, in 1988, the NPS conducted a systemwide survey of Endangered and Threatened

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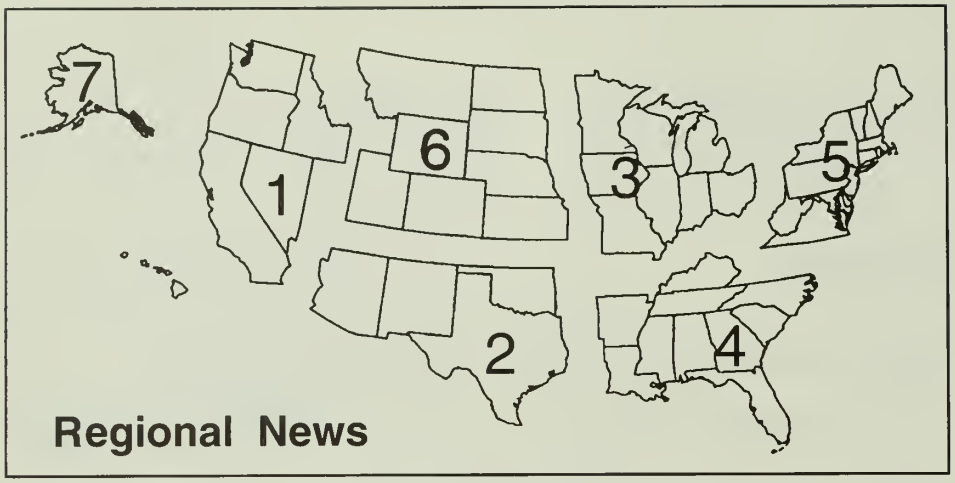

Regional News

Regional endangered species contacts have reported the following news:

Region 2 - Staff at the Aransas National Wildlife Refuge in Texas are considering live-trapping and relocating bobcats *(Felis rufus)* from the area where four whooping crane (*Grus americana*) chicks have disappeared. The recently discovered carcass of a juvenile crane produced the first confirmation of bobcat predation on the species at the refuge. The FWS biologists are continuing air and ground searches for the other young birds, which were reported missing in late November and early December.

Within a few days of the first disappearance, biologists recovered the remains of a juvenile crane in a pile with a great blue heron (*Ardea herodias*) and an American widgeon (*Anas americana*), surrounded by bobcat tracks. Necropsies of the crane and duck at the National Wildlife Health Research Center in Madison, Wisconsin, identified predation as the cause of death. The Center is investigating other factors — such as high lead levels, brain cholinesterase, or disease — that may have predisposed the juvenile to predation.

It is unusual to lose so many young birds. No sick or physically impaired whooping cranes have been noted on aerial surveys. Since the refuge territories from which the birds disappeared are not connected, a transmittable disease simultaneously affecting a large number of birds in different locations seems unlikely. Because juveniles stay with their parents until the spring migration in April, the missing birds are probably dead. The objective of relocating bobcats would be to remove animals experienced in killing whooping cranes, since juvenile birds are naive about predators and depend on the alertness of their parents. A factor contributing to the loss may be that juveniles are ranging farther from parents to find food. The months of drought preceding last December's rains dried up coastal marshes that provide important crane staples, including shellfish and other invertebrates.

The peak count of whooping cranes wintering on the refuge this year was 143, including 16 juveniles. Two families that arrived with one chick each had not been counted during the 1993 spring surveys, when 45 pairs — a record number — nested on the species' Canadian breeding grounds.

* * *

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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.

Progress Toward Recovery Leads to Reclassification Proposal for Unique Virginia Tree


photo by F.G. Meyer

The Virginia round-leaf birch *(Betula uber)*, a species of tree endemic to the southwestern part of the State, has been listed since 1978 as an Endangered species. One natural population is known, and it numbers only 11 trees at last count. They are restricted to a narrow band of forest in the Cressy Creek floodplain, a site nearly surrounded by agricultural land. Since 1978, however, a cooperative recovery effort involving State and Federal agencies, arboreta, and private individuals has established 20 additional populations in the area. Several thousand seedlings also have been provided to botanical gardens and other institutions. Because the Virginia round-leaf birch is no longer believed to be in imminent danger of extinction, the Fish and Wildlife Service proposed December 6, 1993, to reclassify this species from Endangered to the less critical category of Threatened.

All 20 of the newly established populations, along with a portion of the single natural population, are on the Jefferson National Forest in the Mt. Rogers area. The U.S. Forest Service is actively involved in the management and protection of these trees. Additionally, the Forest Service provides a public information exhibit at the site of the largest round-leaf birch. A ramp allows visitors a close-up view of the tree, which is enclosed within a protective fence.

With the dramatic population increase of over 1,400 subadult trees at 20 sites, the outlook for the Virginia round-leaf birch has brightened considerably. But because of remaining threats from flooding, drought, competing vegetation, browsing animals, and vandalism, the species' future is not yet secure. The recovery program will continue until the round-leaf birch can safely be removed from Endangered Species Act protection.

Regional News

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Region 3 - Researchers from the Missouri Department of Conservation, the FWS, and other organizations spotted 1,707 bald eagles (*Haliaeetus leucocephalus*), 10 golden eagles (*Aquila chrysaetos*), and 7 unidentified eagles during the winter survey from January 3 to 7. At Eagle Bluffs, south of Columbia along the Missouri River in an area inundated during the 1993 flood, 42 eagles were standing on the ground around the edges of a "blue hole" created during the flood. Because no waterfowl or carrion were visible, the eagles were probably attracted to the site by fish trapped in the hole.

* * *

What do you do when 120,000 people are predicted to attend a fireworks show close to a building where nesting peregrine falcons (*Falco peregrinus*) are expecting young to hatch? If you are the FWS, the answer is to involve all interested parties, create public awareness, and develop a solution — in this case, an alternate fireworks display.

During the summer of 1993, a potential conflict between a July fireworks celebration in Cleveland, Ohio, and the needs of a pair of nesting peregrine falcons was resolved through cooperation among the FWS Reynoldsburg, Ohio, Field Office; the Ohio Division of Wildlife (DOW); management and marketing staff from Cleveland's Tower City Center (a metropolitan retail, office, and transit building); the fireworks company; the City of Cleveland; other private companies; and public citizens.

When it become evident that the celebration, scheduled for July 2, might directly harm the nesting raptors and interfere with the expected hatching of their young on July 4 atop the Tower City Center, team members took action. They created a public relations campaign and developed an alternate fireworks show, cancelling plans to cascade fireworks down the side of the building and moving the launch sites to protect the birds.

In the weeks before July 2, biologists from the FWS and Ohio DOW helped

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Building Economic Incentives into the Endangered Species Act

by Hank Fischer, Bill Snape, and Wendy Hudson

Editor's note: As part of our effort to cover independent views on the endangered species program, we are publishing the following article prepared by Defenders of Wildlife:

Ever since environmentalism became a household word in the 1970's, many conservationists and economists have maintained a healthy suspicion of one another. But America's patron saint of conservation, Aldo Leopold, rejected the notion that economists and ecologists should be at odds. In defining an environmental ethic for the country in his 1949 classic, *A Sand County Almanac*, Leopold offered this suggestion:

"Examine each question in terms of what is ethically and aesthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

It is noteworthy — and certainly not accidental — that Leopold included economic expediency as part of his environmental ethic. He recognized the limitations of government regulation in achieving environmental quality.

Conservation groups — including Defenders of Wildlife — have long supported a regulatory approach to the recovery of species on the brink of extinction. We have worked actively to establish effective recovery plans and to define scientifically supportable recovery standards. We have urged agencies to implement such plans and standards, and have filed lawsuits when we felt it necessary.

This regulatory approach to endangered species management has been largely successful on public lands, with modest impact on other land uses. As pointed out by a 1992 World Wildlife Fund study, of the approximately 74,000 endangered species consultations conducted by the U.S. Fish and Wildlife Service between 1987 and 1991, only 19 proposed developments or activities were blocked because of Endangered Species Act (Act) considerations.

This evocative poster, featuring the work of Montana artist Monte Dolack, was produced by Defenders of Wildlife to raise money for its Wolf Compensation Fund. The proceeds reimburse ranchers for livestock losses to wolves in the northern Rockies and the Southwest. Printed on museum-quality paper with fade-resistant ink, the highly-colored poster measures 23 by 32 inches. It can be purchased by writing Defenders of Wildlife, 1101 Fourteenth Street NW, Suite 1400, Washington, D.C. 20005, or by calling 202/682-9400.

It's undeniable that, in a handful of instances, endangered species conservation has had significant impact on other land uses, leading to what Secretary of the Interior Bruce Babbitt terms "train wrecks." But it's also irrefutable that, day in and day out, the Act continues to do what it does best: making development compatible with a diversity of life forms.

At the same time, the record of endangered species recovery on private lands points out the limitations of a strictly regulatory approach. Some Americans defend private property rights as vigorously as others champion the protection of endangered species. Progress with endangered species recovery on private lands will require approaches that do not constantly place these deeply held values at odds with one another.

A 1993 publication from the Natural Heritage Data Center Network pointed out how essential private lands are to endangered species conservation. It reported that approximately 50 percent of the 728 domestic species listed at the time were found exclusively on privately owned land. At least half the known occurrences of another 20 percent of the listed species were on private land. The conclusion is inescapable: no matter how well endangered species are protected on public land, we will fail in our efforts to conserve them unless we address endangered species management on private land.

Defenders of Wildlife first experimented with providing economic incentives to private landowners in the Northern Rockies in 1987 with a program that paid livestock producers at market value for all verified livestock losses to wolves. Since that time, Defenders' Wolf Compensation Fund has paid approximately $12,000 to about a dozen livestock producers.

According to Dr. Steve Fritts, U.S. Fish and Wildlife Service wolf recovery leader for the northwestern United States, "Defenders' compensation program has re-

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Economic Incentives

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duced animosity and made a major contribution to wolf recovery. For a relatively small cash outlay, it appears Defenders has increased cooperation and decreased the likelihood that wolves will be shot on sight."

In 1992, Defenders announced the initiation of a Wolf Reward Program that would pay $5,000 to any private landowner who had wild wolves breed and successfully rear their pups on private land. The first award from this program was made in February 1994 to a landowner along Montana's Rocky Mountain Front (the geographical area where the northern Great Plains meet the Rockies). It was the first record of wolves denning in this area in more than 50 years.

Defenders' experimentation with economic incentives has brought us into contact with many of the nation's leading economists and endangered species experts. The depth and diversity of interest in economic incentives has been impressive. We have been nothing short of excited by the volume and quality of innovative, incentive-based ideas.

Our enthusiasm for these new concepts has led us to share them with the public and Congress. In early 1993, Defenders contacted many of the nation's leading national experts and asked them to write papers on how to build economic incentives into the Act. Fourteen authors responded, including resource economists, environmental leaders, State and Federal endangered species biologists, developmental interests, a State wildlife agency director, and a U.S. Fish and Wildlife Service regional director. The resulting report, *Building Economic Incentives into the Endangered Species Act*, was published in October 1993. We believe it is the most exhaustive work on this subject published to date. Interest in the publication was so high we had to reprint it within 90 days.

Congress is paying close attention to the incentives discussion. Bills to reauthorized the Endangered species Act offered in the last session by Senator Max Baucus (D-MT) and Rep. Gerry Studds (D-MA) contain economic incentive provisions. According to Rep. Studds, "Endangered and threatened species do not recognize property boundaries. If we are going to be successful in bringing listed species back to health, we will clearly have to enlist the help of private landowners." Rep. Studds' bill (H.R. 2043) instructs the Secretaries of the Interior and Commerce to actively experiment with incentive approaches and report to Congress on the results. Such pilot projects provide the opportunity to test new methods without weakening existing regulatory protections.

Even the bills introduced by Rep. Billy Tauzin (D-LA) and Sen. Richard Shelby (D-AL), which contain elements opposed by many conservation groups, also contain interesting ideas for using incentives to protect endangered species. Both bills would allow private landowners who have species that are listed, proposed for listing, or candidates for listing proposals to submit conservation plans to Federal agencies. Upon approval, the cost of some private conservation activities could be reimbursed.

At the State level, California has been the trend-setter in examining incentive approaches. Conflicts between real estate interests and conservation of key habitats, such as coastal sage scrub, have intensified the need for finding solutions to the challenge of protecting endangered species on private land.

California is revising its own Endangered Species Act with an eye toward building economic incentives into the law. In late 1993, Gov. Pete Wilson hosted two roundtable discussions in California focused on improving both the State and Federal endangered species laws. Discussions about incentives dominated both meetings.

Defenders is working closely with a coalition of California conservation organizations called the California Biodiversity Alliance on incentives legislation. We believe California may provide a preview of how economic incentives can be incorporated in endangered species conservation.

Although it sometimes seems as if we have been debating endangered species issues forever, the current Federal law is a mere 20 years old. Society is only now taking its first steps toward devising a system that prevents the extinction of various life forms on earth. We are still investigating new techniques and exploring innovative approaches for making endangered species recovery more successful and more acceptable to all citizens.

Legal battles and confrontation dominated endangered species conservation during the first 20 years of the Endangered Species Act. The next major advances may come through incentives and cooperation.

Hank Fischer has been the Northern Rockies Representative for Defenders of Wildlife since 1977, and is the director of Defenders' economic incentives project. He has a long association with endangered species issues, particularly those involving wolves, grizzly bears, and black-footed ferrets. Bill Snape is Defenders' legal counsel on endangered species in Washington, D.C. Wendy Hudson is the coordinator for Defenders' watchable wildlife program in Portland, Oregon, and the editor of Building Economic Incentives into the Endangered Species Act.

The opinions expressed by the authors are not necessarily those of the U.S. Fish and Wildlife Service. Their article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 320 ARLSQ, Washington, D.C. 20240, or call 703/358-2166. See Bulletin Vol. XVIII, No. 4, for style guidelines, or request them from the Editor.

Defenders' special publication, *Building Economic Incentives into the Endangered Species Act,* is a 130-page report featuring papers from 14 of the nation's leading endangered species experts. To order, send $10 (shipping and handling included) to Defenders of Wildlife, Northwest Regional Office, 1637 Laurel Street, Lake Oswego, Oregon 97034. For more information, call Hank Fischer at (406) 549-0761 or Wendy Hudson at (503) 697-3222.

The Peregrine Fund: Giving Wing to Recovery

by William A. Burnham and Jeff Cilek

Editor's note: Restoring a rare species is seldom an easy or straightforward task. Government agencies cannot do the job alone; the assistance of the private sector is often crucial for recovery to succeed. To help illustrate this point, we asked The Peregrine Fund — an organization that has worked extensively with the Fish and Wildlife Service — to provide an article on its activities to recover endangered birds.

The Peregrine Fund (Fund), a non-profit conservation organization, was founded in 1970 at Cornell University by then Professor of Ornithology Tom J. Cade to conserve birds of prey. The Fund has cooperated on projects in over 35 countries on 5 continents. Our biologists have participated in efforts to restore the peregrine falcon (*Falco peregrinus*), Mauritius kestrel (*Falco punctatus*), northern aplomado falcon (*Falco femoralis septentrionalis*), bald eagle (*Haliaeetus leucocephalus*), 'alala or Hawaiian crow (*Corvus hawaiiensis*), and California condor (*Gymnogyps californianus*). In all, the Fund has hatched and reared over 4,000 individuals of 22 raptor species, reintroduced 9 species, and conducted research on over 60 species.

Although the Fund's primary focus has been on raptors, we have also conducted research and conservation projects for neotropical migrant and resident songbirds, shrikes, and other non-raptor bird species. The World Center for Birds of Prey, established in 1984 in Boise, Idaho, is the headquarters for the Fund's global research, conservation, and education programs. It also shelters one of the largest collections of endangered birds of prey — more than 200 individuals representing over 10 different species.

The Fund also has a very active public education program, and we anticipate over 50,000 visitors a year at our new Velma Morrison Interpretive Center. Student education is supported through research opportunities and scholarships. The Fund helped establish a masters degree program in raptor biology at Boise State University, the only such degree program in the world. Over 100 conservationists from throughout the world annually receive training from the Fund.

Peregrine Falcon

Many naturalists would argue that the peregrine falcon is the most dynamic of raptors, with tremendous dives of 200 miles per hour and an impressive defense of its home and young. The declining populations of this charismatic species led to the foundation of the Fund. At that time, breeding peregrines were extirpated east of the Mississippi River and the population had diminished by 80 to 90 percent in the West. Since then, with the cooperation of others, we have released over 3,700 peregrines in 28 States.

The peregrine falcon is making a good recovery, with about 100 pairs known in the eastern United States, 57 pairs known in the Midwest, over 100 known pairs in California, about 100 pairs in the Northwest (Idaho, Washington, Oregon, Montana, and Wyoming), and over 170 pairs known in Colorado and Utah. Additional releases are planned in Idaho, Oregon, Montana, Washington, and Wyoming for 1994 and 1995.

California Condor

California condors, with their wingspans of over 9 feet, are among our continent's most impressive birds. Ten thousand years ago, this species soared over much of North America. However, as the large, ice age mammals gradually became extinct, the California condor's food supply also declined. The birds eventually were restricted to areas along the Pacific Coast, where their diet included beached whales and seals. Shooting, poisoning, and loss of habitat decimated the condor population, which reached a low point of 22 individuals in 1983. *(Editor's note: the population has since been increased to 75 birds, including 66 in captive breeding flocks and 9 that have been released into the wild.)*

In November of 1992, at the recommendation of the California Condor Recovery Team, the Fish and Wildlife Service (FWS) selected the Fund's World Center for Birds of Prey as the site for the third California condor breeding facility. The other two facilities are located at the Los Angeles Zoo and the San Diego Wild Animal Park. Construction of the new Peter and Conni Pfendler California Condor Breeding Facility was completed last summer, and six pairs of condors arrived from the Los Angeles Zoo and the San Diego Wild Animal Park on September 23, 1993. (See *Bulletin Vol. XVIII, No. 4.*)

Young California condors raised at the World Center may someday be released in the Grand Canyon of Arizona, providing spectacular opportunities to view the largest bird in North America.

Aplomado Falcon

When Spanish explorers came to the grasslands of Texas, Arizona, and New Mexico, the aplomado falcon was part of the landscape. It perched atop yuccas and in the crowns of scattered trees that rose from the green and yellow prairies. The falcons sped on flashing blue-grey wings to chase the abundant birds thriving in the seed-grasses that brushed the bellies of the Spanish horses.

Unfortunately, the aplomado falcon population declined drastically by the early 1940's. The major cause appeared to be the loss of native grasslands resulting from changing land uses. Between 1977 and 1988, the Fund and cooperators were able to obtain permission from the Mexican government to collect aplomado falcon nestlings in southern Mexico for captive propagation. At the

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A Successful Year in the Recovery of the Aplomado Falcon

by Chris Perez and Phil Zwank

For the effort to recover the northern aplomado falcon *(Falco femoralis septentrionalis)*, a bird of prey classified as Endangered, 1993 was a banner year. From June through August, 26 young birds were released on the Laguna Atascosa National Wildlife Refuge in southern Texas. This single year's record exceeded the total of 24 falcons previously released since the program began in 1985.

Laguna Atascosa was chosen because of its proximity to remnant aplomado falcon populations in Mexico. In addition, much of the refuge's 45,000 protected acres (18,200 hectares) is coastal prairie, which is similar to the native habitat the birds historically occupied in southern Texas.

The released aplomado falcons were young-of-the-year progeny of a captive flock maintained by The Peregrine Fund, a private conservation organization. When nestlings reached approximately 29 days of age, they were flown to the refuge and released through a process known as hacking. This technique, which has worked so successfully in peregrine falcon restoration, includes providing food and protection until young birds fledge and become independent. At the refuge, young birds were first placed in a large wooden box atop a 10-foot (3-meter) tower at one of two hack locations. After a week in the hack box, tarsal-mounted transmitters were attached to each bird and they were set free. While the released falcons became familiar with their surroundings, volunteers watched their progress from a blind near the hack tower and monitored their movements with radio telemetric receivers. Food was brought to the hack box until the young birds no longer returned.

In previous aplomado falcon releases, monitoring ended when released birds left the hack site or transmitters stopped functioning. This usually occurred within one month after release. This year, however, fledglings were recaptured after about 3 weeks and tarsal-mounted transmitters were replaced by tail-mounted transmitters with a battery life of about 6 months. These birds were monitored by staff of the New Mexico Cooperative Fish and Wildlife Research Unit, with funding from the FWS Corpus Christi, Texas, Ecological Services Field Office, Laguna Atascosa National Wildlife Refuge, and The Peregine Fund.

Radio telemetry has provided data on survival, dispersal distances and direction, and the structural characteristics of habitats in which the birds chose to settle. Many of the released falcons have established residence on or near the refuge. Most are in coastal prairie along the refuge's western boundary.

It is not certain exactly how many of the released birds are still alive. We do know, however, that there have only been four confirmed mortalities. Coyotes and owls are suspected, but determining conclusively what caused the deaths is almost impossible.

In spite of the mortalities, we view the 1993 releases as a success. It remains to be seen, however, if these released birds will achieve the long-term goal of establishing a self-sustaining breeding population.

photo by Steve Bentsen

Aplomado falcon

Chris Perez is with the New Mexico Cooperative Fish and Wildlife Research Unit, and Dr. Zwank is Unit Leader.

Giving Wing to Recovery

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request of the FWS, the Fund has taken a leadership role in the species' restoration, and a captive breeding population has been established at the World Center for Birds of Prey.

The Laguna Atascosa National Wildlife Refuge, located near the southernmost part of Texas, was selected as the place in which to begin the restoration effort. However, the cooperation of ranchers to conserve the species on private lands will be important to ultimate success. One of the last known nesting sites of the aplomado falcon in the U.S. was near the wildlife refuge in the 1940's.

Twenty-six captive bred aplomado falcons were released the summer of 1993. (See accompanying article.) In 1994, we hope to release 30 to 35 more falcons at three sites on the refuge and one nearby site on private land. Long-term plans call for releasing 50 aplomado falcons a year for 10 to 15 years, moving westward from Texas into New Mexico, Arizona, and adjacent areas in Mexico.

Hawaiian Crow

The Hawaiian Islands are known as "the endangered species capital of the nation." They have more endangered and threatened plants and animals than any other State, and are home to 19 species of endangered forest birds.

One of these species is the 'alala or Hawaiian crow, of which only 12 wild and 11 captive individuals were known to exist in late 1992. That November, when the FWS asked the Fund to join the 'alala recovery program, we assembled a team of experts to assist. The Zoological Society of San Diego provided for the incubation of 'alala eggs collected from the wild and the rearing of young. Greenfalk Consultants undertook surrogate research on non-threatened corvid species in Idaho. The Fund coordinated these activities and accomplished the release of captive-hatched 'alala into the wild. Biologists with the FWS monitored the wild 'alala and managed the overall program. Because the birds occur on private property, the participation of landowners has been critical.

Through these efforts, eight first-clutch eggs were gathered from three wild pairs of 'alala nesting on private ranches. From these eight eggs, six young were hatched and reared in captivity. Five of the young were released to the wild, while the other was sent to enhance the captive flock at the State's endangered species propagation facility at Olinda, Maui. In addition, two of the three wild pairs renested and hatched young. For unknown reasons, both pairs failed when their young were about two weeks old. One pair renested for a third time, and three eggs were removed after the adults abandoned the nest. Only one egg was fertile and hatched, and the young was later sent to the Olinda facility.

Five captive-hatched young were released into the wild in August 1993. (See *Bulletin Vol. XVIII, No. 3.)* Food was provided at the release aviary until late 1993, when the birds were fully independent of human care, successfully foraging for food, and evading predators.

As a result of this success and the extreme needs facing native Hawaiian forest birds, the FWS, State of Hawaii, and others have requested that the Fund cooperatively develop and operate a facility for the 'alala and other endangered birds on the Island of Hawai'i. Construction will begin in 1994.

Harpy Eagle

The harpy eagle (*Harpia harpyja*) is usually considered the world's most powerful eagle, and it is certainly one of the largest. Its talon is similar in size to the claw of a tiger. Harpy eagles occur in lowland tropical forest environments from Mexico to Argentina. As forest habitats have been altered, the species has greatly declined in Mexico and Central America, and populations are falling in South America as well.

We aim to conserve the harpy eagle and its tropical forest environments by (1) working cooperatively with Latin American governments, organizations, and local people, and (2) by using the Gerald D. and Kathyryn Swim Herrick Tropical Raptor Building to develop captive breeding and release techniques to reestablish the eagle where suitable habitat remains. In the past 2 years, we have investigated the distribution of harpy eagles and their use of habitat in different geographical areas, locating 14 nests. We also examined human-caused mortality. Shooting and habitat destruction are now major problems for this species.

In cooperation with NASA and David Ellis of the FWS, we began following the dispersal of five juvenile harpy eagles in Venezuela, with satellites reading signals from radio transmitters carried by the birds. We are also expanding this cooperative effort to the Darien National Park of Panama. On a roughly monthly basis, we acquire activity data on these young birds from NASA tracking stations. We found that harpy eagles may have the longest rearing period among raptors. For more than a year after they are capable of flight, the fledglings stay within a small area near their nests and rely on their parents for food.

We had the opportunity to rescue juvenile eagles that had been removed from their nests and to salvage birds wounded by shooters. In Venezuela, we enlisted the help of loggers to successfully release a young eaglet whose nest they had destroyed to build a new road, and we were able to keep the bird in its original habitat until it was old enough to become self-supporting. Through cooperation with Latin American governments, six non-releasable birds have been loaned to our captive breeding center in Boise.

The Maya Project

The Maya Project, initiated in 1987, uses birds as an environmental focus for sustaining tropical forests and building local support for conservation. The 2.2 million-hectare project area in the contiguous border parks of Guatemala, Mexico, and Belize is one of the most important biotic reserves in Latin

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Giving Wing to Recovery

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America. Its ecologically diverse forests are critical for the conservation of native and migrant bird species. Our activities directly contribute to management and monitoring of the biological diversity in this large, mostly undeveloped area.

The predominant factor affecting viability of raptors is habitat alteration resulting from rapidly increasing human populations and a growing demand for fuel, fiber, food, and minerals. Survival of most wildlife will depend on its ability to adapt to highly modified environments or on our capacity to establish and maintain preserves of sufficient size and quality. The Maya Project is designed to yield information needed to address those problems.

The study uses raptors as indicators of the nature, complexity, and health of the entire ecosystem. Because many tropical forest raptors require a large undisturbed area to survive, their conservation provides an "umbrella of protection" for the entire ecosystem, helping to conserve other species of the forest.

In addition, the Maya Project studies neotropical songbirds — species that breed in the U.S. and Canada, and migrate south to winter in Latin America and the Caribbean. The past decade has witnessed growing concern for the well-being of neotropical songbirds. Many, if not most, of these species spend more time in the tropics than they do in their temperate breeding haunts. During the 1991 and 1992 field seasons, the Fund began a major new segment of the Maya Project—a large research effort designed to provide new information on the ecology and conservation needs of neotropical migrant songbirds in the three-nation project area. This constitutes the first detailed look at the importance of the Maya Biosphere Reserve as a wintering area for neotropical migrants.

In the Maya Project, members of the Fund work with Latin American field researchers, trainees, and graduate students. Since the program began, more than 115 Latin American colleagues have received informal training, with some receiving even more years of involvement in field work. In addition, the Maya Project sponsors formal education. As a result, 18 Latin Americans administer the project and are heading research/conservation teams.

* * *

More and more we are separated from our natural world. But knowledge about nature helps people understand their relationship with the environment. Learning more about birds of prey enhances that understanding. The benefit we receive from the wild beauty of an eagle's flight, a falcon's dive, or the majestic soaring of a condor cannot be measured. Still, nature's inspiration and beauty help fuel the human spirit.

William Burnham is President of The Peregrine Fund and Jeff Cilek is Program Executive. For more information, write Mr. Cilek at The Peregrine Fund, Inc., World Center for Birds of Prey, 5666 West Flying Hawk Lane, Boise, Idaho 83709.

Final Rules

Final rules issued under the Endangered Species Act to reclassify one plant species and list two fishes as Endangered were published in December 1993:

Siler Pincushion Cactus *(Pediocactus sileri)*

A small globose or cylindrical cactus, this species has spines with black/purple tips when young and produces yellow flowers in the spring. It is endemic to parts of northwestern Arizona and southwestern Utah, where it occurs primarily on public lands administered by the Bureau of Land Management (BLM). The Siler pincushion was listed in 1979 as Endangered because of threats posed by livestock grazing, off-road vehicles, mining, road construction, and illegal collecting to the small number of known plants.

Recovery actions carried out in recent years by the BLM include developing a habitat management plan and conducting surveys for other populations. As a result, the status of the Siler pincushion has improved, although it is not yet secure enough to remove from protection under the Act. In recognition of the progress made toward full recovery, the Fish and Wildlife Service reclassified the Siler pincushion on December 27 from Endangered to the less critical category of Threatened.

Two Freshwater Fishes

Two species of freshwater fishes with restricted ranges were listed December 27 as Endangered:

- **relict darter** *(Etheostoma chienense)* - a small fish endemic to the Bayou du Chien drainage in western Kentucky.
- **bluemask darter** *(Etheostoma* sp.) - a smaller fish distinguished by the bright blue color displayed in breeding males. This taxon, for which a formal species description is being prepared, is endemic to the Caney Fork River system in central Tennessee.

Both darters are threatened by water quality degradation from a number of sources, including coal mining, gravel mining, and siltation caused by poor land use practices. Habitat has also been altered by impoundments and stream channelization.

Making the Best of Mother Nature: Managing the Puerto Rican Parrot After Hurricane Hugo

by Francisco J. Vilella and Ana B. Arnizaut

The Puerto Rican parrot (*Amazona vittata*) was once extremely abundant and widely distributed throughout Puerto Rico and its satellite islands. During the late 1800's and early 1900's, however, large scale deforestation eliminated most of the habitat upon which this species depends. By 1940, the parrot population had declined to about 2,000 individuals (Rodriguez-Vidal 1959), and was restricted to the rainforests of the Luquillo Mountains on northeastern Puerto Rico, mainly the area encompassed by the Caribbean National Forest.

Efforts to conserve the Puerto Rican parrot began in 1968 when a relict population of 23-24 birds was found in the upper elevations of the national forest. By August 1989, there were 45-47 parrots in the wild and 53 at the aviary in Luquillo. On September 18, 1989, however, Hurricane Hugo struck with sustained winds in excess of 150 miles per hour. Damage to parrot habitat was extensive.

Since 1990, both the Fish and Wildlife Service (FWS) and the Forest Service have been dedicated to restoring the wild population. After the storm, parrot surveys were conducted using canopy-level platforms. The network of canopy platforms has increased from fewer than 10 in 1988 to 40 in 1993. Parrot numbers also have grown consistently since the passage of Hugo. By September 1993, the wild population stood at 41 birds, or 91 percent of the pre-hurricane level.

Habitat and Population Management in the Wild

Puerto Rican parrots nest in tree cavities, and studies have suggested that the availability of suitable cavities may be one of the main factors limiting the species' recovery (Snyder et al., 1987). Since 1990, 47 cavities in palo colorado (*Cyrilla racemiflora*) trees have been enhanced by Forest Service and FWS personnel. Cavities selected for this treatment were within or adjacent to active nesting territories and within areas where non-breeding pairs were observed searching for nest sites.

All of these cavities were initially unsuitable for parrot nests due to such characteristics as inappropriate cavity depths (too deep or too shallow), excess humidity, and inaccessibility to the cavity interior. Each cavity was evaluated and "improved" as needed to match the characteristics of the natural cavities used by nesting parrots (Snyder et al., 1987). Cavities were modified to suitable dimensions and drainage was provided for nest bottoms. Access doors were constructed to allow the inspection of cavity contents. The last additions were visors to divert rainwater, a perching vine, and camouflaging vegetation. These cavity improvements have contributed significantly to parrot recovery efforts since Hurricane Hugo struck the island.

Since 1991, 6 Puerto Rican parrot pairs have nested in the wild each year, the highest number since a study conducted in the 1950's (Rodriguez-Vidal 1959). It has been suggested that the recent record years were due to the environmental effects of Hurricane Hugo (Meyers et al., 1993). Now, we believe the fact that all parrot pairs have been successful and highly productive since 1991 may be due to several additional factors: (1) the composition of the surviving population, (2) the availability of improved natural cavities, and (3) the effectiveness of the nest management program.

During the 1993 breeding season, a potential seventh pair inspected another improved cavity in a palo colorado tree. Additionally, parrots are nesting in areas at lower elevations and using cavities in tree species such as tabonuco (*Dacryodes excelsa*) that previously were not known to provide nest sites. However, these new breeding areas were sporadically visited by parrots before Hurricane Hugo and, consequently, before the cavity improvement program.

All of these new breeders are banded birds, and some even wear transmitters from a study conducted in the late 1980's. One transmitter was recovered from the base of a tabonuco cavity in 1992. This bird, a male, was found to have hatched in 1986 in the eastern section of the forest. It was recruited into the breeding population before its fifth year and was nesting less than a mile from where it fledged.

A number of the methods used to manage parrot nests were modified after Hurricane Hugo. One improvement was to better camouflage the nest observation blinds and equip them with large windows of one-way glass. Microphone systems placed inside the nests to monitor activities of the adults as well as their brood have been improved. Also, a commercial wood chipper is providing fresh nesting material, which is being used to reduce the humidity of parrot nests. High humidity can lead to hatching failure due to poor embryonic development or pathogenic microorganisms (e.g., *Aspergillus flavus*). Most important, nest guarding efforts are being allocated by addressing the particular needs of each breeding pair, rather than by trying to cover every nest every day.

The guarding of parrot nests — which includes monitoring of nesting behavior — has been employed as a management strategy for more than 20 years. It is used to detect potential problems and to schedule nest inspections and manipulations. Although some studies have argued that nest guarding should be

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maximized to improve nesting success (Lindsey 1992), our data for the last 18 nests in 1991-1993 suggest that the intensity of these efforts is not necessarily directly proportional to nesting success. Six parrot nests during 1992-1993 were guarded 36 percent of the time, compared to 4 nests guarded 92 percent of the time before Hurricane Hugo (1987-1988). Nesting success was 100 percent for both post-hurricane years and 26 chicks were produced, more than twice the number produced before the storm. This suggests that increased nesting success and productivity can be achieved with a program that is smaller, yet better allocated and more cost effective.

Nest manipulations such as cross-fostering (where chicks from the aviary are placed into nests in the wild, and vice versa) are conducted during the brooding phase. The temporary placement of captive produced surrogate Hispaniolan parrot (*Amazona ventralis*) chicks in Puerto Rican parrot nests has been successful in reducing chick mortality and increasing nest success. The Hispaniolan parrot chicks take the place of the native parrot chicks until problems at the nest can be resolved and the young Puerto Rican parrots can be returned to their parents or fostered into another nest. Management of Puerto Rican parrot nests has been instrumental in mitigating problems that could have led to nest losses, such as the swarming of nest cavities by honeybees (*Apis mellifera*) and predation of parrot eggs and chicks by the pearly-eyed thrasher (*Margarops fuscatus*).

In 1993, the 6 wild breeding pairs of Puerto Rican parrots produced 13 chicks. One of these young birds was removed from the wild to increase genetic representation in the captive breeding flock, which is maintained at the Luquillo aviary. On the other hand, three chicks from the captive-breeding flock were placed into nests in the national forest. As a result, the 6 wild pairs fledged an all-time record of 15 chicks in the wild.

Managing the Captive Population

Captive propagation efforts for the Puerto Rican parrot began in 1972. This part of the recovery project has been expensive and slow, but a series of modifications to the management program and the aviary facilities were initiated in January 1992.

Information from a population genetics study (Brock and White 1992) helps guide managers in the optimal pairings of Puerto Rican parrots. A pair-bonding cage is used to assemble the targeted breeding pairs. In 1993, 13 genetically and behaviorally compatible pairs were set up for captive breeding. Out of these 13 pairs, 11 laid eggs, 9 laid *fertile* eggs, and 5 produced a total of 10 young parrots. Nine of the 10 young survived, an all-time record for the Luquillo aviary. Three of the nine parrot chicks produced at the aviary were fostered into nests in the national forest to join the wild population.

For the first time, captive breeding pairs at the aviary were supplied with a nest structure made of PVC material. These artificial nests are reusable and help to keep nesting females in a drier, more sterile environment. The nest entrance, the only part extending into the breeding cage, is covered with a "cap" carved out of coconut palm (*Cocos nucifera*), Also, breeding pairs were monitored by closed-circuit television, which allowed keepers to observe the parrots' breeding behavior while reducing disturbance. Nutritional and microbiology studies of both wild and captive parrots also are in progress.

Most important, during 1993, 6 pairs of captive Puerto Rican parrots were transferred to the Rio Abajo aviary — managed by the Puerto Rico Department of Natural Resources — to initiate a second captive breeding population.

A Challenging Future

The wild population has been increasing since 1991 at a rate of approximately 5 birds per year, about twice the growth rate during the pre-hurricane years of 1975 to 1989. We are extremely encouraged to see such a high rate of productivity just 4 years after the storm. The 22 chicks produced in 1993 by both wild and captive populations stand as evidence of the opportunities for recovery. But although the parrot population in the wild has demonstrated a high degree of resilience, it would be extremely difficult to restore from captive-produced birds alone if lost. Hurricanes are a fact of life in the West Indies, and we must strive to increase the abundance and distribution of the wild parrot population before the next storm arrives.

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Listing Proposals — December 1993/January 1994

Nine species — four animals and five plants — were proposed by the Fish and Wildlife Service during December 1993 and January 1994 for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will extended to the following:

Two Puerto Rican Hawks

Two rare subspecies of hawks endemic to mountain forests on the island of Puerto Rico were proposed January 3 for listing as Endangered:

- **Puerto Rican broad-winged hawk** *(Buteo platypterus brunnescens)* — a small brown hawk with a black-and-white banded tail and rufous breast. An estimated population of only 124 birds is restricted to 3 areas: the Caribbean National Forest and the Río Abajo and Carite Commonwealth Forests.
- **Puerto Rican sharp-shinned hawk** *(Accipiter striatus venator)* —another small hawk with a dark gray upper body and heavily barred rufous underparts. A total population of about 155 birds is believed to remain in five forests: the Caribbean National Forest and the Maricao, Toro Negro, Guilarte, and Carite Commonwealth Forests.

The patchy distribution and low numbers of both hawks may be the result of the widespread deforestation that took place in Puerto Rico during the first half of this century. Despite the growth of secondary forests in recent decades, the hawks have not been observed in any of these areas. The birds are restricted to the remnants of mature montane forests that escaped the earlier logging. Any further logging or management practices that would diminish the quality of the remaining mature forests could jeopardize the hawks.

Other threats to the hawks include road construction connected with logging or recreation, human disturbance, and the danger of habitat damage from hurricanes. Additionally, biologists have documented the deaths of sharp-shinned hawk nestlings to parasitism by the warble fly *(Philornis* spp.*)*. One study attributed approximately 60 percent of nestling mortality in the Maricao forest to the fly.

Three Puerto Rican Plants

Many of Puerto Rico's native plants also are vulnerable. Three species were proposed January 3 for listing as Endangered. Their limited range and numbers put these plants in danger of extinction:

- *Eugenia woodburyi* — a small evergreen tree in the myrtle family (Myrtaceae). Only 45 individuals are known from 3 areas.
- *Mitracarpus maxwelliae* — a low, densely-branching, moundlike shrub in the coffee family (Rubiaceae). Just over 1,400 plants are found at a single site.
- *Mitracarpus polycladus* — a related perennial that branches from the base to form erect or spreading stems. This species occurs at two locations, one on Puerto Rico and the other on the island of Saba in the Lesser Antilles. Its numbers are difficult to estimate due to extreme drought conditions in recent years.

Except for *M. polycladus*, all populations of these species are restricted to semi-arid habitat found in the extreme southwestern portion of Puerto Rico. Privately owned land in this region is subject to intense pressure for agricultural and tourism development. Populations of all three taxa are also found within Guánica Commonwealth Forest, but both *Mitracarpus* species grow along infrequently used roads and could be vulnerable to increased traffic or road widening in the future. The sites are near areas that experience heavy recreational use.

photo by James W. Wiley

Puerto Rican broad-winged hawk

Sacramento Splittail (*Pogonichthys macrolepidotus*)

Widescale habitat degradation led the FWS to propose listing the Sacramento splittail, a primarily freshwater fish native to California's Central Valley, on January 6 as a Threatened species. A relatively large fish, the splittail can exceed 40 centimeters (16 inches) in length. It is characterized by an elongated body, distinct hump, and small, blunt head with barbels at the corners of the mouth.

Historically, Sacramento splittail were distributed throughout the waters of the Central Valley, as far north as Redding on

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the Sacramento River and as far south as the present-day site of the Friant Dam on the San Joaquin River near Fresno. Recreational anglers reported catches of 50 or more splittail per day prior to the damming of these and other rivers. The fish was once part of the diet of Native Americans living in the valley.

Today, the Sacramento splittail no longer survives in most of its historical range. It declined as rivers were dammed, water was diverted for agriculture, spawning and nursery habitat was diked and drained, the water became polluted, nonnative aquatic animals were established, and all of these factors were exacerbated by drought.

Splittail, which can tolerate some salinity, now are restricted to the Suisun Bay, Suisun Marsh, Napa Marsh, and the San Francisco Bay/Sacramento-San Joaquin Estuary. Even within this reduced range, the species' numbers have fallen more than 60 percent since 1984. Most of the problems that led to the original decline — especially freshwater diversions and increased water pollution from agricultural runoff, municipal effluents, and industrial chemicals — threaten the remaining populations.

Spruce-fir Moss Spider *(Microhexura montivaga)*

Also endangered by habitat degradation is the spruce-fir moss spider. This small arachnid is known only from a few sites in the southern Appalachian Mountains where — as its name implies — it inhabits mature spruce-fir forest communities. These forests are deteriorating rapidly due to air pollution and the infestations of an exotic insect.

The spruce-fir moss spider has a specialized habitat: moist but well-drained moss mats growing on rocks and boulders in well-shaded locations within high-elevation conifer forests dominated by red spruce *(Picea rubens)* and Fraser fir *(Abies fraseri)*, a tree that itself is a candidate for listing. The spider requires situations of high, constant humidity. Unfortunately, these conditions are changing as the forests decline.

photo © Nora Murdock

These dead Fraser firs are all that is left of a once productive forest on Roan Mountain, North Carolina. Acid precipitation and an introduced insect are believed to be the main causes for the decline of such conifir stands in the southern Appalachians. Forests like this provided habitat for the spruce-fir moss spider and the rock gnome lichen.

Significant amounts of the high-elevation conifer forests in the southern Appalachians appear to be dying. At one site where the spider is apparently extirpated, the red spruce have lost up to 90 percent of their foliage, possibly due to acid precipitation. Also, spruce-fir forests within the spider's range have been decimated by the balsam wooly adelgid *(Adelges picea)*, a pest insect introduced from Europe. The death and thinning of the forest canopy produces drastic changes in associated microclimates, including increased temperatures and decreased moisture. As a result, the moss mats become desiccated and cannot support the spider, and possibly its prey.

Four populations of the spruce-fir moss spider are known to remain. Three are within Great Smoky Mountains National Park near the Tennessee/North Carolina border, but they are very small. The only population considered viable is on private property in Avery and Caldwell Counties, North Carolina, and the landowner has expressed support for the proposed listing. Due to the species' precarious status, the FWS proposed January 27 to list the spruce-fir moss spider as Endangered.

Spruce-fir moss spider

Rock Gnome Lichen *(Gymnoderma lineare)*

Another sign that the high-elevation forests of the southern Appalachians are in trouble is the decline of the rock gnome lichen, a low-growing plant in the reindeer moss family (Cladoniaceae). This species occurs in North Carolina and Tennessee, and grows only in areas of high humidity — usually at high elevations, where the habitat is frequently bathed in fog, but also in deep gorges at lower elevations. Within these areas, it is limited primarily to intermittent seeps on rock outcrops and cliffs within forests dominated by red spruce and Fraser fir.

Like the spruce-fir moss spider, the rock gnome lichen declined as air pollution and exotic insects took their toll on the region's forests. Habitat became desiccated as the forest canopy thinned. In addition, lichens generally are very sensi-

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Listing Proposals

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tive to a wide range of air pollutants. Only 32 populations of the rock gnome lichen remain, and most occupy less than 1 square meter. Four of the populations contain 75 percent of the existing plants, and 3 sites are on land administered by the National Park Service and U.S. Forest Service that are subject to heavy recreational use. This disturbance is adding to the other problems facing the species. Accordingly, the FWS proposed December 28 to list the rock gnome lichen as Endangered.

Rock Cress *(Arabis perstellata)*

This rock cress, a perennial in the mustard family (Brassicaceae), is known only from Kentucky and Tennessee. It has a grayish appearance due to the large quantity of hairs on the stems and foliage. Each spring, new stems about 80 centimeters (31.5 inches) tall arise from a basal rosette produced the previous year. The inflorescence is an elongate raceme with numerous flowers containing pale green sepals and white to lavender petals. Rock cress colonies grow at moist sites on steep, wooded slopes with limestone outcrops.

There are two recognized varieties of *Arabis perstellata*: the small rock cress *(A. p.* var. *perstellata)*, which occurs within three counties in Kentucky, and the large rock cress *(A. p.* var. *ampla)*, known only from one county in Tennessee. These plants face habitat damage or loss due to residential, commercial, or industrial development; logging; grazing and trampling; and the spread of competing plants, especially the non-native European garlic mustard *(Alliaria petiolata)*. Because of these threats, the FWS proposed January 3 to list both varieties of the rock cress as Endangered.

Endangered Species in the National Parks

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species on lands and in waters under its jurisdiction. The survey found that over 120 Endangered or Threatened species occurred or were suspected in more than 140 units of the National Park System.

Some listed species occur in many parts of the System. For example, the bald eagle *(Haliaeetus leucocephalus)* nests, migrates, or winters in 71 parks, while the peregrine falcon *(Falco peregrinus)* occurs in 59. But most listed species in the parks are very restricted; the survey found that 74 species occur in only one or two parks each. Some Endangered species are known to occur only in NPS areas, such as the Presidio manzanita *(Arctostaphylos pungens* ssp. *ravenii)*, a large shrub, at Golden Gate National Recreation Area, California; the Lee pincushion cactus *(Coryphantha sneedii* var. *leei)* at Carlsbad Caverns National Park, New Mexico; the Shenandoah salamander *(Plethodon shenandoah)* at Shenandoah National Park, Virginia; and the Devils Hole pupfish *(Cyprinodon diabolis)* at Death Valley National Monument, California. Coastal parks in the southeast contain some of the highest numbers of listed species in the System. Everglades National Park and Canaveral National Seashore in Florida support more than any other unit in the continental U.S., with 15 and 14 listed species respectively.

Most parks on oceanic islands also contain Threatened or Endangered species. Native species on these islands are especially vulnerable to competition or predation by introduced species. The problem is acute in the Hawaiian Islands. Haleakala National Park, for example, has 15 listed species and Hawaii Volcanoes National Park has 12. Many plant species in these parks are candidates for listing, and in the State as a whole, 300-400 plant taxa are considered at risk of extinction.

NPS Management Actions

The Park Service takes a variety of measures to monitor, protect, maintain, and restore Threatened and Endangered species in the parks. For example, the Big Bend National Park staff in Texas annually monitors the park's five known populations of the Chisos Mountain hedgehog cactus *(Echinocereus chisoensis* var. *chisoensis)* to document their condition and status. This Threatened plant numbers only 800 to 1,000 individuals, which occur in the park within a narrow band. Intensive livestock grazing before the park was established seriously degraded the vegetation and may have reduced the numbers of this taxon. Monitoring the populations will enable the NPS to determine if this variety is increasing in number now that livestock grazing has been prohibited in the area.

The NPS faces a different issue in protecting the Endangered Kentucky cave shrimp *(Palaemonias ganteri)*, which occurs only in Mammoth Cave National Park, Kentucky. The population of this unique crustacean could be decimated if sewage seeps into the groundwater, which feeds the cave's subterranean streams. The park staff is working with local authorities to develop a regional sewage treatment system to prevent any such pollution.

Some situations call for the protection of Endangered species from predators. At Canaveral National Seashore in Florida, screens are put around the nests of Endangered loggerhead sea turtles *(Caretta caretta)*, green sea turtles *(Chelonia mydas)*, and leatherback sea turtles *(Dermochelys coriacea)* to prevent raccoons *(Procyon lotor)* from digging up the eggs. At turtle nesting beaches in Virgin Islands National Park, mongooses *(Herpestes* sp.), non-native mammals, are periodically trapped. In Haleakala National Park in Hawaii, rats (*Rattus* sp.), feral cats *(Felis catus)*, and mongooses are live-trapped to protect nesting Hawaiian dark-rumped petrels *(Pterodroma phaeopygia sandwichensis)*. Nearly the entire known population of this Endangered bird breeds in or near the park's volcanic crater.

Habitat management is another approach taken to protect listed species. Prescribed burning at Big Cypress National Preserve in Florida and Congaree Swamp National Monument in South

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Endangered Species in the National Parks

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Carolina compensates for the loss of natural fire cycles that maintained the open pine stands required by red-cockaded woodpeckers *(Picoides borealis)*. At Milagra Ridge in Golden Gate National Recreation Area, California, the park staff has removed nonnative pampas grass and replanted 200 acres (80 ha) with native grasses, two nectar-producing species, and the lupines and sedum upon which the Endangered mission blue butterfly *(Icaricia icarioides missionensis)* and San Bruno elfin butterfly *(Callophrys mossii bayensis)* lay their eggs.

Intensive management has been required to keep the Big Bend gambusia *(Gambusia gaigei)*, a small fish, afloat. At one time, its population was reduced to a single female and two males, but this Endangered species has been restored to a safer level by captive breeding. It now survives in the wild in an artificial warmwater pond and two recently created ponds in Big Bend National Park, Texas. The warm water in the artificial pond, supplied from a nearby spring by a pump, protects the fish against the threat of cold weather. Constant vigilance is needed to prevent the possible introduction of fish species that would compete with or prey on the still vulnerable gambusia. A back-up population is maintained at the Fish and Wildlife Service's National Fish Hatchery in Dexter, New Mexico, and a few individuals are kept for research and back-up at several other institutions.

Sometimes human activities in the parks must be controlled. Research has shown, for example, that human disturbance is one of the principal factors in the decline of the piping plover *(Charadrius melodus)*, a Threatened shorebird. Signs, ropes, and special regulations are used seasonally to restrict beachgoers at some plover nesting areas on Cape Cod National Seashore in Massachusetts, Assateague Island National Seashore in Maryland, and other coastal units where the plover breeds.

Each summer, Endangered humpback whales *(Megaptera novaeangliae)* feed in Glacier Bay National Park in southeast Alaska. In 1978, 17 of the 20 whales present abruptly departed, prompting the NPS to consult with the National Marine Fisheries Service (NMFS), which has Endangered Species Act responsibility for this rare marine mammal. Following NMFS's recommendations, the Park Service restricted the number of vessels entering the bay and prohibited close approaches to the whales. When cruise ship and tour boat operators objected to the regulations, the NPS began research on the whales. This showed that loud vessel noise or erratic vessel movement could indeed cause disturbance of whale feeding and social behavior. Regulations in place today limit the numbers and classes of vessels that can enter the bay in summer, establish vessel operating restrictions, provide a mechanism for designating restricted whale waters and vessel limits, and prohibit the harvest of certain species of fish and crustaceans that the whales eat. Researchers are continuing to study the movements and behavior of the whales in the bay.

photo by J Snyder

The careful use of prescribed burning is a management tool that can compensate for the suppression of natural fires, which once maintained the open habitat needed by some species. This burn at Big Cypress National Preserve in Florida was used to benefit the red-cockaded woodpecker.

Recovery Efforts

The NPS is involved in restoring species in many parks. Tennessee purple coneflowers *(Echinacea tennesseensis)* have been successfully planted at Stones River National Battlefield, Tennessee, and have increased their numbers. Peregrine falcons have been hacked at Shenandoah, Isle Royale, Rocky Mountain, and other national parks across the country.

A new endeavor for the Park Service, in cooperation with the Fish and Wildlife Service, is the captive propagation of red wolves *(Canis rufus)*. Gulf Islands National Seashore, Mississippi, is one of the island sites now used for captive rearing of these Endangered animals. Some of the red wolves raised at this site were transported to Great Smoky Mountains National Park on the Tennessee/North Carolina border. After an intensive public information effort by the Park Service and Fish and Wildlife Service, which found strong local interest and little opposition, releases of red wolf families into the park began. Several wolves died, but radiocollar monitoring has shown that the animals have found enough wild prey, seldom wander outside the park, and have taken only a few domestic livestock (for which the owners have been compensated). It is too early to predict long-term success, however. (For more background, see *Bulletin* Vol. XV, No. 6.)

NPS Activities in the Future

Although much is being done for Endangered plants and animals in the na-

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Protecting Endangered Species at Canaveral National Seashore

by John Stiner

To many people, the thought of Canaveral National Seashore conjures up images of long stretches of pristine beach or spectacular NASA shuttle launches. Not as well known is the fact that the Seashore contains one of the most productive inshore fisheries on the entire eastern seaboard, over 100 archeological sites, and the second largest number of federally-listed Endangered and Threatened species in the entire National Park System. Fourteen species of protected animals inhabit the 24,000-hectare (59,300-acre) park.

The best known resource management activity at Canaveral National Seashore is the "Night Stalker" sea turtle nest protection program. Between 3,000 and 4,000 sea turtle nests are recorded from the park's beaches each year. Over 90 percent of these nests are from loggerheads *(Caretta caretta)*, with the remainder from greens *(Chelonia mydas)* and an occasional leatherback *(Dermochelys coriacea)*. Before 1984, more than 95 percent of the nests were destroyed by raccoons, which dig up and eat the turtle eggs. Since that time, the park has initiated night patrols to search out the nests soon after the eggs are laid and cover them with wire mesh screens. This has reduced depredation to less than 20 percent. Last year, about 50 volunteers sacrificed sleep and braved the mosquitoes to donate almost 2,000 hours of labor to protect the nests.

Raccoon removal has been proposed as a solution to the problem. However, the National Park Service discourages single-species management, and the reduction of any important natural predator — such as the raccoon — could have unforeseen effects on the Seashore's ecosystem.

photo by David McEwen

Standing 3.3 feet (1 meter) tall, with a wingspan of 5 feet (1.5 m), wood storks are impressive birds. As they wade through muddy or vegetation-filled water, the storks use their massive bill to catch fish.

In January, the University of Georgia initiated a 2-year study to gather critical information on raccoon density, age and sex distribution, incidence of disease, seasonal movements, and diet. Also included were experiments on conditioned taste aversion, in which chicken eggs injected with estrogen were placed in the dunes to induce nausea in raccoons, and the implantation of Norplant birth control devices in mature females. These data will be used to assist management in developing a comprehensive long-range program of sea turtle nest protection.

The feral hog *(Sus scrofa)* is an unwelcome non-native predator at the Seashore. This alien species threatens a number of the Seashore's native protected animals. Voracious predators of snakes, the hogs may be harming the park's population of eastern indigo snakes *(Drymarchon corais couperi)*, a subspecies already listed as Threatened, as well as other native reptiles and amphibians. Although it has yet to frequent the beach area of the park, the hog has caused major damage to sea turtle nests in areas just to the south. The danger to the Seashore's sea turtle nests is immense.

So far, the hogs have proven impossible to control. The Fish and Wildlife Service is trapping on the adjacent Merritt Island National Wildlife Refuge and in portions of the Seashore. More than 2,500 hogs were removed last year without any visible effect on the population. More stringent measures are being investigated.

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Endangered Species in the National Parks

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tional parks, there is room for improvement. The NPS intends to complete a more detailed inventory of endangered species in the National Park System, provide additional training to its employees on endangered species management and interagency consultation procedures, contribute additional resources to implementing recovery plans for species found in national parks, and increase its efforts to inform scientists and other agencies about the work being done in the parks.

The NPS is committed to maintaining the biological diversity of the National Park System, including Threatened and Endangered species. Its role in protecting and restoring listed species and their habitats will undoubtedly increase in importance as the number of listed species in the Nation increases.

Napier Shelton recently retired from the National Park Service, where he was a writer with the Division of Wildlife and Vegetation in Washington, D.C.

Canaveral National Seashore

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The smallest of the Seashore's protected species, the southeastern beach mouse *(Peromyscus polionotus niveiventris)*, occurs at several locations along the 39 kilometers (24 miles) of dune line. In 1991 and 1992, it was detected north of its previously confirmed range. However, the beach mouse was not found in the northernmost section of the park, probably due to predation by feral cats and possibly competition with house mice *(Mus musculus)*. The park is attempting to remove the cats, although they are constantly being replenished from the adjacent developed area. Trash receptacles have been redesigned to prevent raccoons and other animals from scattering litter, in an effort to reduce the likelihood of house mice infestations.

The Intracoastal Waterway, which runs along the western boundary of the park, is a major thoroughfare for West Indian manatees *(Trichechus manatus)* as well as boats. The State of Florida has implemented slow-speed zones in the Waterway to reduce the number of manatee deaths from boat collisions. The State is currently involved in a hotly contested battle over the length and location of these zones.

The presence of one slow-speed zone adjacent to the Seashore has encouraged boaters to detour through the park, threatening manatees using shallow areas adjacent to the Waterway. The park is working with State and county agencies to survey manatee use and distribution to identify critical areas that need speed restrictions.

Habitat Management

One of the most inconspicuous species within the Seashore is the Atlantic salt marsh snake *(Nerodia fasciata taeniata)*, which occurs on the mangrove islands of Mosquito Lagoon. Much of this area was ditched and diked for mosquito control prior to the park's creation. This destroyed valuable salt marsh and, as the ditches filled in at the ends, ironically created additional mosquito breeding areas. The park is obligated by deed with the State of Florida to cooperate with the local mosquito control district in its efforts to reduce mosquitos in the most environmentally acceptable manner. Recently, a mosquito growth inhibitor (Altosid) was applied to over 4,000 acres (1,620 hectares) of potholes and ditches within the Seashore.

photo by David Goethe

Having thus far escaped predators, this loggerhead hatchling races for the water.

In consultation with Fish and Wildlife Service, the park is experimenting with Open Marsh Management techniques in highly disturbed (ditched and diked) areas to reduce the need for chemical use and to rehabilitate former marshes. Rotary ditching contours the old ditch networks to simulate natural tidal creeks, thereby enhancing habitat for species of fish that eat mosquito larvae. Salt marsh snakes have also been observed using the contoured ditches, burrowing into the banks and feeding on fish that frequent the ditches.

Another species that could benefit from improved ditching practices is the wood stork *(Mycteria americana)*, a large wading bird that feeds on fish in potholes and ditches. Low earthen sills are being installed to prevent complete drainage of the potholes during low tide, which could result in the loss of important foraging sites. The presence of wading birds in ditched versus non-ditched areas will be monitored to determine the effects of Open Marsh Management.

The Seashore also is developing a Fire Management Plan that will allow the use of prescribed burns. The carefully managed use of fire is crucial to maintain habitat for such species as the Florida scrub jay *(Aphelocoma coerulescens coerulescens)*, which lives in open oak scrub. The bald eagle *(Haliaeetus leucocephalus)* also will benefit. A key factor limiting the recovery of the eagle population in the park and the Merritt Island Refuge is the small number of suitable nest trees. Eagles nesting at the Seashore will use only the largest tree in a clump of old pines. Abnormally high fuel loads resulting from past fire suppression policies could result in a large, uncontrolled fire and destroy these trees. A combination of mechanical fuel reduction and managed, low-intensity burns may be needed to protect these trees and maintain suitable eagle nesting habitat.

Other species requiring habitat that is burned periodically, particularly to maintain areas of bare sand, are the eastern indigo snake and a species of special concern, the gopher tortoise *(Gopherus polyphemus)*. The tortoise is a keystone species whose burrow provides shelter for dozens of other species, including the indigo snake.

John Stiner is a Resource Management Specialist at the Canaveral National Seashore.

Restoring Endangered Species in Hawaii Volcanoes National Park

by Dan Taylor

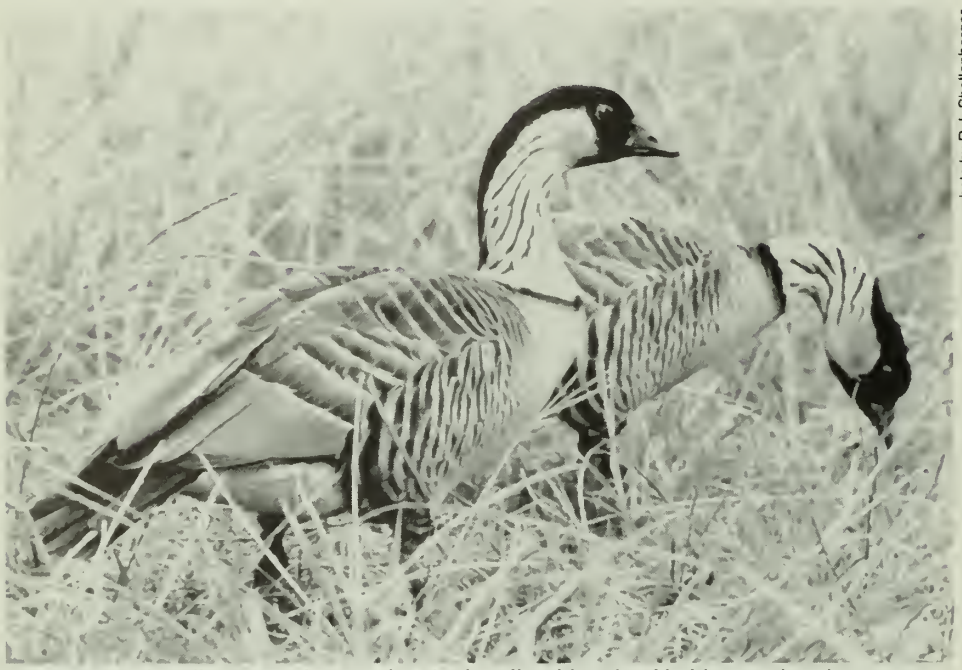

photo by R.J. Shallenberger

The nene or Hawaiian goose is associated primarily with upland habitats rather than wetlands.

The unique animals and plants of the Hawaiian Islands represent an eminent example of adaptive radiation. A relatively small number of species made their way to the geographically isolated archipelago, colonized its wide variety of habitat types, and evolved into a diverse biota. The arrival of the first human settlers, however, initiated tremendous changes. People, together with the animals and plants they brought with them, have caused wide-scale alterations in the islands' array of ecosystems. Many of Hawaii's endemic species—especially the birds— have become extinct, and many of those that remain are rare and/or declining.

Hawaii Volcanoes National Park, situated on the island of Hawai'i (the "Big Island"), is well known for its spectacular volcanic eruptions. But it also contains important habitat for many rare native animals and plants, and can play an important role in their conservation.

Birds

The nene, or Hawaiian goose *(Nesochen sandvicensis)*, the State bird of Hawaii, has thus far escaped extinction. Unlike other geese, nene are slightly cumbersome fliers and, as terrestrial birds, they have only a mild penchant for wetlands. Fewer than 600 free-flying nene remain, and they are found on 3 of the State's 7 main islands: Hawai'i, Maui, and Kaua'i.

Nene populations were reduced by predation from introduced animals (primarily mongooses and feral cats), the decline of native food plants due to grazing and competition from introduced plant species, and the loss of natural habitat to agriculture and urbanization. These problems continue to make nene productivity in the wild extremely low. Some adults are killed every year along roadsides by motor vehicles, and we believe this is another significant loss of reproductive potential.

Since the species' decline, nene populations have been sustained by intensive husbandry. The State of Hawaii (Department of Forestry and Wildlife) and two units of the National Park System — Haleakala and Hawaii Volcanoes — maintain captive adult birds, which are used as breeders and/or foster parents for captive-bred goslings. The State operates an advanced breeding facility on Maui, and donates some goslings to the parks for release in the wild. The parks maintain captive nene pairs in open-topped pens within wilderness thresholds to serve as foster parents for young birds. These young are donated by State brooders or are hatched by captive pairs. Birds that fledge in the pens then become free-flying and wild. Wild nene are also produce some young, but not enough to sustain the population.

Park management emphasizes enhancing backcountry feeding areas for the nene by regularly mowing large plots of senescent alien grasses to produce palatable sprouts. Managers also plan to develop more efficient predator control methods, enlarge and improve conditions inside the open-topped backcountry release pens, and make road corridors safer for nene. Our goal is to achieve a self-sustaining, free-flying population in an environment with manipulated refuges. Scientists from the United Kingdom Wetlands and Wildfowl Trust are advising the parks in this nene management and habitat enhancement effort.

Forest birds have proven a greater challenge to conserve. Most of Hawaii's original endemic forest bird species are now extinct. Some were overcollected early for their colorful feathers, and others have declined due to habitat loss and the effects of exotic species. Currently, there are 19 species of Hawaiian forest birds listed as Threatened or Endangered. The main threats to the survival of forest birds now are avian disease (especially malaria, which is borne by introduced mosquitos), degradation of forests by invasions of alien plants and animals (especially feral pigs), and direct losses of native forests to urbanization, agriculture, and fire. Four forest bird species once known in Hawaii Volcanoes National

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Park are listed as Endangered, and are now found only in neighboring forests.

Forest conservation is the basis for forest bird conservation. The park's main management effort is to control feral pigs and alien plants. In addition, the park and neighboring land managers are developing a regional forest management stategy for more than 20,000 acres (8,100 hectares) of native montane forest. To address another serious threat, National Biological Survey scientists are studying avian diseases.

Pelagic birds, like forest birds, are threatened because their terrestrial habitat is degraded. Hawaii Volcanoes National Park is visited by the 'ua'u or Hawaiian dark-rumped petrel *(Pterodroma phaeopygia sandwichensis)* and the 'a'o or Newell's Townsend's shearwater *(Puffinus auricularis newelli)*, both of which come ashore to nest. They are threatened by disorientation from artificial lights, collisions with overhead wires, predators, and limited habitat. The park's protection strategy includes delineating nesting territories and trapping the non-native predators within them. Haleakala National Park on the island of Maui has demonstrated success in protecting both petrels and shearwaters.

The State of Hawaii has only two native raptors, the 'io or Hawaiian hawk *(Buteo solitarius)* and the pueo or short-eared owl *(Asio flammeus sandwichensis)*. Both occur within Hawaii Volcanoes National Park. They are listed for protection (the hawk federally and the owl by the State), primarily because of habitat destruction and low reproductivity. Both have been able to maintain small populations because they have adapted somewhat to their changed environment. There are no specific plans for management of these birds in the park, but it is expected that the general programs for controlling alien plants and animals will benefit both species.

Sea Turtles

Hawksbill *(Eretmochelys imbricata)* and green *(Chelonia mydas)* sea turtles frequent the park's shores, but only the hawksbill nests here. Hawksbill sea turtles are among the most imperiled marine species. Threats to hawksbill survival in Hawaii include nest predation by mongooses and feral cats, disturbance of nesting territory by people, and incidental take during fishing.

Turtles make their nests on only five or six beaches in Hawaii, and only two of these are within the park. Unfortunately, some people have not learned to share beaches with turtles. Gravid female turtles have been displaced by campers, nests have been contaminated by garbage and crushed by campers, and hatchlings have been disoriented by lights and campfires.

The park's protection efforts consist of intensive monitoring and exotic predator trapping at nesting beaches during the turtles' June-November nesting season. We have also relocated some camping sites to protect turtle nests from disturbance. Persons doing the trapping and monitoring (mostly volunteers) talk to beach-goers and can usually persuade them to modify their behavior if it threatens turtle nests.

Plants

There are 377 native vascular plant species in Hawaii Volcanoes National Park. Five are listed by the Fish and Wildlife Service as Threatened or Endangered, another 14 species are proposed for listing, and yet another 17 species are considered listing candidates (as of January 1994). They became rare after being eaten or trampled by feral ungulates, outcompeted by invasive alien plants, or burned in fires.

The park's protection strategy is to strengthen the native ecosystem by removing alien species, beginning first with ungulates. Non-native species are removed from a large area in order to promote recovery of an entire plant and animal community. This is usually followed by alien plant control, often in smaller units in which native plant communities are relatively intact and species diversity is highest.

Research workers and managers have started mapping the distribution and determining reproductive status and population sizes of some rare species in these units. This will provide the information base needed for managing individual species.

photo by Linda Pratt

Kokia drynarioides, *an attractive but rare tree in the mallow family (Malvaceae), has palmately lobed leaves and large red flowers. Although this species is not known to have occurred naturally within Hawaii Volcanoes National Park, it is endemic to the Big Island, and the Park shelters a transplanted colony.*

Dan Taylor is Chief of the Division of Resources Management at Hawaii Volcanoes National Park.

Endangered Species Conservation at Big Bend National Park

In western Texas, along the United States/Mexico border, the Rio Grande abruptly changes course, sweeping to the northeast after flowing south and southeast for almost one thousand miles. This large arc gives the region its name, the Big Bend. At the river's very turning point lies Big Bend National Park, which boasts a rich variety of habitats — desert, river floodplains, grasslands, and mountains — in a preserve nearly the size of Rhode Island.

Big Bend National Park is home to a number of plant and animal species protected under the Endangered Species Act. Representatives of this group include the peregrine falcon *(Falco peregrinus anatum),* Big Bend gambusia or mosquitofish *(Gambusia gaigei),* black-capped vireo *(Vireo atricapillus),* Mexican long-nosed bat *(Leptonycteris nivalis),* and Chisos Mountain hedgehog cactus *(Echinocereus chisoensis* var. *chisoensis).* Another species, the Mexican wolf *(Canis lupus baileyi),* no longer occurs in the Big Bend region, but is receiving increasing attention because of possible reintroductions in other parts of its range.

photo by Merlin D. Tuttle, Bat Conservation International

Instead of insects, the Mexican long-nosed bat feeds on the highly caloric nectar and protein-rich pollen of certain cacti and agaves. Its long muzzle and tongue allow the bat to reach deep into the flowers.

Peregrine Falcon

This remarkable bird of prey was well-distributed in the U.S. until the 1950's, when it began to suffer a severe decline. Contributing factors included shooting, illegal captures, and habitat loss or disturbance, but the main cause was the increasing use of the pesticide DDT. This chemical inhibits calcium metabolism in raptors, resulting in thin eggshells that break prematurely. Most uses of DDT are now prohibited in the U.S., but the pesticide is still applied in some countries.

Big Bend has had moderate success in restoring its falcon population by protecting eyries from disturbance during the breeding season. Sections of several trails in the Chisos Mountains and along the Rio Grande canyon rims are closed at these times, and river runners are limited to non-motorized craft. Fifteen peregrines fledged in 1991, eight fledged in 1992, and six fledged in 1993.

Big Bend Gambusia

The Big Bend gambusia, or mosquitofish, is a small fish restricted to a warm spring pond system near Rio Grande Village in the southeastern section of the park. It is not only extremely limited in range but also is highly adapted to local habitat conditions, which makes this species extremely vulnerable to fluctuations in water quality, quantity, and temperature. At one time, the population was reduced to one female and two males held in captivity. To ensure the species' future, the artificial refugium was modified to receive piped-in warm water on a day-to-day, year-round basis.

The gambusia population is now stable in the refugium and in two other warm water spring ponds in the area. Park personnel regularly monitor the habitats. Continued threats to the species include proposed campground expansion, floods on the Rio Grande (which could allow invasion of the pond by competing or predatory fish species), and anglers transferring fish to the gambusia habitats. Captive populations of the Big Bend gambusia are maintained at the Fish and Wildlife Service's Dexter National Fish Hatchery in New Mexico and the University of Texas at Austin as a precaution against extinction of the wild population.

Black-capped Vireo

The black-capped vireo is a summer resident of Big Bend, where it is found in brushy canyon areas. Aside from habitat loss, one of the biggest threats this species faces is brood parasitism by the brown-headed cowbird *(Molothrus ater),* which is known for its reproductive strategy of laying eggs in the nests of other bird species. Cowbirds often lay their eggs before the vireo clutches are completed, and their eggs hatch sooner. By the time the vireos do hatch, the cowbird nestlings are larger and more competitive, and the vireo parents raise them as their own. Sometimes cowbirds will even "kick out" the vireo eggs. This behavior has obviously led to reduced reproductive success of vireos.

In 1987, the same year the black-capped vireo was listed as Endangered, Big Bend National Park initiated a study

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Big Bend National Park

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of the park's population. Since the studies began, vireo numbers have fluctuated between 12 and 16, and their nest locations vary from year to year. Brown-headed cowbirds were trapped for 5 years, but efforts to correlate taking of cowbirds to fledging success of vireos were not conducted. For now, vireos are being monitored annually to determine population status and reliable breeding areas. Black-capped vireos also nest at scattered locations in central Oklahoma, central and western Texas, and northern Mexico.

Mexican Long-nosed Bat

As its name indicates, the Mexican long-nosed bat is primarily a Mexican species. Its sole known roosting site in the U.S. is a cave near Emory Peak in the Chisos Mountains. The bats migrate south through Mexico and into Central America. One of this species' distinctive features is its long tongue, which at 3 inches (75 millimeters) almost equals its entire head and body length, and is an adaptation to feeding at flowers. The diet of these small bats consists mostly of nectar, but they also ingest pollen, which is rich in protein.

There is an apparently close interdependence between these bats and their food plants. Annual bat migrations seem to be associated with the times that agaves and cacti flower in certain areas. The plants benefit, too; long-nosed bats are important pollinators of some cactus and agave species. In Big Bend, the bats rely almost exclusively on the flowers of agaves, including the well-known century plant *(Agave harvardiana).*

The long-nosed bat was once very common in Mexico, but recent surveys have revealed massive population declines. In Big Bend, 10,650 bats were counted in 1976, yet during 1980-1984 only 1,000 were estimated each year. Several factors have contributed to this severe loss, including the undeservedly poor public image many bats still have, which leads to incidents of vandalism and mass killing at roost sites. Perhaps the biggest problem, however, is the intensive harvesting of wild agaves in Mexico by "moonshiners" for the small-scale production of tequila and other alcoholic beverages. This practice has resulted in a loss of food sources along the bats' migratory routes, a serious problem when one considers that the high metabolic rate of this mammal requires it to feed very frequently.

Annual population counts are needed to assess the species' local status in Big Bend, but typical bat censusing techniques have several major drawbacks. One method of counting bats is to set up a video camera at the opening of a known roosting cave and visually record the flight of the bats when they leave the cave. However, unlike some other bat species, *Leptonycteris nivalis* tends to leave and re-enter a cave several times before leaving the roost site to feed, making visual counts questionable. Long-nosed bats also share their roosting caves with other bat species, making census accuracy even more difficult.

Even if the roosting site at Big Bend is protected, efforts are needed in Mexico to curtail the destruction of bats and agaves if the species is to recover.

National Park Service photo

The Chisos Mountain hedgehog is a small, barrel-shaped cactus with deep green to bluish-green stems, and produces attractive red, white, and fuchsia-colored flowers.

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Big Bend National Park

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Threatened and Endangered Plants

One rare plant unique to Big Bend National Park, the Chisos Mountain hedgehog cactus, was listed in 1988 as Threatened. It grows amid sparse Chihuahuan Desert vegetation on alluvial flats near the Chisos Mountains, the local range from which the plant takes its name. Severe overgrazing prior to World War II eliminated most of the native short grass cover, which may have altered the preferred habitat conditions for establishment of Chisos hedgehog cactus seedlings. Recovery of overgrazed desert rangelands is a slow process, and some desert plant communities never return to their former composition.

Park biologists and resource managers monitor the cactus population, and conduct surveys prior to such activities as road maintenance and trail construction. In 1989, 10 specimens were removed from the shoulder of one park road and sent to the Chihuahuan Desert Research Institute in Alpine, Texas, for propagation. The rescued plants were scarred to produce extra stems, and up to 350 cuttings have been rooted. However, because the offsets were produced clonally, they have the same genetic makeup. The original plan was to transfer them to the park, but genetic swamping of the natural population has become a concern. Methods for how at least some of the rooted cuttings can be reintroduced are under review.

Chisos Mountain hedgehog cacti, like all plants in the park, are protected. They may not be collected without a permit, although "cactus rustling" remains a threat. Other cacti listed as Threatened that are found in the park include the bunched cory cactus *(Coryphantha ramillosa)* and Lloyd's mariposa cactus *(Neolloydia mariposensis)*.

Several other plants in the park are candidates for listing under the Endangered Species Act. Recent field studies have addressed the status, distribution, and reproductive biology of such species as the little-leaf brongniartia *(Brongniartia minutifolia)*, which belongs to the pea family (Fabaceae); tall paintbrush *(Castilleja elongata)*, a plant in the family Scrophulariaceae; Guadalupe fescue *(Festuca ligulata)*, a member of the grass family (Poaceae); and Chisos agave *(Agave glomeruliflora)*.

Material for this story was provided by Carol Benzing, Interpretive Park Ranger, and Michael Fleming, Environmental Protection Specialist, at Big Bend National Park.

Regional News

(continued from page 3)

arrange construction activities — for example, mounting launching sites, television cameras, and mirrors for the laser light show. During late June, July, and August, the Tower City Center used a closed circuit camera and two TV monitors, provided by a local company, to show customers the nesting peregrines and, finally, their two chicks.

The fireworks celebration incorporated images of flying falcons in the laser show. At one point in the program, the Cleveland orchestra played a lullaby, while tens of thousands of people, taking on the role of peregrine caretakers, sang for the soon-to-hatch falcons.

* * *

A meeting between the FWS Bloomington, Indiana, Field Office and the Office of Surface Mining to discuss how the pending Federal listing of the northern copperbelly water snake (*Nerodia erythrogaster neglecta*) might impact Indiana's coal mining industry resulted in the decision to develop a habitat conservation plan. The snakes live in lowland swamps or other warm, quiet waters and use upland woods as winter hibernation sites.

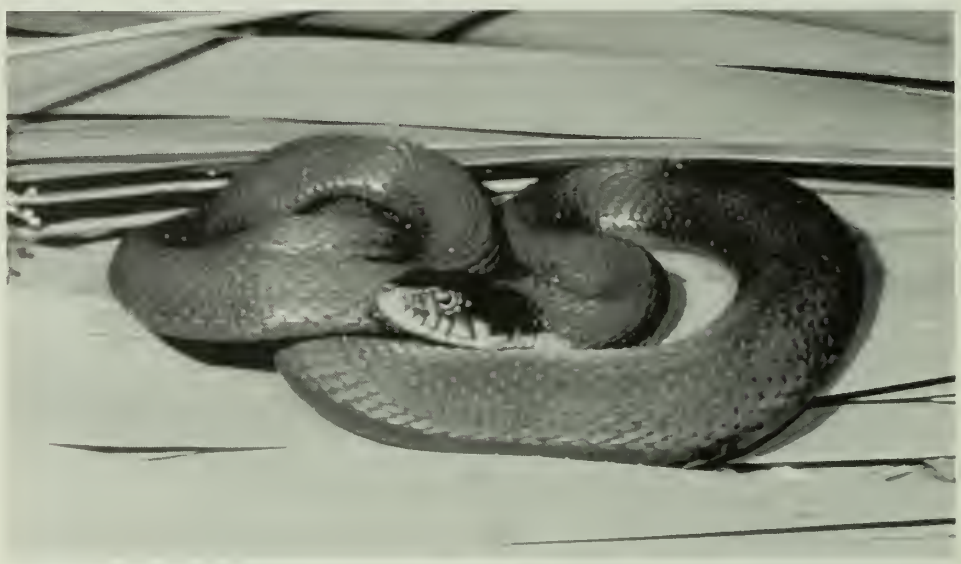

photo by J.R. MacGregor

The northern copperbelly water snake is the subject of a habitat conservation plan to be developed with coal mining interests in Indiana.

* * *

The Minnesota Department of Agriculture is conducting a voluntary landowner herbicide use agreement program to protect federally listed plant species. The program focuses on establishing no-use buffers around plants such as the Minnesota dwarf trout lily (*Erythronium propullans*), prairie bush clover (*Lespedeza leptostachya*), western prairie fringed orchid (*Platanthera praeclara*), and Leedy's roseroot (*Sedum integrifolium* var. *leedyi*). Funded as a pilot by the Environmental Protection Agency, the program has the

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support of Region 3 and the Minnesota Department of Natural Resources.

* * *

Region 4 - Despite their discovery of two new occurrences of the Tar spinymussel (*Elliptio steinstansana*) in 1993, biologists with the North Carolina Wildlife Resources Commission and the FWS regard this mussel as one of the most critically endangered North American species. Named for the Tar River system in eastern North Carolina, where it is endemic, the Tar spinymussel is one of only three species of freshwater mussels in the world with spines. Biologists found the 1993 specimens in Little Fishing Creek and Shocco Creek, two small tributaries.

The Tar spinymussel is believed to have existed historically throughout much of the Tar River system. By 1985, however, habitat deterioration resulting from sedimentation and water pollution dramatically reduced the species' numbers and range, and it was listed as Endangered. By 1990, the species was rarely found. At that time, only one reproducing population, restricted to Swift Creek — another small tributary — was known to survive.

Biologists consider the newly discovered population in Little Fishing Creek relatively healthy, based on the evidence of recent reproduction from shells found in muskrat middens. However, the population is known to occur only within a short reach of this small creek, making it vulnerable to any habitat alteration or degradation. The other new record is a single specimen, also collected from a muskrat midden, in Shocco Creek. Portions of the creek have been degraded severely in recent years.

* * *

Region 5 - Biologists searching for remnant populations of the once-widespread American burying beetle (*Nicrophorus americanus*) increased the knowledge of this secretive insect but added only one area to its range: McCurtain County, Oklahoma, adjacent to known habitat.

The American burying beetle is known to occur only in Rhode Island, Massachusetts (in a small reintroduced population), several counties in eastern Oklahoma, a nearby part of Arkansas, and two counties in Nebraska. Several of the county occurrences are represented by a single or few specimens.

Biologists conducted the 1993 surveys in selected localities in Maine, Massachusetts, Pennsylvania, New Jersey, North Carolina, Arkansas, Mississippi, Ohio, Oklahoma, and Nebraska. Despite the surveys in 10 States within the historic range of the species, no new areas (aside from the one county) were added to the current range.

The American burying beetle has been federally protected since July 1989, when the magnitude of the species' decline became apparent. Says FWS biologist Michael Amaral, "We haven't unlocked the mystery yet of just what caused the reduction in numbers. This is still an enigma, but we think several factors relating to habitat alteration and its effect on both food availability and competition for limited food (carrion) resources are responsible."

photo by Christopher Raithel, Rhode Island Department of Fish and Wildlife

One of nature's most efficient recyclers, the American burying beetle eats carrion, converting animal protein to soil nutrients. Historically distributed in 35 States, the District of Columbia, and 3 Canadian provinces, this insect declined drastically in number and range even before the widespread use of DDT. Carrion availability may determine where the species can survive today; changes in land use have reduced its food supply (small-to-medium birds and mammals) and increased the competition for carrion, a limited resource. There is also speculation that even the extinction of the once ubiquitous passenger pigeon may have had a ripple effect on the status of the beetle.

Measuring 1-1/2 inches in length, this species is the largest of the North American carrion beetles. It has a black "patent-leather" body complemented by bright red-orange scallops. After burying the remains of a chipmunk or dove, the beetle strips the fur or feathers and coats the carcass with secretions to preserve it.

photo © Richard Biggins

The Tar spinymussel is a freshwater mollusk endangered primarily by sedimentation and water pollution from a variety of point and non-point sources. This photo was taken in Sandy (Swift) Creek, Nash County, North Carolina.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	17	63	18	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	62	11	39	0	112	62
Snails	12	1	7	0	20	26
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	17	4	9	0	30	15
Arachnids	4	0	0	0	4	0
Plants	352	1	82	2	437	178
TOTAL	660	493	190	38	1,386*	474**

Total U.S. Endangered	660	(308 animals, 352 plants)
Total U.S. Threatened	194	(112 animals, 82 plants)
Total U.S. Listed	854	(420 animals, 434 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 377 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: 120

March 3, 1994

March/April 1994 Vol. XIX No. 2

ENDANGERED SPECIES

Technical Bulletin

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

Report to Congress

Recovery Program

Endangered and Threatened Species ✧ 1994

U.S. Department of the Interior ✧ U.S. Fish and Wildlife Service ✧ Washington, D.C. 20240

Front and Back Cover Photo Credits

Species: *Green pitcher-plant*
Listed As: *Endangered*
Population Status: *Improving*
FWS PHOTO

Species: *Cave crayfish*
Listed As: *Endangered*
Population Status: *Stable*
KEN SMITH

Species: *Red wolf*
Listed As: *Endangered*
Population Status: *Improving*
CHRIS LUCASH

Species: *Oregon silverspot butterfly*
Listed As: *Threatened*
Population Status: *Declining*
PAUL OPLER

Right

Species: *Kirtland's warbler*
Listed As: *Endangered*
Population Status: *Improving*
FWS PHOTO

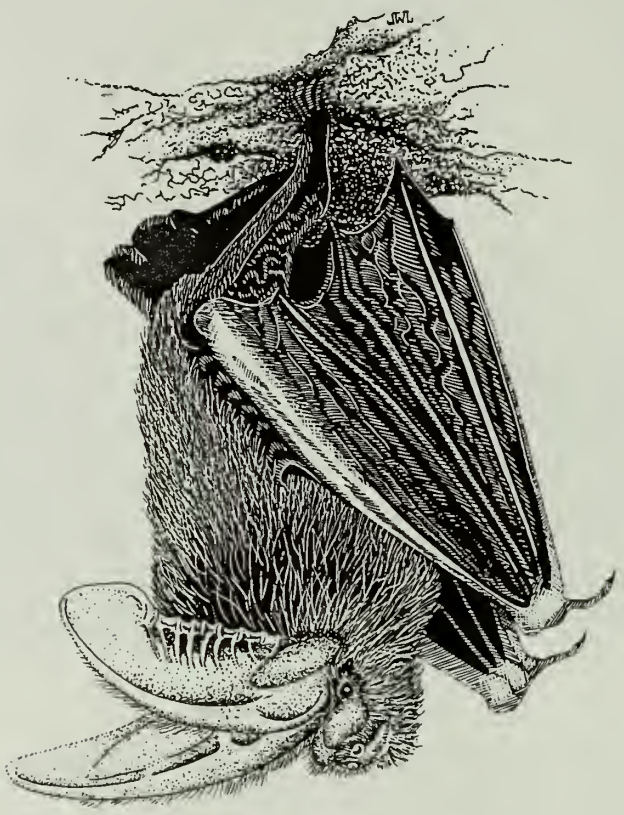
Report to Congress

Recovery Program

Endangered and Threatened Species ✧ 1994

Prepared by
U.S. Department of the Interior ✧ U.S. Fish and Wildlife Service
Washington, D.C. 20240

For further information contact the Division of Endangered Species (703) 358-2171 ***or***
Internet: R9FWE_DES.BIM@mail.fws.gov ***or*** http://www.fws.gov



Species: *Ozark big-eared bat*
Listed As: *Endangered*
Population Status: *Stable*

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LIST OF MAPS

LIST OF FIGURES

LIST OF TABLES

APPENDIX

Species: *Alamosa springsnail*
Listed As: *Endangered*
Population Status: *Improving*

Literature citations should read as follows:
U.S. Fish and Wildlife Service. 1995. *Report to Congress: Endangered and Threatened Species Recovery Program.* U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 64 pp.

THE SECRETARY OF THE INTERIOR

WASHINGTON

FOREWORD

The American landscape has undergone dramatic changes over the past 300 years. The towering forests and vast prairies that characterized the landscape found by the first European settlers are now crisscrossed by highways and are fragmented by a patchwork of cities and towns, farms and subdivisions. With the growing population, the demands for increased agriculture, industry, and other pursuits accelerate the changes. During the middle years of the present century, it became increasingly clear that many of our native species of plants and animals were being stressed by such activities; some had been driven to extinction. Recognizing these trends, Congress took action in 1973 by passing the Endangered Species Act, making the conservation of endangered and threatened species and the ecosystems that sustain them a National priority and instituting public policy to work for their recovery.

Over the two-century period preceding the passage of the Endangered Species Act, scientists estimate that over 500 species slipped to extinction in the Unites States, most due to habitat loss. In the 21 years since the passage of the Endangered Species Act, 909 species have been determined to be either endangered or threatened, and, for all but 7, their extinction has been prevented. The U.S. Fish and Wildlife Service has been tasked to first stabilize and then recover these species by securing their populations, reversing their declines, and bringing them back to a point where the protections of the Act are no longer needed.

This 1994 report to Congress chronicles the success of the Service's efforts to recover these species. A good case study, representing the success of the Service's recovery efforts is the conservation of the bald eagle, our national symbol. Based on historical information available, these birds nested throughout the United States. In 1967, bald eagle numbers in the lower 48 States had dropped to approximately 417 nesting pairs. Population declines were attributed to habitat loss, illegal shooting, and the effects of DDT (a widely used insecticide) on reproductive success. In 26 years, the eagle rebounded to more than 4,000 nesting pairs in 1993. Additionally, scientists estimate that 5,000 to 6,000 juvenile bald eagles dwell in the lower 48 States. This success was due to reintroductions, the banning of DDT, public awareness campaigns, aggressive law enforcement, and other actions involving the Service, States, private organizations, and the cooperation of the American public. As a result, on July 12, 1994, the Service proposed to reclassify the bald eagle from endangered to threatened in all of the lower 48 States.

Species: *Iowa Pleistocene snail*
Listed As: *Endangered*
Population Status: *Uncertain*
FWS PHOTO

Species: *Shenandoah salamander*
Listed As: *Endangered*
Population Status: *Declining*
C. KENNETH DODD, JR.

Species: *Hawaiian hawk chick*
Listed As: *Endangered*
Population Status: *Stable*
CURT GRIFFIN

Species: *Mitchell's satyr butterfly*
Listed As: *Threatened*
Population Status: *Uncertain*
FWS PHOTO

EXECUTIVE SUMMARY

PURPOSE

On October 7, 1988, President Reagan signed into law a bill amending the Endangered Species Act and authorizing increased appropriations to implement the Act through fiscal year 1992 (Public Law 100-478/50 CFR 1533(f)(3)). One of the major amendments made more specific the general requirement that the Secretaries of the Interior and Commerce develop and implement recovery plans. The amendment further directs the Secretaries to report every 2 years on the status of efforts to develop and implement recovery plans for all listed species and on the status of all species for which recovery plans have been developed. This report is required by section 4(f)(3) of the Act and it is the third Report to Congress on the status of the recovery program for federally listed endangered and threatened species under the Secretary of the Interior's jurisdiction.

The Endangered Species Act, passed by Congress in 1973, established a strong leadership role for the Federal government in the conservation of species at risk of extinction. Congress envisioned a network of international, national, State, and private organizations working together toward common goals. It was made clear that the people of the United States were to act together as a team to conserve not only individual species, but their habitats as well.

BACKGROUND

Recovery is the cornerstone and ultimate purpose of the endangered species program. Recovery is the process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured. The goal of this process is to restore listed species to a point where they are secure, self-sustaining components of their ecosystem so as to allow delisting. The Secretary of the Interior has delegated responsibility for endangered species recovery to the Fish and Wildlife Service.

Recovery of threatened and endangered species is a tremendous challenge; but it can be done and the successes are much celebrated by the American public. Recovery must reverse decline that has occurred over the past two centuries. The habitat base for species at the time listing under the Act becomes necessary is usually very limited. Reversing long-term declines and finding innovative solutions, which conserve the habitat of listed species, while also accommodating society's other goals is another challenge. Many success stories already exist for many species that are on the road to recovery. Our success are the results of many years of research, restoration, protection, and active management, but most importantly, the key ingredient is almost always many partners working together to achieve common goals.

The primary objectives of the Service's recovery program, while working in close cooperation with our partners, are to: (1) complete development of recovery plans within 2.5 years, to the maximum extent possible, (2) determine tasks necessary to reduce or eliminate the threats to the highest priority species, (3) apply available resources to the highest priority recovery tasks, and (4) reclassify and delist species as appropriate. Recovery activities include: defining threats through research on biological requirements, managing threats through habitat protection and restoration, and achieving a stable or upward population trend for an endangered species. All of these activities and associated efforts must allow time for an endangered species to respond biologically to protective efforts implemented on its behalf.

The Service recognizes that preventing the extinction of individual species is impractical when other interdependent species that are members of the same ecosystem continue to decline. The Service is directing increased attention to producing multi-species or ecosystem recovery plans that address the needs of other species that are not primary targets of the plan, and will continue to emphasize conservation of species through a multi-species or ecosystem approach.

Although the endangered species recovery program is relatively new with respect to the considerable time required to reverse a species' decline, the program has produced many successes, including reclassifications from endangered to threatened, delistings, and achieving significant objectives on the path to recovery. Highlights of these successes are included in this report.

RESULTS

The extraordinary success of the recovery program is demonstrated by the fact that even with a substantial increase in the number of species listed over the past decade, over 41 percent of the 909 species listed as of September 30, 1994, have been stablized or are improving. This success is attributed to the efforts of the Service, other Federal agencies, States, tribal governments, and private organizations and individuals. As of September 30, 1994, 893 of the 909 listed species in the United States were under the jurisdiction of the Fish and Wildlife Service. The remaining 16 species were administered by the National Marine Fisheries Service. Two hundred and eighty-two of the 893 had been listed for less than 3 years. Additionally, species that had been listed in the 3 years prior to that date did not yet have approved recovery plans. Many, however, had plans in some stage of development.

Of the 893 species, 484 (54 percent) had final approved recovery plans as of September 30, 1994, while 185 (21 percent) had a plan that was in draft (i.e., Technical or Agency Draft plans). Of the remaining 224 species without recovery plans, 159 had been listed for less than 3 years but had recovery plans under development, and 14 species (2 percent) were exempted from plan development for reasons indicated in this report. The remaining 51 species were listed longer than 3 years and did not have approved recovery plans or plans being developed. The Service has implemented a plan to eliminate this backlog by the end of FY 1997.

Table 1 summarizes the population status and trends of 776 species federally listed as of 1993 based on 5 year intervals. This table shows the percent of species that are known to be stable or improving, declining, or for which the population trend is uncertain. Stable or improving species are those for which the trend toward extinction has been halted or reversed, in the wild. Overall, the data on stable or increasing species illustrates that recovery of endangered species takes time. Just as the threats to these species accumulated through time to result in the precarious status seen for many species today, recovery will also require time.

Of all the species listed between 1968 and 1993, only 7, or less than 1 percent, have been officially recognized as extinct and subsequently delisted. Preventing the extinction of the remaining 99 percent, which is a major portion of our Nation's heritage, is perhaps the biggest success story of the Act. The Act has also turned the tide from declining to stable or increasing for many species. Fifty-eight percent of the 108 species listed between 1968 and 1973 are currently known to be stable or improving in their native habitats. Of the 294 species listed between 1989 and 1993, only 22 percent have recovered to the point that they are stable or increasing. The fact that almost all listed species remain extant and that many species are on their way to reaching recovery goals speaks to the success of the Act as a mechanism for conserving our Nation's natural heritage.

For the species in decline or where population trends are uncertain, the Service and its partners in recovery are collecting biological information, developing recovery strategies, and implementing management activities that will stabilize, halt, or reverse the trends toward extinction.

Table 1: Summary of Current Populations Trends of Listed Species Based on Time of Listing

Year Listed (5 Year Intervals)	Percent of Species Stable or Improving	Percent of Species Declining	Percent of Species with Uncertain Population Trends
1968-1973	58 %	30 %	12 %
1974-1978	42 %	41 %	17 %
1979-1983	44 %	27 %	29 %
1984-1988	45 %	39 %	16 %
1989-1993	22 %	34 %	44 %

INTRODUCTION

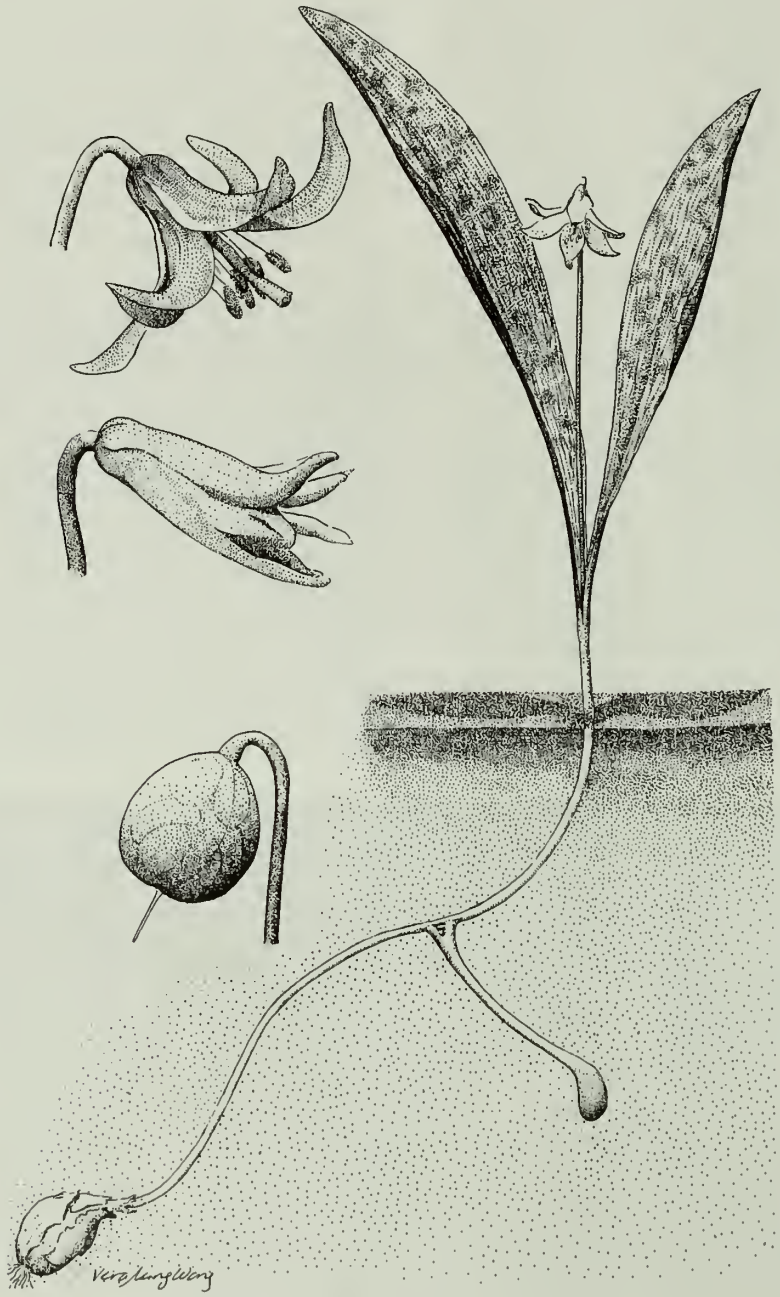
The Endangered Species Act of 1973 [16 U.S.C. 1531 et seq.] (Act) is one of the most comprehensive pieces of environmental legislation ever enacted by Congress. Fiscal year (FY) 1993 was the 20-year anniversary of the Act, and coincided with profound Congressional and public interest in the Act's reauthorization as well as wide-ranging debate over its purposes, effects, and accomplishments. The Act calls for the conservation of threatened and endangered species, and more importantly, the ecosystems upon which they depend. The Act established the Federal government as the national leader in the conservation of species at risk of extinction. To accomplish the objectives of the Act, Congress envisioned a network of international, national, Federal, State, and private organizations working together toward common goals.

In passing this landmark legislation, Congress specifically intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and to provide a program for the conservation of these species. The Act defines "conserve" as the use of "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary...." The Act further declared that the policy of Congress is that all Federal departments and agencies shall seek to conserve endangered and threatened species, and use their own authorities to further the purposes of the Act. This policy, in conjunction with the statutory definition of "conserve," makes clear that Congress intended all Federal agencies to promote the recovery of listed species. The Fish and Wildlife Service's (Service) responsibilities under the Act include: consultation, listing, recovery planning and implementation, permitting, and prelisting.

This Report to Congress represents an accounting of the recovery progress for all federally listed endangered and threatened species under the jurisdiction of the Service occurring in the United States and Trust Territories as of September 30, 1994. While some of the species covered in this report are found in both the United States and foreign countries, the Service has no authority to implement recovery programs for species outside United States jurisdiction and the status of foreign populations is not discussed in this report. Specifically, this report contains information on the status of recovery plan development and overall population status for all listed species in the United States and a summary of the success of the recovery program to date.

Species: *Wood stork*
Listed As: *Endangered*
Population Status: *Improving*
JOHN & KAREN HOLLINGSWORTH

DAVID M EWEN



Species: *Minnesota trout lily*
Listed As: *Endangered*
Population Status: *Uncertain*
VERA WONG

PROGRAM STATUS

Recovery Overview

Recovery, the ultimate purpose of the endangered species program, is the process by which the decline of an endangered or threatened species is arrested or reversed, or threats to its survival neutralized so that its long-term survival in nature can be ensured. The Act calls for the conservation of threatened and endangered species and the ecosystems upon which they depend and, ultimately, the recovery of listed species to levels where protection under the Act is no longer necessary. The Secretary of the Interior has delegated responsibility for endangered and threatened species recovery to the Service. The primary objectives of the Service's recovery program, while working in close cooperation with our partners, are to: (1) complete development of recovery plans within 2.5 years, to the maximum extent possible, (2) determine tasks necessary to reduce or eliminate the threats to the highest priority species,(3) apply available resources to the highest priority recovery tasks, and (4) reclassify and delist species as appropriate.

Section 4(f) of the Act calls for the development and implementation of recovery plans for species listed as endangered or threatened unless such plans would not contribute to their conservation. Recovery plans serve as blueprints for private, Federal, and State cooperation in the conservation of threatened and endangered species and the ecosystems on which they depend. As such, the plans must identify precise, measurable criteria to determine objectively when recovery has been achieved. Recovery planning may be done by the Service or may utilize the expertise of individuals from other Federal agencies, State personnel, or private contractors. The Service reviews outside work and may modify the draft plan as necessary to ensure consistency among plans, resolve disputes among recovery team members, and determine task priorities. Recovery plans must identify, to the extent possible, management tasks, recommended research needs, and other actions necessary to reach recovery plan goals. Recovery plans are reviewed periodically to determine whether revision of the plan is warranted. Strategies outlined in recovery plans may be modified when needed to incorporate new information and ensure that the species remains on the most effective path to recovery.

Coordination among Federal, State, and local agencies, conservation organizations, appropriate experts, and major land users is a key ingredient for effectively implementing a recovery program. The recovery planning process is designed to allow potentially affected segments of the public to participate in planning and provide comments to facilitate coordination and plan acceptance. Importantly, such coordination allows the special local knowledge of affected communities to be fully considered. This understanding can serve to reduce or eliminate human use conflicts with listed species and their habitats. The Service recognizes that public support is vital to long-term survival and recovery of threatened and endangered species and the public is invited to provide comments on draft recovery plans. All comments are reviewed, to the extent possible, and addressed in the final plans.

Not all species have recovery plans. Some, such as the Little Kern golden trout, have recovery objectives outlined in State management plans that substitute as a recovery plan. Other species, such as Bachman's warbler and Scioto madtom, have not been sighted in several years and may be extinct. Recovery plan preparation is deferred for these species until individuals are found in the wild.

Recovery Policy

In July 1994, the Service and the National Marine Fisheries Service issued six joint policies regarding implementation of the Act (59 FR 34269-34275), four of which address some aspect of the recovery process. Of these four policies, the *Policy on Recovery Plan Participation and Implementation Under the Endangered Species Act* reiterates the requirement that plans be completed within 2.5 years of the species' listing date. It further requires that diverse expertise is represented on recovery teams; representatives of affected groups and stakeholders have the opportunity to participate in the planning process; social and economic impacts of implementing recovery actions be minimized; and multiple species plans be developed when possible.

The second policy, *Policy Regarding the Role of State Agencies in Endangered Species Act Activities,* requires the Service to solicit State agency expertise and participation in both the recovery planning and implementation processes. It also requires that the expertise and authority of State agencies be used in developing monitoring programs for recovered and delisted species.

The third policy, *Policy for the Ecosystem Approach to the Endangered Species Act*, addresses the need to take a cooperative approach focusing on groups of species dependent on the same ecosystem. It directs the Service to make group listing decisions where possible and to develop and implement recovery plans for multiple listed and candidate species. The policy also emphasizes the importance of integrating Federal, Tribal, State, and private efforts in cooperative, multi-species efforts under the Act.

The last policy, *Policy for Peer Review in Endangered Species Act Activities*, directs the Service to ensure that all actions taken under the Act are based on the best available scientific information. With regard to recovery, the policy directs that draft recovery plans be submitted for independent peer review to obtain all available scientific and commercial information, and to review scientific data relating to selection or implementation of specialized tasks in draft recovery plans.

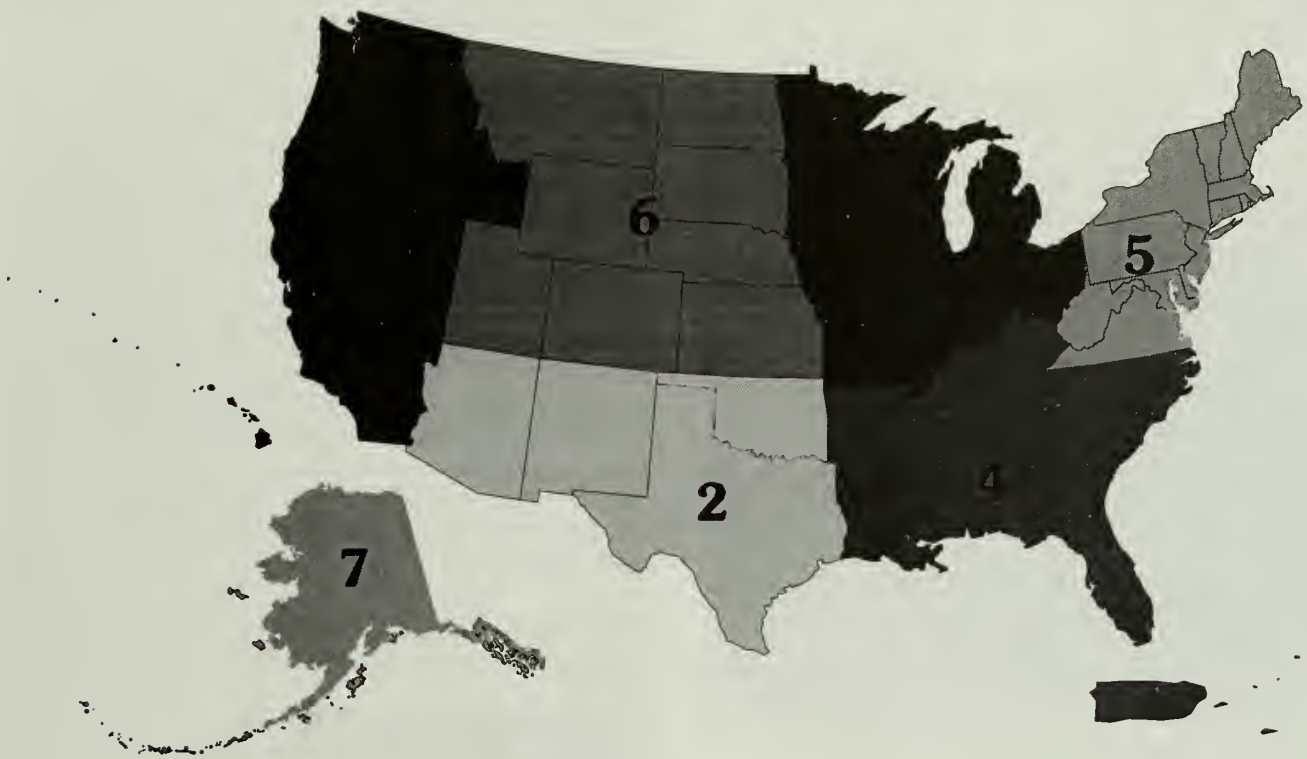
Recovery Implementation

The Director of the Service has delegated responsibility for recovery of listed species to the Service's seven Regional Directors across the nation. Each listed species is the responsibility of at least one Region. When the distribution of a species crosses regional boundaries, the lead Region coordinates decisions regarding the species among other appropriate Regions. Regional Directors determine whether recovery plans are needed, ensure that recovery plans are developed, appoint recovery team members, and direct recovery plan implementation. The boundaries of Service's Regions and the location of Regional Offices are illustrated on Map 1.

Species: *Gray bat*
Listed As: *Endangered*
Population Status: *Improving*
FWS PHOTO

Species: *Mead's milkweed*
Listed As: *Threatened*
Population Status: *Declining*
JOHN SCHWEGMAN

Regional Boundaries



Map 1: The Fish and Wildlife Service is comprised of seven Regions and a headquarters in Washington D.C. When the range of a species crosses Regional boundaries, a lead Region is designated to coordinate rangewide conservation activities.

Examples of Recovery Activities

The tools available for recovery of listed species are numerous and may include reintroduction of species into formerly occupied habitat, land acquisition, captive propagation, habitat restoration and protection, population assessments, research, and technical assistance for landowners and public education. All of these activities and associated efforts must allow time for an endangered species to respond biologically to protective efforts implemented on its behalf. Recovery activities conducted by the Service and its partners include: defining threats through research on biological requirements, managing threats through habitat protection and restoration, and achieving a stable or upward population trend for an endangered species.

The following examples illustrate the variety of recovery efforts conducted by the Service and recovery partners:

- ✧ the Aleutian Canada goose has benefitted from both habitat restoration and reintroduction into formerly occupied habitat;

Species: *Aleutian Canada geese*
Listed As: *Threatened*
Population Status: *Improving*
GEORGE GEE

- ✧ translocation of young bald eagles into formerly occupied habitat is one factor contributing significantly to bald eagle recovery;

- ✧ captive propagation has increased the numbers of the California condor and the red wolf;

- ✧ research on Peter's Mountain mallow, which revealed that the seeds require fire to germinate, has resulted in controlled burns that have dramatically increased the species' numbers;

- ✧ education efforts on behalf of the furbish lousewort have resulted in an enhanced conservation ethic, and conservation easements are being pursued for its habitat; and

- ✧ land acquisition and cooperation among the Service, National Aeronautics Space Administration, the National Park Service, private conservation foundations, and the State of Florida has made a major contribution to the recovery of the Florida scrub jay.

Cooperation with Others

Although Congress envisioned the Service as the leader in recovery of listed species, it recognized the role other Federal agencies, States, and private citizens should play. Recent examples of enhanced cooperation among Federal agencies include the January 1994 Memorandum of Understanding signed by the Service, Bureau of Land Management, National Park Service, Forest Service, and National Marine Fisheries Service on behalf of candidates for listing as threatened or endangered under the Act.

Candidate species conservation may reduce threats so that listing is no longer necessary, or reduce time and resources needed to achieve recovery once a species is listed. In September 1994, the Service and 13 other Federal agencies signed a second Memorandum of Understanding pledging cooperation toward the common goal of conserving listed species by protecting and managing their populations and the ecosystems upon which they depend.

The Federal Native Plant Conservation Memorandum of Understanding (MOU) (established May 25, 1994) has

Species: *Red wolf pups*
Listed As: *Endangered*
Population Status: *Improving*
TED SIMONS

been signed by nine agencies in three Federal departments (Department of Defense, Bureau of Land Management, Fish and Wildlife Service, National Biological Service, National Park Service, Office of Surface Mining Reclamation and Enforcement, Agricultural Research Service, Forest Service, and Natural Resources Conservation Service). The MOU's purpose is to ensure that native plant species and communities are maintained, enhanced, restored, or established on public lands, and that such activities are promoted on private lands. The MOU established the Federal Native Plant Conservation Committee to identify priority conservation needs for native plants and their habitats and coordinate implementation of programs for addressing those needs. Currently, 47 non-federal organizations have signed on as Cooperators to the Committee.

The MOU notes that plants constitute over half of the listed species in the United States, and that over 200 listed plants occur on Federal lands. As stated in the MOU, "Careful management of these lands can help maintain our Nation's plant heritage. Federal agencies also have the expertise to assist non-Federal land managers in plant conservation and protection efforts. Innovative partnerships are needed among public and private sectors...to conserve native plants and their habitats...." The 56 member and Cooperator agencies and organizations on the Committee form an ideal national partnership to promote plant recovery efforts.

This Committee is building partnerships, developing a strategic plan, coordinating regional and national working groups to address conservation actions, developing databases and information exchange networks, and coordinating education and public outreach opportunities. The overall goal is to mobilize agencies and organizations across the Nation into a cohesive force to support local and national habitat conservation efforts for plants, much as the Partners in Flight program is doing for neotropical migratory birds. The National Fish and Wildlife Foundation (on behalf of the Committee) has awarded the Bureau of Land Management a $100,000 challenge grant to fund urgent conservation projects to benefit at-risk plant species and communities. These projects demonstrate the ability of the partner-ships to deliver on-the-ground results, including recovery of listed plant species.

The Partners in Flight program, which includes about 90 signatories from Federal and State agencies, non-governmental organizations, and industry, focusses attention on high priority species and ecosystems that can benefit both listed and candidate bird species. Partners in Flight has directed several projects towards restoring and managing western riparian habitats. Restoring the habitat not only benefits the Southwestern willow flycatcher, but numerous other threatened species as well. Alliances like these can minimize the need to list species under the Act, since the threats to their continued existence can be alleviated before the species status becomes critical. The Service actively pursues partnerships with other Federal and State agencies, private organizations, and individuals. Examples include:

- Cheat Mountain salamander: Three quarters of the populations identified as necessary for recovery of the Cheat Mountain salamander are protected and managed through the cooperative efforts of the State of West Virginia, the Service, and the Forest Service.

Species: *Cheat Mountain salamander*
Listed As: *Threatened*
Population Status: *Improving*

- Mexican wolf: By the mid-1900s, the Mexican wolf had been completely eliminated from a portion of its historic range, the Southeast quadrant of Arizona. In the 1970s, the Arizona-Sonora Desert Museum in Tucson received four animals and launched a captive breeding program. By 1994, there were 92 animals, comprising 78 in 16 different United States facilities and 14 in 5 Mexican facilities.

- Pahrump poolfish: The Pahrump poolfish was listed as endangered in 1967. The primary threat has been the loss of springs due to a decline in underground water table levels. While poolfish no longer only occur in their historic location, Manse Spring, recovery efforts by Federal agencies, Nevada's State agencies, and university biologists have established secure populations in three other Nevada springs.

- Small whorled pogonia: Residential and commercial development has been the primary threat to the small whorled pogonia. But since the plant's listing, State and municipal conservation efforts and significant private landowner contributions have afforded permanent protection for the largest known population of this plant. Recovery successes have allowed it to be reclassified as threatened.

- Western prairie fringed orchid: Site protection through voluntary landowner agreements and other State efforts to protect and restore this species on State and private lands have helped to arrest the decline of this flower and stabilize its populations.

Species: *Western prairie fringed orchid*
Listed As: *Threatened*
Population Status: *Stable*
MARLIN BOWLES

Ecosystem Approach to Recovery

Recognizing that listed species that share common geographic locations may face similar threats, the Service investigates opportunities to combine conservation strategies for several listed, proposed, and candidate species into one recovery plan. A "multi-species" or "ecosystem" approach can improve the rate, fiscal efficiency, and effectiveness of recovery actions for listed species, and may eliminate the need to list candidate species. Examples of recovery plans that address multiple listed species' recovery needs include:

- Maui-Molokai Forest Birds Plan—7 birds in Hawaii;

- Ash Meadows Recovery Plan—4 fishes, 1 insect, and 7 plants on the border of Nevada and California;

- California Channel Island Species Plan—4 plants, 2 birds, and 1 reptile in California;

- Pine-rockland Ecosystem Plan—5 plants in south Florida; and

- San Marcos River Ecosystem Plan—2 fishes, 1 amphibian, and 1 plant in Texas.

Taking ecosystem integrity into consideration when planning prelisting, listing, and recovery activities is of utmost importance in conserving biological diversity.

Relationship of Recovery to Other Sections of the Act

Coordination among Federal, State, and local agencies, academic researchers, conservation organizations, private individuals, and major land users is an essential ingredient in developing and implementing an effective recovery program. A summary of sections 6, 7, and 10 of the Act follows. These sections of the Act play an important role in the recovery of listed species.

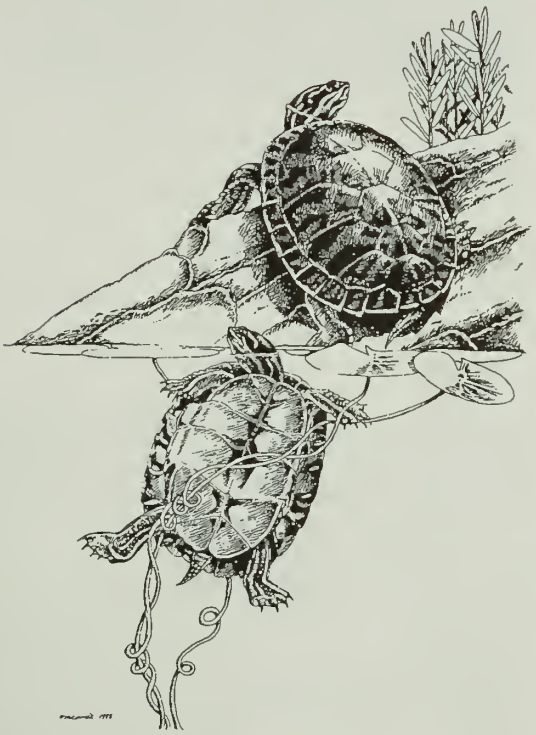
Section 6 (Cooperation with the States)

Section 6 of the Act authorizes the Secretary to enter into cooperative agreements with States that establish and maintain an adequate and active program for the conservation of endangered species. Those States are provided with financial assistance to support the development of programs for the conservation of endangered and threatened species and to monitor the status of candidate and recovered species. Up to 5 percent of the combined annual amounts of the Federal Aid in Wildlife and Sport Fish Restoration accounts can be appropriated annually to the Cooperative Endangered Species Conservation Fund and allocated to the States in accordance with subsection 6 (d) of the Act. The total appropriations for FY 1993 and FY 1994 for activities conducted under section 6 was $6.565 and $9.0 million respectively. The majority of recent grants have been used for implementation of recovery actions.

All 50 States, Puerto Rico, the Virgin Islands, and Guam are under cooperative agreements for animals. All but 11 of these entities are also under cooperative agreements for plants. States assist the recovery of endangered and threatened species and in monitoring the status of recovered species. Reimbursement can be up to 90 percent when two or more States have a common interest in conservation of one or more species.

These grants provide States with resources to participate in a wide array of recovery activities that include population assessments, habitat restoration, propagation, and reintroductions of listed species. States may also use section 6 grants to initiate conservation actions before a species is listed. Stabilization of candidate species and their habitats can often be accomplished in a more cost effective manner than through the process of listing, recovery planning and recovery implementation. A few examples of these grants are:

- In Massachusetts, section 6 funds were used by the Division of Fisheries and Wildlife to support nest protection and monitoring for the Plymouth redbelly turtle. These funds were also used to track survival of released turtles in the wild. The Massachusetts Division of Fisheries and Wildlife monitors population status and trends, searches for new occurrences, evaluates limiting factors, locates and protects nests, coordinates the headstarting program, reestablishes new populations, and conducts public information and education programs. Several of these tasks have been conducted in conjunction with researchers at the Worcester State College and the University of Massachusetts, as well as the private sector. Through this cooperation, the population appears to be stable.



Species: *Plymouth redbelly turtle*
Listed As: *Endangered*
Population Status: *Improving*

Species: *Black-footedferret*
Listed As: *Endangered*
Population Status: *Improving*
FWS PHOTO

- Section 6 funds were provided to Wyoming, Montana, and South Dakota for their participation and involvement in the release of black-footed ferrets. The releases in South Dakota and Montana have been carefully monitored since release. In Montana there are five or six adults and two litters had at least four kits. In South Dakota there are three or four adults and two litters had a total of five kits. Releases in Wyoming are not planned because the release area was exposed to plague and the prey base has virtually disappeared.

- In Hawaii, section 6 funds were used to prevent the extinction of the Hawaiian crow through captive propagation and nest enhancement in the wild. Captive propagation was used to enhance the existing stocks and to increase the inhabited range of the Hawaiian crow through the release of additional captive-reared birds. A captive bird propagation facility has been completed on the island of Hawaii and although initially focusing on the Hawaiian crow, this facility will eventually assist with the recovery efforts for up to 17 endangered Hawaiian forest birds.

Section 7 (Interagency Cooperation)

Congress placed special responsibilities on all Federal agencies to ensure that the Federal government would not contribute to the extermination of species. Section 7(a)(1) of the Act clearly identifies the role Federal agencies play in recovery and directs them to use existing authorities to promote the conservation of listed species. These existing authorities include the National Forest Management Act of 1976 [16 U.S.C.A. 1601-1614], Multiple-Use Sustained Yield Act [16 U.S.C.A. 528-531], Federal Water Pollution Control Act Amendments of 1972 (i.e., the Clean Water Act) [22 U.S.C. 1251 et seq.], and the Federal Land Policy and Management Act [43 U.S.C. 1701 et seq.].

Responsibilities under section 7 of the Act fall into two categories. Under section 7(a)(1), Federal agencies are directed to use existing authorities to promote the conservation of listed species. Under section 7(a)(2), Federal agencies are precluded from authorizing, funding, or carrying out activities that are likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat. Through consultation with the Service before initiating projects, the agencies review their actions to determine whether they could adversely affect listed species or habitat.

Section 7(a)(2) consultation may be either "informal" or "formal." Informal consultation provides an assessment of a proposed project to determine if formal consultation is required or if project modifications could be implemented that reduce or remove adverse impacts to the listed species. If an agency finds an action "may adversely affect" a listed species or designated critical habitat, formal consultation is required. Formal consultation results in a biological opinion outlining the Service's assessment of the proposed activity and its likely impact on the listed species. The Action agency may proceed with the action as proposed, provided no incidental take is anticipated. If incidental take is anticipated, the agency or the applicant must comply with the reasonable and prudent measures and implementing terms and conditions in the Service's incidental take statement to avoid liability from taking under the Act.

A General Accounting Office study of the Act and the implementation of section 7 found that over a 5-year period (1987-1991) the Service conducted 71,560 informal consultations with Federal agencies to assess the potential for impacts on listed species and critical habitat. Of these, 2,000 (or 2.8 percent) required formal consultation, and only 350 (or 0.5 percent) of those concluded that the Federal action would be likely to jeopardize listed species or adversely modify critical habitat. In all but 23 cases, the Service and Federal action agencies were able to develop alternatives that allowed the actions to go forward while adequately protecting listed species or designated critical habitats. The 23 actions that were not undertaken due (in whole or in part) to listed species conflicts, represent less than 0.03 percent of all actions reviewed. Thus, over 99.97 percent of the projects were not "blocked" due to such conflicts. This success was largely due to informal cooperation between the Service and the Federal action agencies early in the planning process, allowing relatively minor adjustments to projects that decrease or remove any adverse impacts they may otherwise have on listed species. The cooperative spirit exhibited by many Federal agencies has contributed greatly to this record of success.

In addition to the determination of "jeopardy" or "no-jeopardy," the formal consultation process also provides a vehicle for recommending additional, discretionary conservation measures to Federal action agencies. Often drawing on tasks outlined in the implementation schedules of recovery plans, conservation actions appropriate to the Federal agency and the specific Federal action under review can be recommended in biological opinions. While not required, these actions provide a means whereby all Federal agencies can fulfill their section 7(a)(1) obligations to go beyond just ensuring that their actions do not jeopardize threatened or endangered species.

There are numerous instances where section 7 consultation has resulted in conservation benefits to listed and candidate species. For example:

- ✧ Through the consultation process, the Georgia Department of Transportation and the Coast Guard found methods to avoid injury and death of manatees by implementing protection measures on numerous bridge replacement projects along the coast.

Species: *West Indian manatee*
Listed As: *Endangered*
Population Status: *Declining*
JIM KRAUS

- ✧ Consultation with the Florida Gas Transmission Company resulted in an agreement upon construction time-frames that will allow for better protection for active bald eagle nests, scrub jays, gulf sturgeon, and gopher tortoises.

Species: *Florida scrub jay*
Listed As: *Threatened*
Population Status: *Declining*
REED BOWMAN

- ✧ Through consultation, the only known habitat for the Warton's cave spider will be protected in central Texas. Protective measures include: gating the entrance of the cave; restricting the use of pesticides and fertilizers; and using native vegetation for landscaping near the cave.

All Federal agencies play a vital role in the conservation of listed and candidate species, and the Service makes a consistent effort to educate other Federal agencies and emphasizes the importance of the role they play in the conservation of the Nation's diverse natural resources.

Section 10(a)(1)(B) (Habitat Conservation Plans)

Section 10(a)(1)(B) allows the Service to issue permits for the "take" of federally listed species if the taking will be incidental to, and not the purpose of, an otherwise lawful activity. Congress intended that the section 10(a)(1)(B) process be used to reduce conflicts between listed species and private development and to provide a framework that would encourage "creative partnerships" between the private sector and local, State, and Federal agencies in the interests of listed species and their habitat.

To obtain an "incidental take permit," an applicant must submit a Habitat Conservation Plan (HCP) that describes how the applicant will minimize and mitigate the impacts of the taking and how HCP implementation will be funded. An HCP allows development activities that impact threatened or endangered species in return for a conservation program implemented by the permittee that offsets those impacts or benefits the species. HCPs vary greatly in size and complexity, covering anywhere from a few acres to statewide efforts.

Recovery of listed species is not a direct requirement of the HCP process but is indirectly involved through the "no jeopardy" standard required by section 7(a)(2) of the Act and by the permit issuance criteria found at section 10(a)(2)(B). Under both these mandates, the Service must ensure that issuance of an incidental take permit does not "reduce appreciably the likelihood of the survival *and recovery* of the species in the wild." In other words, an HCP must not preclude or significantly reduce the recovery prospects of affected species. Nevertheless, though not a statutory requirement, many HCPs have a net positive affect on species recovery, and some substantially contribute to meeting recovery goals. This is especially true of HCPs that are range-wide or regional in scope because they provide long-term assurances of conservation actions and protection across large habitat areas. Recovery plans are often used to guide the crafting of HCPs. Thus, recovery is inherently an important consideration in any HCP. HCPs can significantly advance or even achieve recovery objectives.

The Service's role in the habitat conservation planning process is to provide technical assistance to the applicant during the HCP development phase, review the permit application and HCP, and issue the permit if all requirements have been satisfied. Examples of recently completed HCPs include the Simpson Timber Company HCP for the northern spotted owl in northern California (1992), the International Paper HCP for the Red Hills salamander in Alabama (1993), and the Metropolitan Bakersfield HCP for the San Joaquin kit fox and other species in California (1994). Each of these HCPs involves relatively large planning areas (30,000 to 380,000 acres) and allows economic activities (e.g., timber harvest or residential development) to proceed in endangered species habitat. However, each plan also requires that sufficient habitat be protected, through set-aside or acquisition, to offset project effects on listed species.

Species: *Bald eagle chicks*
Listed As: *Threatened*
Population Status: *Improving*
JIM CARPENTER

Species: *Black-footed ferret*
Listed As: *Endangered*
Population Status: *Improving*
LARRY SHANKS

HCPs currently under development include the Brevard County HCP in Florida (10,000 acres); HCPs for timber harvest activities in Georgia (1,000,000 acres), South Carolina (3,000,000 acres), North Carolina (300,000 acres), Mississippi (500,000 acres), Washington (3,000,000 acres), and Oregon (300,000 acres); Washington County HCP in Utah (135,000 acres); Balcones Canyonlands HCP in Travis County, Texas (633,000 acres); Kern County HCP in California's San Joaquin Valley (1,920,000 acres); several HCPs in southern California being developed jointly with the State's Natural Communities Conservation Planning (NCCP) Program; and the Clark County HCP in Nevada (22,500 acres).

Recovery Successes

Examples of Recovery Successes

There have been many successes of the recovery program; reclassifications, delistings, and significant steps toward achieving species recovery objectives. Highlights of a few of these successes are summarized below.

Bald eagle

This species formerly nested throughout North America. Population declines were attributed to habitat loss, illegal shooting, and the effects of DDT on reproductive success. In addition to the DDT ban, the eagle benefitted from nest site protection, aggressive habitat management, and reintroductions. Many States have successfully reestablished nesting populations by translocating young birds from areas with healthy populations into suitable, unoccupied habitat. Public awareness campaigns and vigorous law enforcement have helped to reduce illegal shooting of eagles. Bald eagle numbers in the lower 48 States have increased from approximately 417 nesting pairs in 1963 to more that 4,000 pairs in 1993. In addition, there are an estimated 5,000 to 6,000 juvenile bald eagles in this part of the range. As a result of the significant progress toward recovery, on July 12, 1994, the Service proposed to reclassify the bald eagle from endangered to threatened in all but four States. Subsequent action reclassified the species as threatened in all of the lower 48 states.

Black-footed ferret

A long history of prairie dog control programs reduced populations of the black-footed ferret by reducing the ferrets' preferred prey. Once thought to be extinct, black-footed ferrets were rediscovered in 1981 near Meeteetse, Wyoming. Canine distemper devastated that population in the late 1980s. A captive propagation program,

founded by the 18 survivors of this population, has been extremely successful, resulting in a population of over 400 by mid-1992. In the fall of 1991, 49 juvenile ferrets were released in the Shirley Basin area of southeast Wyoming as part of a nonessential experimental population. The release was the result of considerable landowner cooperation. About 55 percent of the management area where the ferrets were released is in private ownership. A similar release was conducted in north-central Montana and the Conata Basin/Badlands area of South Dakota in 1994. Releases continue at the Shirley Basin site in Wyoming, where the Service has confirmed at least 10 surviving ferrets and 6 young born in the wild resulting from the release. Releases of captive bred ferrets will continue in other States as new sites are identified and releases are coordinated with involved agencies and landowners.

Species: *Greenback cutthroat trout*
Listed As: *Threatened*
Population Status: *Improving*
FWS PHOTO

Greenback cutthroat trout

Originally listed as endangered in 1967, the greenback cutthroat trout was reclassified as threatened in 1978. This native trout declined due to the introduction of nonnative rainbow, brook, and brown trout that out competed or hybridized with the greenback cutthroat trout in its native streams. At the time of its original listing, only two small historic populations were known to exist. Since then, the Service has restored the species in over 40 lakes and streams in and around Rocky Mountain National Park and other areas in Colorado. There is catch and release fishing for the species in 15 lakes, and a new captive broodstock is being established by the Colorado Division of Wildlife for future stocking. The species is nearing its recovery goals and, with continued reintroduction of the greenback cutthroat trout into its native streams and continued control of nonnative trout, the species may be delisted by the year 2000.

Species: *Haleakala silversword*
Listed As: *Threatened*
Population Status: *Stable*
JOAN CANFIELD

Haleakala Silversword

The Haleakala silversword is found only in a 250-acre area in the crater and on the outer slopes of Haleakala, Maui's largest volcano. Population declines were attributed to habitat disturbances, detrimental effects from introduced species, and vandalism. The Maui Chamber of Commerce felt so strongly about the declining populations that it petitioned Congress to intervene with efforts to save the species. As a result, the Haleakala National Park was established. Although the establishment of the park eliminated some of the threats, others continued and the silversword was listed in 1991. Now, the most dangerous threat to the plant is the loss of the localized, endemic pollinators. These pollinators are being threatened by the Argentine ant, a non-native species that preys on native insects. Biologists are currently working on an effective control for the ants, but have not

been successful. A collaborative effort by the National Park Service and the Service has saved the Haleakala silversword from extinction.

Whooping Crane

The whooping crane is not believed to have been numerous prior to the development of the western United States and Canada. However, hunting, the conversion of the prairies to agriculture, and other human disturbances greatly reduced their numbers. More modern activities, such as dam and powerline construction along their principal migration route, and dredging in their principal wintering area, continue to result in deaths of individual whooping cranes or degrade their essential habitats. The Service, through whooping crane recovery partnerships with the Florida Game and Freshwater Fish Commission, the Canadian Wildlife Service, and the International Crane Foundation began the recovery process. Through the Partners for Wildlife program, the Service has helped restore whooping crane roosting habitat on the Platte River. This area serves as habitat for migrating whooping cranes, which prefer to roost in wide channels free of vegetation and other obstructions. Agreements have also been signed with the National Audubon Society and individual private landowners to clear trees and other vegetation from the channels, providing open habitat not only for the endangered whooping crane, but for sandhill cranes, shorebirds, and other migrating waterfowl as well. A captive propagation program has also been developed to reintroduce birds to the wild and now there are now more than 200 birds, which includes 122 held in captivity. Through these efforts, the whooping crane population continues to increase in North America. Several goals of the recovery plan have been implemented through these cooperative ventures, and the whooping cranes are closer to being recovered as a result.

Species: *Whooping crane*
Listed As: *Endangered*
Population Status: *Improving*
W F KUBICHEK

American peregrine falcon

This widespread species occurs throughout much of North America. Population declines were attributed to habitat loss, illegal shooting, and the effects of DDT on reproductive success. The falcon has benefitted greatly from cooperative recovery efforts, such as the ban on pesticides (which caused thinning of falcon eggshells and adult mortality) and from the broad-based public involvement in the raising of thousands of falcons in captivity for their eventual reintroduction to the wild. Populations of the American peregrine falcon in southwestern Canada, the northern Rocky Mountain States, and the Pacific coast States were greatly depressed or extirpated. Over 3400 young American peregrine falcons were released to promote the species' recovery. These releases and many other recovery activities have helped to stabilize the falcon's population. The Service intends to propose removal of the American peregrine falcon from the list of threatened and endangered wildlife.

These, and many other species, have clearly benefitted from protection under the Act. With persistence and time, it **is** possible to make a u-turn on the road to extinction.

Monitoring Recovered Species

A species is considered "recovered" when the threats that initially led to a species' listing are corrected, when specified recovery goals (in terms of numbers, distribution, etc.) have been met, and when protection under the Act is no longer needed. Reaching recovery requires concerted efforts on the part of Federal and State authorities, as well as private parties.

The 1988 amendments to the Act recognized a potential conflict involving removal of just recovered species from the protective oversight of the Act. If a newly recovered species were no longer protected under the Act, the threats that led to its listing might resume and once again endanger the species. Section 4 of the Act was amended by adding a requirement that recovered species be monitored for at least 5 years after delisting. The Service cooperates with State agencies and other partners to accomplish monitoring for those species within State jurisdiction except in cases where the species are wide-ranging or migratory beyond State lines. In the event of a "significant risk to the well being" of any delisted species, the Secretary must use his emergency authority under section 4(b)(7) to relist the species.

Delistings and Reclassifications

Delisting (removing species from the List of Endangered and Threatened Wildlife and Plants) can occur for one of three reasons: (1) species extinction, (2) species recovery, or (3) more accurate scientific or commercial data becomes available. Delisting, resulting from successful recovery, is the culmination of a process involving planning recovery objectives, implementation of objectives, and evaluation and monitoring to ensure that all objectives have been met.

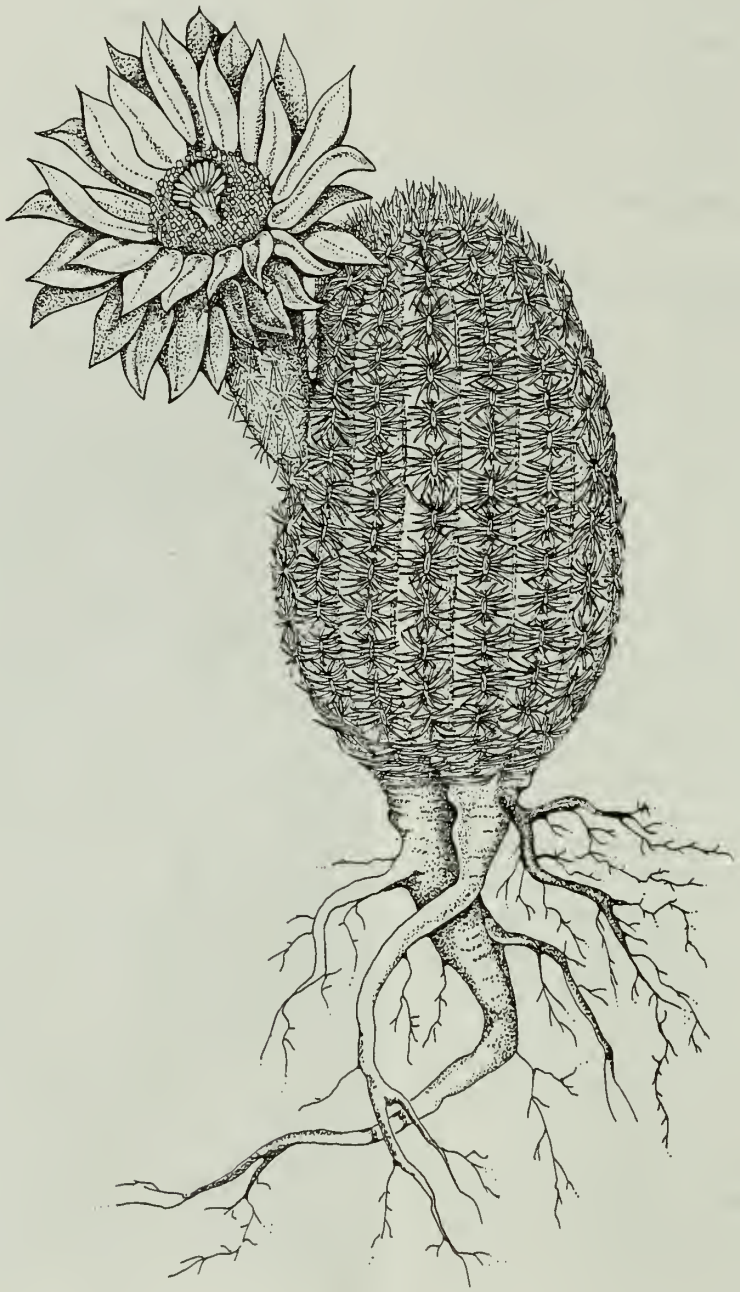
Reclassification from endangered to threatened is an intermediate step in the recovery process and signals significant success in an endangered species' recovery. The 1994 reclassification of the bald eagle represented over 20 years of coordinated efforts to reverse population declines, preserve habitat, and address pesticide contamination problems in the environment.

The Service is considering the species listed in table 2 for delisting or reclassification. In some cases, status surveys are underway to determine the appropriateness of these actions; in other cases, the Service has already determined appropriateness and is preparing proposals to carry out delisting or reclassification. While most of these reclassifications and delistings are a result of recovery having being achieved, some of these delistings and reclassifications are a result of taxonomic changes in the species' classification (e.g., cuneate bidens, Lloyd's hedgehog cactus) or discovery of additional secure populations (e.g., Maguire daisy). Others are a result of effective protection measures afforded to the species under the Act through the recovery process.

Table 2: Species Under Consideration for Delisting or Reclassification.

American Peregrine Falcon - western
Cui-ui
Eureka Valley plants
Hawaiian hawk
Loch Lomond coyote-thistle
MacFarlane's four-o'clock
Pahrump poolfish
Truckee barberry
Bald eagle
Cape Sable seaside sparrow
Inflated heelsplitter
Magazine Mountain shagreen
Slackwater darter
Robbins cinquefoil
Eskimo curlew

Species: *American peregrine falcon*
Listed As: *Endangered*
Population Status: *Improving*
FWS PHOTO



Species: *Black lace cactus*
Listed As: *Endangered*
Population Status: *Declining*

Analyses and Status of Listed Species

Recovery Program Analyses

Endangered Species Recovery Appropriations

Congressional funding authorizations to support the Service's recovery program have increased since the 1988 amendments. In FY 1993 and FY 1994, recovery represented approximately 31 percent of the Service's total endangered species budget. Species with specific recovery activities funded as a result of Congressional directives, or activities funded as a Service directive, are presented in Table 3. These directives represented 55 percent and 35 percent of the total recovery appropriation in FY 1993 and FY 1994, respectively. Directives represent a substantial portion of the money available for implementing recovery and limit the money remaining for recovery actions benefitting other species.

Table 3: Recovery Program Directives for FY 1993 and 1994

Fiscal Year 1993

$ 77,000	Kirtland's warbler
$ 450,000	Grizzly bear
$ 377,000	Peregrine falcon
$ 848,000	California condor
$ 265,000	Sea turtles
$ 339,000	Southern sea otter
$ 681,000	Hawaiian birds
$ 805,000	Rocky Mountain wolf (Animal Damage Control included)
$ 680,000	Puerto Rican parrot
$ 144,000	Cui-ui
$ 340,000	Whooping crane
$ 280,000	Black-footed ferret
$ 74,000	Florida panther
$ 435,000	West Indian manatee
$ 395,000	Aleutian Canada goose
$ 132,000	Bruneau hot springsnail
$ 2,685,000	Northern spotted owl
$ 286,000	Desert tortoise
$ 665,000	Red wolf
$ 624,000	Upper Colorado River fishes
$ 297,000	Hawaiian species
$ 91,000	Central Valley
$ 296,000	Piping Plover
$ 147,000	San Juan
$ 154,000	Mexican grey wolf
$ 297,000	Pacific Islands
$ 30,000	Southeast fishes
$11,894,000	TOTAL DIRECTIVES
$ 20,065,000	**TOTAL FY 1993 RECOVERY APPROPRIATION**

Fiscal Year 1994

$ 100,000	Kirtland's warbler
$ 200,000	Grizzly bear
$ 400,000	Peregrine falcon
$ 600,000	California condor
$ 300,000	Sea turtles
$ 300,000	Southern sea otter
$ 500,000	Hawaiian birds
$ 600,000	Rocky Mountain wolf (Animal Damage Control included)
$ 400,000	Whooping crane
$ 300,000	Black-footed ferret
$ 100,000	Florida panther
$ 500,000	West Indian manatee
$ 400,000	Aleutian Canada goose
$ 2,000,000	Northern spotted owl
$ 300,000	Desert tortoise
$ 600,000	Red wolf
$ 624,000	Upper Colorado River fishes
$ 300,000	Pacific Islands
$ 400,000	Mexican grey wolf
$ 218,000	Steller's/Spectacled eider
$ 100,000	Piping plover
$ 450,000	Freshwater molluscs
$ 200,000	San Juan
$ 350,000	Mexican spotted owl
$ 150,000	Edward's aquifer
$10,392,000	TOTAL DIRECTIVES
$ 29,550,000	**TOTAL FY 1994 RECOVERY APPROPRIATION**

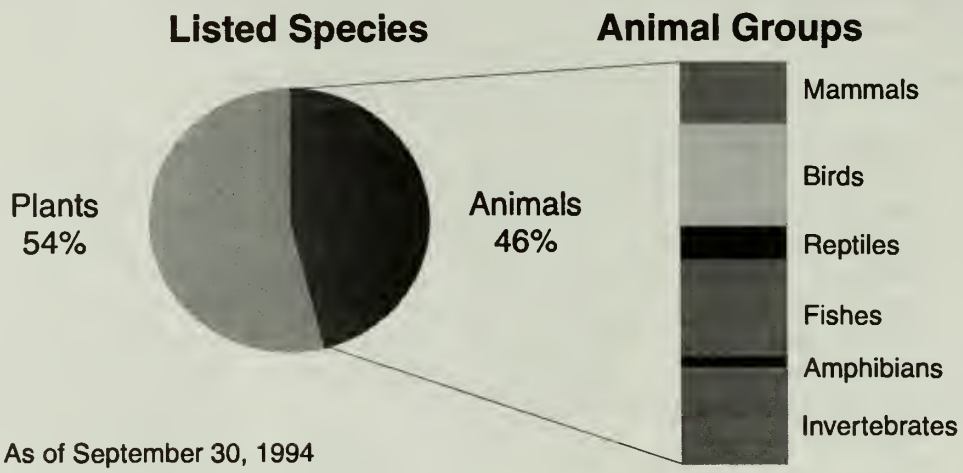
Summary of the Status of Listed Species

Figure 1 shows the percentage of listed species represented in the major taxonomic groups as of September 30, 1994. Map 2 shows the number of listed species in each State and Trust Territory as of September 30, 1994.

Figure 2 summarizes the status of 776 species listed as of 1993 through an analysis of the status and trends based on 5 year intervals. This figure shows the percent of species, divided according to time of listing in 5 year intervals, that are known to be stable or improving, declining, or for which the population trend is uncertain. Stable or improving species are those for which the trend toward extinction has been halted or reversed in the wild.

Overall, the data on stable or increasing species illustrates that while recovery of listed species takes time it can be achieved. Just as the threats to these species accumulated through time to result in the precarious status seen for many species today, recovery also takes time.

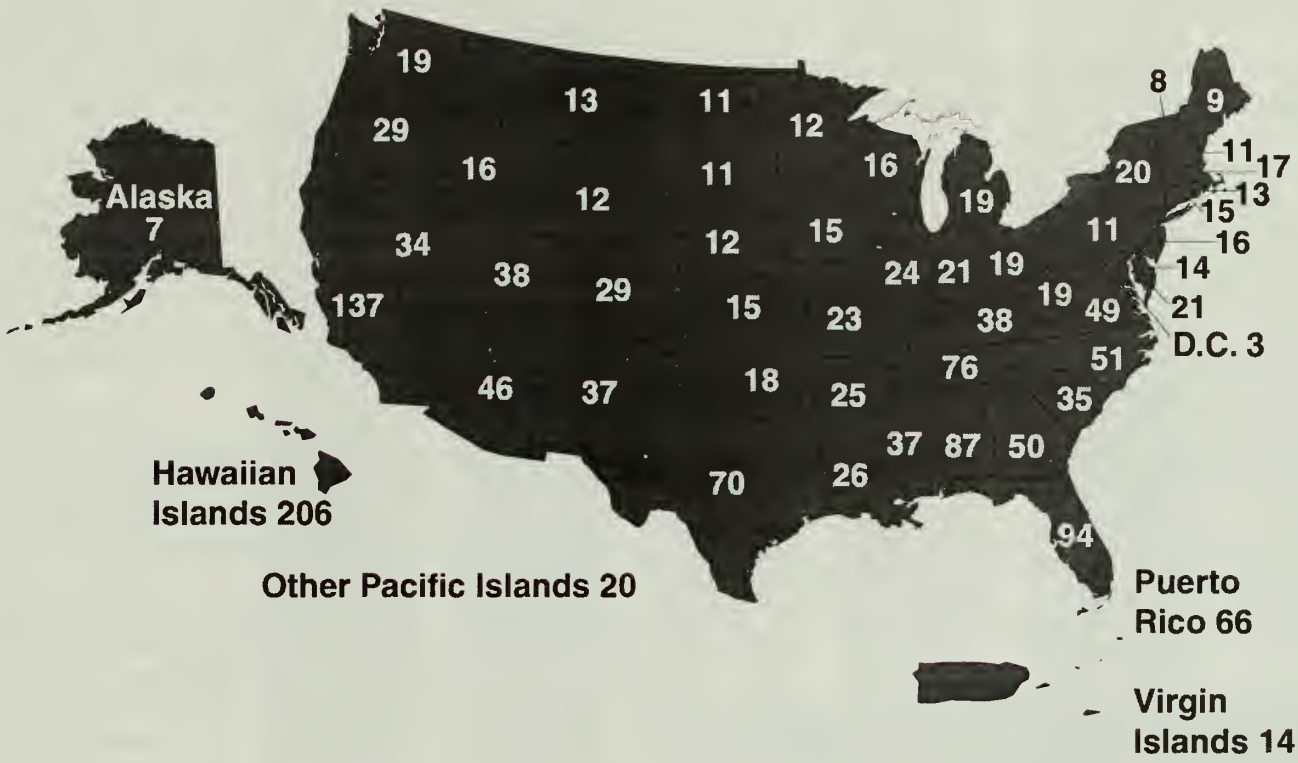
Figure 1. Distribution of Listed Species by Taxonomic Group



Listed Species by State/Territory

As of September 30, 1994

(Omits "similarity of appearance" and some extirpated species)



Map 2: Species listed under "similarity of appearance" and extinct species are not included in the totals identified.

The following definitions of population trend categories are useful in interpreting the data presented in figure 2:

Improving: species known to be increasing in numbers and/or whose threats to their continued existence are lessening in the wild.

Stable: species known to have stable numbers over the recent past and whose threats have remained relatively constant or diminished in the wild.

Declining: species known to be decreasing in numbers and/or whose threats to their continued existence are increasing in the wild.

Uncertain: species where additional survey work is required to determine the trend in their status.

Of the 108 species listed between 1968 and 1973, 58 percent are currently known to be stable or improving in their native habitats. Of the 294 species listed between 1989 and 1993, only 22 percent have recovered to the point that they are stable or increasing. For the species in decline or where population trends are uncertain, the Service and its partners in recovery are collecting biological information, developing recovery strategies, and implementing management activities that will stabilize the species and halt or reverse the trend toward extinction for many of these species.

The extraordinary success of the recovery program is demonstrated by the fact that even with a substantial increase in the number of species listed over the past decade, over 41 percent of the 909 species listed as of September 30, 1994, have stablized or are improving. This success is attributed to the efforts of the Service, other Federal agencies, States, tribal governments, and private individuals and organizations. Their efforts have similarly managed to hold those species with declining population trends to an overall average of 35 percent of total listed species. For some of these species, severely depressed populations may take a very long time to turn the corner toward recovery. For others, populations may have become so depressed or habitat so limited, that full recovery is not likely. Of all the species listed between 1968 and 1993, only 7, or less than 1 percent, have been officially recognized as extinct, and subsequently delisted. Several other species (e.g., Scioto madtom, Bachman's warbler) have not been located in a number of years and may also be extinct. These species will be delisted when supporting evidence is relatively conclusive. Though extinct species represent an irreplaceable loss to the biodiversity of our natural flora and fauna, the fact that almost 99 percent of listed species remain extant speaks to the success of the Act as a mechanism for conservation of species at risk of extinction. The percent of species for which the population trend is uncertain is indicated in the figure and, overall, there is an average of only 23 percent of listed species for which the population trend continues to be uncertain.

Species: *Houston toad*
Listed As: *Endangered*
Population Status: *Uncertain*
ROBERT THOMAS

Figure 2 shows that the percent species increased noticeably within the past 10 years. The population trend of a species can remain uncertain for several reasons. In many cases, these species have not been listed for a sufficient period of time, and consequently their populations not monitored long enough, to establish clear information on population trend. Other species, including some that have been listed for many years, may have uncertain status as a result of their rarity, remoteness and/or inaccessibility of habitat, or significant, unmanageable threats to the species throughout its entire range. Rare Hawaiian rainforest birds, oceanic sea turtles, and subterranean salamanders are examples of species where inaccessibility of habitat may result in uncertain population trends. The status of the Houston toad remains uncertain as a result of its occurrence primarily on private lands where the Service lacks access to conduct population surveys. Still other species do not fit clearly into the population trend categories and their trend is listed as uncertain by default. As funding permits, the Service is conducting status surveys to determine the population trend for species where the trend is uncertain.

Summary of the Current Population Trends of Listed Species According to Time of Listing

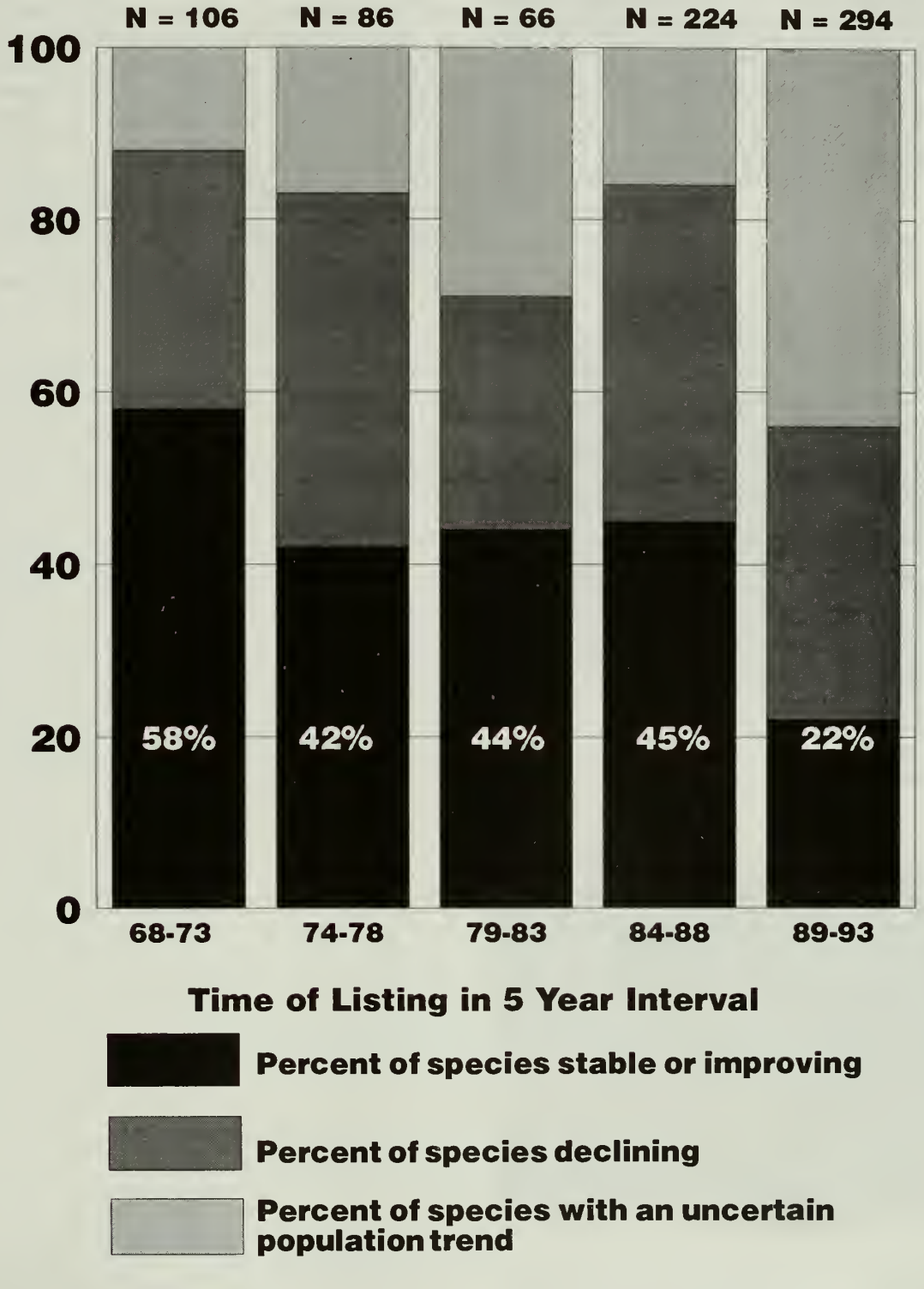


Figure 2

Species: *Knowlton cactus*
Listed As: *Endangered*
Population Status: *Stable*
PEGGY OLWELL

Species: *Green sea turtle*
Listed As: *Endangered*
Population Status: *Improving*
BLAIR WITHERINGTON

Species: *Yaqui chub*
Listed As: *Endangered*
Population Status: *Stable*
FWS PHOTO

Species-by-Species Status Summary

The status of all listed species under the Service's jurisdiction (United States and Trust Territories) as of September 30, 1994, has been summarized in the Appendix. As of September 30, 1994, 909 species were listed as endangered or threatened in the United States and Trust Territories. Of the 909, 893 are under the jurisdiction of the Fish and Wildlife Service. Of these 893 species, 484 (54 percent) had final approved recovery plans as of September 30, 1994, and another 185 (21 percent) have approved draft recovery plans. Two hundred eighty two of these species have been listed for less than 3 years. For the most part, species listed less than 3 years do not yet have approved recovery plans. Most do, however, have plans in some stage of development. There are 14 species for which the Service has determined that a recovery plan is not needed.

Species: *Relict trillium*
Listed As: *Endangered*
Population Status: *Declining*

Species: *Piping plover*
Listed As: *Endangered*
Population Status: *Declining*

SUMMARY

Recovery of threatened and endangered species is among the most important tasks delegated to the Fish and Wildlife Service; it is also one of the most challenging. The decline of many of these plants and animals that are at the brink of extinction is usually the result of a long history of decreasing habitat quality and quantity. By the time many species are listed, they are critically close to being lost forever. Rarely, stabilizing the population and/or the remaining habitat is the most that can be done. In other instances, the Service and its partners in conservation are able to arrest and reverse the decline of species and re-establish them as functional components of their ecosystems. Recovery is achieved because of the protections and conservation mechanisms provided by the Act, and these successes are much celebrated by the American people. Through the continuation of these cooperative efforts, many more success stories will be realized, resulting in continued conservation of our Nation's natural heritage.

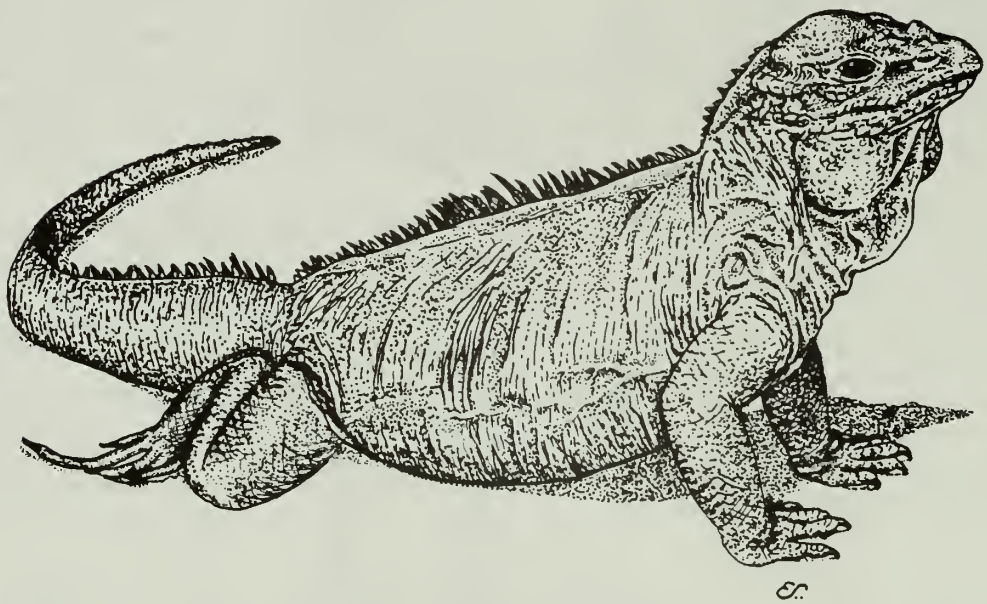
The greatest challenge is reversing long-term declines while finding innovative conservation and management actions that serve to both benefit the species and accommodate society's other goals, including economic growth. Fortunately, the Service and its partners have been largely successful in balancing these two challenges. In many cases the goals are directly linked, and it is being learned that achieving one facilitates the other. Sustaining economic growth in areas suffering chronic environmental declines is frequently impossible, and we recognize that without a strong economy, a healthy environment and the benefits it provides will be lost.

While there are many successes detailed in this report, much work remains to be done. Ultimately, recovery of listed species must be coordinated through partnerships aimed at conservation of the ecosystems upon which they depend, and such management actions must be carried out in the context of ongoing and anticipated human use.

Although it is sometimes pragmatic and necessary to address specific threats affecting individual species, we strive to avoid managing our lands and resources with a focus on one species only. To maintain a single species focus is to invite an endless progression of extinction crises. Rather, by managing at the ecosystem level, broad environmental gains can be secured and all species sharing those ecosystems will be benefitted.

The Fish and Wildlife Service and other agencies in the Department of the Interior are exploring ways that existing authorities may be used to prevent the degradation of ecosystems, which ultimately leads to endangered species listings and "last resort" recovery planning. The Department is committed to increasing its emphasis on ecosystem management, and will be making greater efforts to promote the partnerships essential for accomplishment of the important challenges facing us all.

Species: *Blackside dace*
Listed As: *Threatened*
Population Status: *Stable*



Species: *Mona ground iguana*
Listed As: *Threatened*
Population Status: *Stable*

APPENDIX

Data presented for each listed species includes: (1) the species' listing status; (2) lead Region; (3) population status; (4) whether or not the species has an approved recovery plan and, if not, whether one will be prepared; (5) the stage of the recovery plan, and (6) the percentage of the species' recovery objective(s) that have been met. The following information will be useful when interpreting the data in table 4.

(1) Species' Listing

The listing status is identified as threatened **(T)** or endangered **(E)**. If critical habitat **(CH)** is designated, it is also listed in the table with the species' status.

(2) Lead Region

This indicates which Service Region has the lead responsibility for the species.

(3) Population Status (Pop. Status)

The status of each species is identified as **Improving (I)**, **Stable (S)**, **Declining (D)**, or **Uncertain (U)** as defined above. **Extinct (E)** species are those that are believed to be extinct in the wild.

(4) Recovery Plan (Rec. Plan)

This column indicate whether a recovery plan has been developed: **Y** for yes; **N** for no; and **NA** for non-applicable.

(5) Plan Stage

The status of recovery plan development is reported as indicated below.

F = Final-Approved
R = Revision-Approved (a numeral indicates the times revised)
D = Draft - published in the Federal Register
U = Under Development, planned or a draft not yet in *Federal Register*
RD = Revision-Under Development (a number indicates times revised)
NA = Not Applicable-Exempt

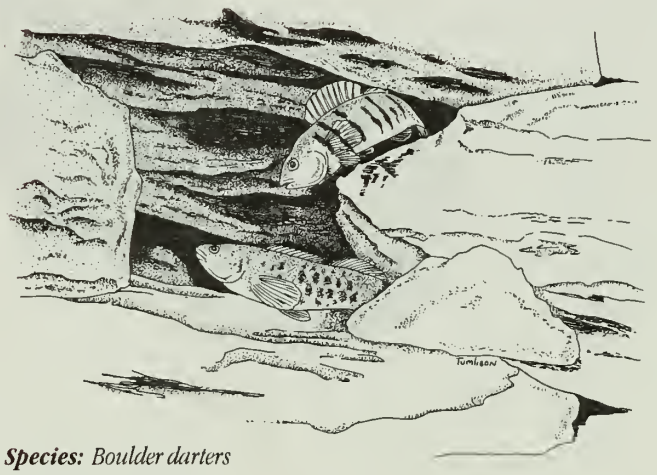
(6) Recovery Achieved

The percentage of species recovery objective(s) achieved is indicated with a value of 1 to 4 as defined below.

1 = 0-25 percent achieved
2 = 26-50 percent achieved
3 = 51-75 percent achieved
4 = 76-100 percent achieved

Recovery Priority as assigned according to species recovery priority system.

A species is assigned a recovery priority from 1 to 18 according to the degree of threats, recovery potential and taxonomic distinctness. In addition, a species' rank may be elevated by adding a C designation to its numerical rank to indicate that there is some degree of conflict between the species' conservation efforts and economic development associated with its recovery. Species with a high priority rank (1, 1C, 2, 2C) are those of most concern with highest potential for recovery. Species with a low rank (16, 17, 18) are of lowest concern or have low recovery potentials.



Species: *Boulder darters*
Listed As: *Endangered*
Population Status: *Stable*

Species: *Concho water snake*
Listed As: *Threatened*
Population Status: *Stable*

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Mammals							
Bat, gray	E	3	I	Y	F	3	8
Bat, Hawaiian hoary	E	1	U	N	U	1	9
Bat, Indiana	E,CH	3	D	Y	RD	2	8
Bat, lesser (=Sanborn's) long-nosed	E	2	U	Y	D	1	8
Bat, little Mariana fruit	E	1	E	Y	F	1	5
Bat, Mariana fruit	E	1	D	Y	F	1	3
Bat, Mexican long-nosed	E	2	U	Y	F	1	5
Bat, Ozark big-eared	E	2	S	Y	F	1	3
Bat, Virginia big-eared	E,CH	5	I	Y	RD(1)	3	9
Bear, grizzly or brown	T	6	S	Y	R(1)	2	3C
Bear, Louisiana black	T	4	I	N	D	1	9
Beaver, Point Arena mountain	E	1	U	N	U	1	3
Caribou, woodland	E	1	D	Y	R(3)	2	3C
Cougar, eastern	E	5	E	NA	F	1	18
Deer, Columbian white-tailed	E	1	I	Y	R(1)	4	15
Deer, Key	E	4	D	Y	R(1)	1	6C
Ferret, black-footed	E	6	I	Y	R(1)	1	2
Fox, San Joaquin kit	E	1	D	Y	RD	1	3C
Jaguarundi	E	2	U	Y	F	1	6
Manatee, West Indian (=Florida)	E,CH	4	D	Y	R(2)	1	5C
Mouse, Alabama beach	E,CH	4	I	Y	F	2	3C
Mouse, Anastasia Island beach	E	4	S	Y	F	1	6C
Mouse, Choctawahatchee beach	E,CH	4	U	Y	F	1	3C
Mouse, Key Largo cotton	E	4	S	Y	D	4	3C
Mouse, Pacific pocket	E	1	U	N	U	1	3C
Mouse, Perdido Key beach	E,CH	4	D	Y	F	2	3C
Mouse, salt marsh harvest	E	1	D	Y	RD	1	2C
Mouse, southeastern beach	T	4	D	Y	F	1	9C
Ocelot	E	2	D	Y	F	1	5
Otter, southern sea	T	1	I	Y	RD	1	9C
Panther, Florida	E	4	S	Y	R(1)	1	6C
Prairie dog, Utah	T	6	S	Y	F	2	14
Pronghorn, Sonoran	E	2	U	Y	F	1	3
Rabbit, Lower Keys marsh	E	4	D	Y	F	1	6C
Rat, Fresno kangaroo	E,CH	1	D	N	U	1	3C
Rat, giant kangaroo	E	1	D	N	U	2	2C
Rat, Morro Bay kangaroo	E,CH	1	D	Y	F	1	6C
Rat, rice (=silver rice)	E,CH	4	U	Y	U	1	9C
Rat, Stephens' kangaroo	E	1	S	N	U	2	2C
Rat, Tipton kangaroo	E	1	D	N	U	1	3C
Shrew, Dismal Swamp southeastern	T	5	I	Y	F	2	9
Squirrel, Carolina northern flying	E	4	S	Y	F	2	6C

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Squirrel, Delmarva Peninsula fox	E	5	I	Y	R(2)	2	9
Squirrel, Mount Graham red	E,CH	2	D	Y	F	1	9C
Squirrel, Virginia northern flying	E	5	I	Y	F	3	9
Vole, Amargosa	E,CH	1	D	Y	D	1	6
Vole, Hualapai Mexican	E	2	U	Y	F	1	3
Vole, Florida salt marsh	E	4	U	N	Exempt	1	6
Wolf, gray (two populations listed)	E,T,CH	3	I	Y	R(1)	4	14C
Wolf, Mexican gray	E	2	I	Y	F	1	3C
Wolf, Northern Rocky Mountain gray	E	6	I	Y	F	1	3C
Wolf, red	E	4	I	Y	R(2)	3	5C
Woodrat, Key Largo	E	4	S	Y	D	1	3C
Birds							
Akepa, Hawaii (honeycreeper)	E	1	S	Y	F	2	9
Akepa, Maui (honeycreeper)	E	1	D	Y	F	1	6
Akialoa, Kauai (honeycreeper)	E	1	U	Y	F	1	5
Akiapola'au (honeycreeper)	E	1	S	Y	F	2	2
Blackbird, yellow-shouldered	E,CH	4	S	Y	F	1	2C
Bobwhite, masked (quail)	E	2	I	Y	RD(2)	2	6
Broadbill, Guam	E	1	E	Y	F	1	5
Caracara, Audubon's crested	T	4	S	Y	F	1	12
Condor, California	E,CH	1	S	Y	RD	2	4C
Coot, Hawaiian (='alae-ke'oke'o)	E	1	S	Y	RD	3	15
Crane, Mississippi sandhill	E,CH	4	I	Y	R(3)	1	6C
Crane, whooping	E,CH	2	I	Y	R(2)	2	2C
Creeper, Hawaii	E	1	S	Y	F	2	8
Creeper, Molokai (=Kakawahie)	E	1	D	Y	F	1	5
Creeper, Oahu (honeycreeper)	E	1	U	N	U	1	5
Crow, Hawaiian (='alala)	E	1	I	Y	F	1	2
Crow, Mariana	E	1	D	Y	F	1	2
Crow, white-necked	E	4	U	N	NA	1	17
Curlew, Eskimo	E	7	U	N	U	1	5
Duck, Hawaiian (=koloa)	E	1	D	Y	R(1)	3	2
Duck, Laysan	E	1	D	Y	F	3	8
Eagle, bald (two separate listings)	E,T	3	I	Y	RD	4	14C
Eagle, bald (southwest)	E	2	S	Y	F	3	6C
Eider, spectacled	T	7	D	N	U	1	5
Falcon, American peregrine (western)	E	1	I	Y	RD	3	9
Falcon, Arctic peregrine	T	7	I	Y	F	4	9
Falcon, northern aplomado	E	2	U	Y	F	1	3
Finch, Laysan (honeycreeper)	E	1	S	Y	F	3	8
Finch, Nihoa (honeycreeper)	E	1	S	Y	F	3	8
Gnatcatcher, coastal California	T	1	D	N	U	1	3C

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Goose, Aleutian Canada	T	7	I	Y	R(2)	3	9
Goose, Hawaiian (=nene)	E	1	D	Y	F	2	2
Hawk, Hawaiian (=io)	E	1	S	Y	F	4	14
Hawk, Puerto Rican broad-winged	E	4	D	N	U	1	6
Hawk, Puerto Rican sharp-shinned	E	4	D	N	U	1	3
Honeycreeper, crested (='akohekohe)	E	1	S	Y	F	2	7
Jay, Florida scrub	T	4	D	Y	F	1	3C
Kingfisher, Guam Micronesian	E	1	S	Y	F	1	3
Kite, Everglade snail	E,CH	4	S	Y	R(4)	1	3C
Mallard, Mariana	E	1	E	NA	NA	1	5
Megapode, Micronesian (=LaPerouse's)	E	1	U	N	U	1	8
Millerbird, Nihoa (Old world warbler)	E	1	S	Y	F	3	9
Monarch, Tinian (Old World flycatcher)	T	1	S	NA	NA	4	14
Moorhen (=gallinule), Hawaiian common	E	1	S	Y	R(1)	3	9
Moorhen (=gallinule), Mariana common	E	1	S	Y	F	1	9
Murrelet, marbled	T	1	D	N	U	1	3
Nightjar (=whip-poor-will), Puerto Rico	E	4	S	Y	F	2	5C
Nukupu'u (honeycreeper)	E	1	D	Y	F	1	5
O'o, Kauai (='o'o 'a'a)(honeyeater)	E	1	D	Y	F	1	4
O'u (honeycreeper)	E	1	D	Y	F	1	4
Owl, Mexican spotted	T	2	U	N	U	1	9C
Owl, northern spotted	T,CH	1	D	Y	D	1	9C
Palila (honeycreeper)	E,CH	1	S	Y	R(1)	3	1
Parrot, Puerto Rican	E	4	S	Y	R(1)	1	2
Parrotbill, Maui (honeycreeper)	E	1	S	Y	F	1	1
Pelican, brown	E	1	I	Y	F	4	9
Petrel, Hawaiian dark-rumped	E	1	S	Y	F	2	3
Pigeon, Puerto Rican plain	E	4	S	Y	F	1	3C
Plover, piping (3 populations)	E,T	3	D	Y	RD	1	5C
Plover, piping (Atlantic coast)	T	5	I	Y	RD(1)	3	2C
Plover, Western snowy (Pacific coast)	T	1	S	N	U	1	3C
Po'ouli (honeycreeper)	E	1	D	Y	F	1	4
Prairie-chicken, Attwater's greater	E	2	D	Y	R(1)	1	3
Rail, California clapper	E	1	D	Y	RD	1	3C
Rail, Guam	E	1	S	Y	F	1	2
Rail, light-footed clapper	E	1	S	Y	D	1	2
Rail, Yuma clapper	E	2	S	Y	F	3	6
Shearwater, Newell's Townsend's (=Manx,='a'o)	T	1	S	Y	F	2	8
Shrike, San Clemente loggerhead	E	1	D	Y	F	1	9
Sparrow, Cape Sable seaside	E,CH	4	S	Y	F	2	12C
Sparrow, Florida grasshopper	E	4	D	Y	F	1	9
Sparrow, San Clemente sage	T	1	D	Y	F	2	9
Stilt, Hawaiian (=ae'o)	E	1	S	Y	R(1)	1	9

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Stork, wood	E	4	I	Y	F	3	6C
Swiftlet, Mariana gray (=Vanikoro)	E	1	S	Y	F	1	9
Tern, California least	E	1	I	Y	RD	2	3C
Tern, least	E	3	I	Y	F	1	3C
Tern, roseate	E,T	5	S	Y	F	1	3
Thrush, large Kauai	E	1	D	Y	F	1	5
Thrush, Molokai (=oloma'o)	E	1	D	Y	F	1	6
Thrush, small Kauai	E	1	S	Y	F	1	5
Towhee, Inyo California (=brown)	T,CH	1	S	N	U	1	9C
Vireo, black-capped	E	2	D	Y	F	1	2C
Vireo, least Bell's	E,CH	1	I	Y	U	2	3C
Warbler (wood), Bachman's	E	4	U	NA	Exempt	1	5
Warbler (wood), golden-cheeked	E	2	D	Y	F	1	2C
Warbler (wood), Kirtland's	E	3	I	Y	R(1)	3	2C
Warbler (Old World), nightingale reed	E	1	S	N	U	1	9
White-eye, bridled	E	1	E	Y	F	1	6
Woodpecker, ivory-billed	E	4	E	NA	Exempt	1	18
Woodpecker, red-cockaded	E	4	D	Y	R(1)	1	8C
Reptiles							
Alligator, American	T	4				Recovered	
Anole, Culebra Island giant	E,CH	4	U	Y	F	1	5
Boa, Mona	T,CH	4	U	Y	F	1	3
Boa, Puerto Rican	E	4	S	Y	F	1	14
Boa, Virgin Islands tree	E	4	U	Y	F	1	3C
Crocodile, American	E,CH	4	S	Y	R(1)	2	2C
Crocodile, saltwater (=estuarine)	E	1	U	Y	D	1	2C
Gecko, Monito	E,CH	4	U	Y	F	1	5
Iguana, Mona ground	T,CH	4	S	Y	F	2	3
Lizard, blunt-nosed leopard	E	1	D	Y	RD	1	2C
Lizard, Coachella Valley fringe-toed	T,CH	1	D	Y	F	2	2C
Lizard, Island night	T	1	I	Y	F	4	8
Lizard, St. Croix ground	E,CH	4	U	Y	F	1	2C
Rattlesnake, New Mexican ridge-nosed	T,CH	2	I	Y	F	1	3
Skink, bluetail (=blue-tailed) mole	T	4	D	Y	F	1	9
Skink, sand	T	4	D	Y	F	1	7
Snake, Atlantic salt marsh	T	4	D	Y	F	1	12
Snake, Concho water	T	2	S	Y	F	1	9C
Snake, eastern indigo	T	4	D	Y	F	1	12C
Snake, giant garter	T	1	U	N	U	1	2C
Snake, San Francisco garter	E	1	D	Y	F	1	3C
Tortoise, desert	T,CH	1	D	Y	F	1	8C
Tortoise, gopher	T	4	D	Y	F	1	9

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Turtle, Alabama red-bellied	E	4	U	Y	F	1	5
Turtle, flattened musk	T	4	S	Y	F	1	14
Turtle, green sea (2 populations)	E,T	2	I	Y	R(1)	1	1C
Turtle, hawksbill sea (=carey)	E,CH	2	U	Y	RD(1	1	1C
Turtle, Kemp's (=Atlantic) ridley sea	E	2	I	Y	R(1)	1	2C
Turtle, leatherback sea	E,CH	2	U	Y	R(1)	1	7
Turtle, loggerhead sea	T	2	U	Y	R(1)	1	7C
Turtle, Plymouth redbelly (=red-bellied)	E,CH	5	I	Y	R(2)	2	9
Turtle, ringed map (=sawback)	T	4	S	Y	F	2	14
Turtle, yellow-blotched map (=sawback)	T	4	S	Y	F	1	14
Amphibians							
Coqui, golden	T,CH	4	D	Y	F	1	5C
Salamander, Cheat Mountain	T	5	I	Y	F	3	8
Salamander, desert slender	E	1	U	Y	F	1	8
Salamander, Red Hills	T	4	S	Y	F	1	7
Salamander, San Marcos	T,CH	2	U	Y	RD(1)	1	2C
Salamander, Santa Cruz long-toed	E	1	S	Y	R(1)	1	3
Salamander, Shenandoah	E	5	D	Y	F	1	8
Salamander, Texas blind	E	2	U	Y	D	1	5
Toad, Houston	E,CH	2	U	Y	RD(1)	1	5C
Toad, Puerto Rican crested	T	4	U	Y	F	1	2C
Toad, Wyoming	E	6	D	Y	F	1	3
Fishes							
Catfish, Yaqui	T,CH	2	D	Y	D	1	8
Cavefish, Alabama	E,CH	4	S	Y	R(2)	1	1
Cavefish, Ozark	T	4	I	Y	R(1)	2	8
Chub, bonytail	E,CH	6	D	Y	R(1)	1	5C
Chub, Borax Lake	E,CH	1	S	Y	F	2	5
Chub, Chihuahua	T	2	D	Y	F	1	2
Chub, humpback	E,CH	6	S	Y	R(2)	1	2C
Chub, Hutton tui	T	1	U	N	U	2	9
Chub, Mohave tui	E	1	D	Y	F	1	6C
Chub, Oregon	E	1	U	N	U	1	2
Chub, Owens tui	E,CH	1	S	Y	RD	1	6C
Chub, Pahranagat roundtail (=bonytail)	E	1	S	Y	RD	1	3
Chub, slender	T,CH	4	D	Y	F	1	11
Chub, Sonora	T,CH	2	S	Y	F	1	11
Chub, spotfin (=turquoise shiner)	T,CH	4	U	Y	F	1	11
Chub, Virgin River	E	6	D	Y	D	1	3C
Chub, Yaqui	E,CH	2	S	Y	D	1	8
Cui-ui	E	1	I	Y	R(2)	2	2C

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Dace, Ash Meadows speckled	E,CH	1	S	Y	F	2	9
Dace, blackside	T	4	S	Y	F	1	11
Dace, Clover Valley speckled	E	1	U	N	U	1	9C
Dace, desert	T,CH	1	S	N	U	1	7C
Dace, Foskett speckled	T	1	U	N	U	2	9
Dace, Independence Valley speckled	E	1	U	N	U	1	6C
Dace, Kendall Warm Springs	E	6	S	Y	F	3	12
Dace, Moapa	E	1	S	Y	RD	2	1
Darter, amber	E,CH	4	S	Y	F	1	5
Darter, bayou	T	4	S	Y	R(1)	1	8C
Darter, bluemask (=jewel)	E	4	S	N	U	1	5
Darter, boulder (=Elk River)	E	4	S	Y	F	1	5
Darter, duskytail	E	4	D	Y	F	1	5
Darter, fountain	E,CH	2	U	Y	RD(1)	1	2C
Darter, goldline	T	4	D	N	D	1	8
Darter, leopard	T,CH	2	S	Y	RD(1)	2	11C
Darter, Maryland	E,CH	5	E	Y	R(1)	1	5
Darter, Niangua	T,CH	3	U	Y	F	1	8
Darter, Okaloosa	E	4	D	Y	F	1	11
Darter, relict	E	4	S	N	D	1	5
Darter, slackwater	T,CH	4	U	Y	F	1	8
Darter, snail	T	4	U	Y	R(1)	1	11
Darter, watercress	T	4	S	Y	R(2)	1	2
Gambusia, Big Bend	E	2	S	Y	F	2	2
Gambusia, Clear Creek	E	2	S	Y	F	2	2
Gambusia, Pecos	E	2	S	Y	F	2	2
Gambusia, San Marcos	E,CH	2	E	Y	F	1	2C
Goby, tidewater	E	1	D	N	U	1	7C
Logperch, Conasauga	E,CH	4	S	Y	F	1	5
Logperch, Roanoke	E	5	S	Y	F	1	5C
Madtom, Neosho	T	6	D	Y	F	1	11C
Madtom, pygmy	E	4	U	Y	F	1	5
Madtom, Scioto	E	3	U	NA	Exempt	1	5
Madtom, smoky	E,CH	4	S	Y	F	1	5
Madtom, yellowfin	T,CH	4	U	Y	F	1	11
Minnow, loach	T,CH	2	S	Y	F	1	4C
Minnow, Rio Grande Silvery	E	2	U	N	U	1	2C
Poolfish (=killifish), Pahrump	E	1	S	Y	F	4	8
Pupfish, Ash Meadows Amargosa	E,CH	1	S	Y	F	2	9
Pupfish, Comanche Springs	E	2	D	Y	F	1	2
Pupfish, desert	E,CH	2	S	Y	F	1	5
Pupfish, Devil's Hole	E	1	S	Y	R(1)	2	8
Pupfish, Leon Springs	E,CH	2	S	Y	F	2	2

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Pupfish, Owens	E	1	S	Y	RD	1	5
Pupfish, Warm Springs	E	1	S	Y	R(1)	2	9
Sculpin, pygmy	T	4	S	Y	F	1	8
Shiner, beautiful	T,CH	2	D	Y	D	1	2
Shiner, blue	T	4	D	Y	D	1	8
Shiner, Cahaba	E	4	D	Y	F	1	2
Shiner, Cape Fear	E,CH	4	S	Y	F	1	5
Shiner, Palezone	E	4	S	N	U	1	5
Shiner, Pecos bluntnose	T,CH	2	U	Y	F	1	3
Silverside, Waccamaw	T,CH	4	S	Y	F	1	8
Smelt, delta	T	1	D	N	U	1	2C
Spikedace	T,CH	2	S	Y	F	1	4C
Spinedace, Big Spring	T,CH	1	U	Y	F	1	12
Spinedace, Little Colorado	T,CH	2	D	Y	D	1	2
Spinedace, White River	E,CH	1	D	Y	F	1	2C
Springfish, Hiko White River	E,CH	1	S	N	U	1	3C
Springfish, Railroad Valley	T,CH	1	S	N	D	1	2C
Springfish, White River	E,CH	1	S	N	U	1	3C
Squawfish, Colorado	E,CH	6	S	Y	R(1)	1	2C
Stickleback, unarmored threespine	E	1	S	Y	R(1)	1	3
Sturgeon, Gulf	T	4	U	Y	D	1	12
Sturgeon, pallid	E	6	D	Y	F	1	2C
Sucker, June	E,CH	6	D	N	U	1	5C
Sucker, Lost River	E	1	D	Y	F	1	1C
Sucker, Modoc	E,CH	1	D	NA	NA	1	5
Sucker, razorback	E,CH	6	D	N	U	1	5C
Sucker, shortnose	E	1	D	Y	F	1	2C
Sucker, Warner	E,CH	1	D	Y	D	1	2C
Topminnow, Gila	E	2	D	Y	F	2	2
Topminnow, Yaqui	E	2	D	Y	RD(1)	2	2
Trout, Apache (=Arizona)	T	2	S	Y	RD(2)	2	8
Trout, Gila	E	2	S	Y	R(2)	2	2
Trout, greenback cutthroat	T	6	I	Y	RD(2)	3	15
Trout, Lahontan cutthroat	T	1	D	Y	D	1	9
Trout, Little Kern golden	T,CH	1	S	NA	NA	2	9
Trout, Paiute cutthroat	T	1	D	Y	F	1	9
Woundfin	E	6	D	Y	RD(2)	1	1C
Snails							
Ambersnail, Kanab	E	6	D	N	U	1	6C
Limpet, Banbury Springs	E	1	S	Y	D	1	8
Riversnail, Anthony's	E	4	S	N	U	1	5
Shagreen, Magazine Mountain	T	4	S	Y	F	1	8

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Snail, Bliss Rapids	T	1	D	Y	D	1	8
Snail, Chittenango ovate amber	T	5	D	Y	RD(1)	1	5
Snail, flat-spired three-toothed (land)	T	5	S	Y	F	2	5
Snail, Iowa Pleistocene	E	3	U	Y	F	2	14
Snail, noonday	T	4	S	Y	F	1	9
Snail, painted snake coiled forest	T	4	U	Y	F	1	8
Snail, royal (=obese)	E	4	S	Y	D	1	5
Snail, Snake River physa	E	1	D	Y	D	1	5
Snail, Stock Island tree	T	4	D	Y	F	1	3
Snail, tulotoma (=Alabama live-bearing)	E	4	S	N	D	1	5
Snail, Utah valvata	E	1	S	Y	D	1	5
Snail, Virginia fringed mountain	E	5	S	Y	F	1	4
Snails, Oahu tree	E	1	D	Y	F	1	2
Springsnail, Alamosa	E	2	I	Y	F	1	14
Springsnail, Idaho	E	1	D	Y	D	1	5
Springsnail, Socorro	E	2	S	Y	F	1	14
Clams							
Acornshell, southern	E	4	D	N	D	1	5
Clubshell	E	5	D	Y	F	1	11
Clubshell, black (=Curtus' mussel)	E	4	D	Y	F	1	5C
Clubshell, ovate	E	4	D	N	D	1	5
Clubshell, southern	E	4	D	N	D	1	5
Combshell, southern (=penitent mussel)	E	4	D	Y	F	1	2C
Combshell, upland	E	4	D	N	D	1	5
Fanshell	E	4	D	Y	F	1	5
Fatmucket, Arkansas	T	4	U	Y	F	1	8
Heelsplitter, Carolina	E	4	D	N	D	1	5
Heelsplitter, inflated	T	4	D	Y	F	1	8C
Kidneyshell, triangular	E	4	D	N	D	1	5
Moccasinshell, Alabama	T	4	D	N	D	1	8
Moccasinshell, Coosa	E	4	D	N	D	1	5
Mucket, orange-nacre	T	4	D	N	D	1	8
Mussel, dwarf wedge	E	5	D	Y	F	1	5
Mussel, ring pink (=golf stick pearly)	E	4	D	Y	F	1	5
Mussel, winged mapleleaf	E	3	U	Y	D	1	2C
Pearlshell, Louisiana	T	4	U	Y	F	2	8
Pearly mussel, Alabama lamp	E	4	D	Y	F	1	5
Pearly mussel, Appalachian monkeyface	E	4	D	Y	F	1	5
Pearly mussel, birdwing	E	4	D	Y	F	1	4C
Pearly mussel, cracking	E	4	D	Y	F	1	4
Pearly mussel, Cumberland bean	E	4	D	Y	F	1	5C
Pearly mussel, Cumberland monkeyface	E	4	D	Y	F	1	5C
Pearly mussel, Curtis'	E	3	D	Y	F	1	6

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Pearly mussel, dromedary	E	4	D	Y	F	1	4C
Pearly mussel, green-blossom	E	4	D	Y	F	1	6
Pearly mussel, Higgins' eye	E	3	U	Y	F	2	2C
Pearly mussel, little-wing	E	4	D	Y	F	1	4
Pearly mussel, orange-footed (=pimple back)	E	4	D	Y	F	1	5
Pearly mussel, pale lilliput	E	4	D	Y	F	1	5
Pearly mussel, pink mucket	E	4	D	Y	F	1	5
Pearly mussel, purple cat's paw	E	4	D	Y	F	1	6
Pearly mussel, tubercled-blossom	E	4	E	Y	F	1	6
Pearly mussel, turgid-blossom	E	4	E	Y	F	1	5
Pearly mussel, white cat's paw	E	3	D	Y	F	1	6C
Pearly mussel, white wartyback	E	4	D	Y	F	1	5
Pearly mussel, yellow-blossom	E	4	E	Y	F	1	6
Pigtoe, flat (=Marshall's mussel)	E	4	D	Y	F	1	5
Pigtoe, heavy (=Judge Tait's mussel)	E	4	D	Y	F	1	5C
Pigtoe, Cumberland	E	4	D	Y	F	1	5
Pigtoe, dark	E	4	D	N	D	1	5
Pigtoe, fine-rayed	E	4	D	Y	F	1	5
Pigtoe, rough	E	4	D	Y	F	1	5
Pigtoe, shiny	E	4	D	Y	F	1	5
Pigtoe, southern	E	4	D	N	D	1	5
Pocketbook, fat	E	4	I	Y	R(1)	2	2C
Pocketbook, fine-lined	T	4	D	N	D	1	8
Pocketbook, speckled	E	4	U	Y	F	1	5
Riffleshell, northern	E	5	D	Y	F	1	12
Riffleshell, tan	E	4	D	Y	F	1	5
Rock-pocketbook, Ouachita (=Wheeler's pearly mussel)	E	2	D	Y	D	1	4C
Spinymussel, James River (=Virginia)	E	5	D	Y	F	1	5
Spinymussel, Tar River	E	4	D	Y	R(1)	1	5
Stirrupshell	E	4	D	Y	F	1	5
Crustaceans							
Amphipod, Hay's Spring	T	5	S	NA	Exempt	3	5
Crayfish, cave (=Cambarus aculabrum)(NCN)	E	4	U	N	U	1	5
Crayfish, cave (NCN)	E	4	S	Y	F	1	5
Crayfish, Nashville	E	4	U	Y	R(1)	1	11C
Crayfish, Shasta (=placid)	E	1	U	N	U	1	5
Isopod, Lee County Cave	E	5	S	N	NA	1	8
Isopod, Madison Cave	T	5	S	N	NA	2	4
Isopod, Socorro	E	2	S	Y	F	4	2
Shrimp, Alabama cave	E	4	D	N	U	1	5
Shrimp, California freshwater	E	1	U	N	U	1	8C
Shrimp, Conservancy fairy	E	1	U	N	U	1	8

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Shrimp, Kentucky Cave	E,CH	4	U	Y	F	1	5
Shrimp, Longhorn fairy	E	1	U	N	U	1	8
Shrimp, Riverside fairy	E	1	U	N	U	1	6C
Shrimp, Squirrel Chimney Cave (=Florida cave)	T	4	D	NA	Exempt	1	5C
Shrimp, Vernal pool fairy	T	1	D	N	U	1	2C
Shrimp, Vernal pool tadpole	E	1	D	U	U	1	2C
Insects							
Beetle, American burying (=giant carion)	E	5	S	Y	F	1	5C
Beetle, Coffin (=Kretchmar's) Cave mold	E	2	U	Y	F	1	2C
Beetle, delta green ground	T,CH	1	U	Y	F	1	8
Beetle, Hungerford's crawling water	E	3	S	N	U	1	5
Beetle, northeastern beach tiger	T	5	S	Y	F	1	6
Beetle, Puritan tiger	T	5	S	Y	F	1	5
Beetle, Tooth Cave ground	E	2	U	Y	F	1	2C
Beetle, valley elderberry longhorn	T,CH	1	U	Y	F	1	9
Butterfly, bay checkerspot	T	1	D	N	U	1	3C
Butterfly, El Segundo blue	E	1	I	Y	F	2	12
Butterfly, Karner blue	E	3	D	N	U	1	5
Butterfly, Lange's metalmark	E	1	S	Y	R(1)	1	9
Butterfly, lotis blue	E	1	U	Y	F	1	3
Butterfly, mission blue	E	1	S	Y	F	2	9
Butterfly, Mitchell's satyr	E	3	U	N	U	1	3
Butterfly, Myrtle's silverspot	E	1	U	N	U	1	9
Butterfly, Oregon silverspot	T,CH	1	D	Y	RD	2	3C
Butterfly, Palos Verdes blue	E,CH	1	S	Y	F	1	6
Butterfly, Saint Francis' satyr	E	4	D	N	U	1	3
Butterfly, San Bruno elfin	E	1	S	Y	F	2	9
Butterfly, Schaus swallowtail	E	4	D	Y	F	1	3C
Butterfly, Smith's blue	E	1	D	Y	F	1	9
Butterfly, Uncompahgre fritillary	E	6	S	Y	F	1	5C
Fly, Delhi Sands flower-loving	E	1	U	N	U	1	6C
Moth, Kern primrose sphinx	T	1	U	Y	F	1	2
Naucorid, Ash Meadows	T,CH	1	D	Y	F	1	2
Skipper, Pawnee montane	T	6	S	N	U	1	9C
Arachnids							
Harvestman, Bee Creek Cave	E	2	U	Y	F	1	2C
Harvestman, Bone (=Bee Creek) Cave	E	2	U	Y	F	1	2C
Pseudoscorpion, Tooth Cave	E	2	U	Y	F	1	2C
Spider, Tooth Cave	E	2	U	Y	F	1	2C

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Plants							
A'e	E	1	U	N	U	1	2
Abutilon eremitopetalum (NCN)	E	1	U	Y	D	1	2
Abutilon sandwicense (NCN)	E	1	S	N	U	1	8
Adiantum vivesii (NCN)	E	4	D	Y	D	1	5
Agave, Arizonica	E	2	U	N	U	1	5
'Aiakeakua, popolo	E	1	U	N	U	1	5
Aiea (Nothocestrum breviflorum)	E	1	U	N	U	1	5
Aiea (Nothocestrum peltatum)	E	1	U	N	U	1	5
Akoko (Chamaesyce celastroides var. kaenana)	E	1	S	N	U	1	9
Akoko (Chamaesyce deppeana)	E	1	U	N	U	1	2
Akoko (Chamaesyce kuwaleana)	E	1	U	N	U	1	2
Alani (Melicope haupuensis)	E	1	U	Y	D	1	5
Alani (Melicope knudsenii)	E	1	U	Y	D	1	5
Alani (Melicope lydgatei)	E	1	U	N	U	1	5
Alani (Melicope mucronulata)	E	1	U	N	U	1	5
Alani (Melicope pallida)	E	1	U	Y	D	1	2
Alani (Melicope quadrangularis)	E	1	U	Y	D	1	5
Alani (Melicope reflexa)	E	1	U	N	U	1	8
Alsinidendron obovatum (NCN)	E	1	D	Y	D	1	2
Alsinidendron trinerve (NCN)	E	1	I	Y	D	1	2
Alulu (=Brighamia, Rock's)	E	1	U	N	U	1	2
Amaranth, seabeach	T	4	D	N	U	1	8C
Ambrosia, south Texas	E	2	U	N	U	1	8
Amphianthus, little	T	4	S	Y	F	1	13
Aristida chaseae	E	4	D	Y	D	1	5C
Arrowhead, bunched	E	4	D	Y	F	1	2C
Aster, decurrent false	T	3	I	Y	F	1	5C
Aster, Florida golden	E	4	I	Y	F	1	5
Aster, Ruth's golden	E	4	D	Y	F	1	5C
Auerodendron pauciflorum (NCN)	E	4	D	N	U	1	5
Aupaka (Isodendrion hosakae)	E	1	U	Y	F	1	5
Avens, spreading	E	4	D	Y	F	1	2
Awikiwiki	E	1	U	N	U	1	2
Awiwi (Centaurium sebaeoides)	E	1	U	Y	D	1	9
Awiwi (Hedyotis cookiana)	E	1	D	Y	D	1	2
Ayenia, Texas	E	2	U	N	U	1	5
Barberry, Truckee	E	1	S	Y	F	4	2C
Bariaco (=guayabacon)	E	4	S	Y	F	1	11
Beaked-rush, Knieskern's	T	5	I	Y	F	3	14
Bear-poppy, dwarf	E	6	D	Y	F	1	5C
Beardtongue, Penland	E	6	S	Y	F	2	14
Beargrass, Britton's	E	4	D	N	U	1	8

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Beauty, Harper's	E	4	I	Y	F	1	7
Bellflower, Brooksville (=Robin's)	E	4	U	Y	F	1	8
Bidens, cuneate	E	1	NA	NA	NA	NA	NA
Birch, Virginia round-leaf	E	5	I	Y	R(2)	3	8
Bird's-beak, palmate bracted	E	1	I	N	U	1	2C
Bird's-beak, salt marsh	E	1	S	Y	F	1	6
Birds-in-a-nest, white	T	4	U	Y	F	1	8
Bittercress, small-anthered	E	4	D	Y	F	1	5
Bladderpod, Dudley Bluffs	T	6	S	Y	F	1	14
Bladderpod, kodachrome	E	6	S	N	U	1	14
Bladderpod, lyrate	T	4	S	N	U	1	8
Bladderpod, Missouri	E	3	I	Y	F	3	8
Bladderpod, San Bernardino Mountains	E	1	S	N	U	1	9
Bladderpod, white	E	2	D	Y	F	1	8
Blazing-star, Ash Meadows	T,CH	1	U	Y	F	2	8
Blazing-star, Heller's	T	4	I	Y	F	2	8
Blazing-star, scrub	E	4	D	Y	F	2	2
Blue-star, Kearney's	E	2	U	Y	F	1	2
Bluegrass, Hawaiian	E	1	U	Y	D	1	2
Bluet, Roan Mountain	E	4	D	Y	D	1	6
Bonamia, Florida	T	4	I	Y	F	3	8
Boxwood, Vahl's	E	4	D	Y	F	1	5
Broom, San Clemente Island	E	1	I	Y	F	4	9
Buckwheat, clay-loving wild	E,CH	6	U	Y	F	1	5
Buckwheat, Cushenbury	E	1	S	N	U	1	9
Buckwheat, gypsum wild	T,CH	2	U	Y	F	1	8
Buckwheat, scrub	T	4	D	N	U	1	15
Buckwheat, steamboat	E	1	D	N	U	1	3
Bulrush, northeastern (=barbed bristle)	E	5	I	Y	F	3	2C
Bush-clover, prairie	T	3	I	Y	F	2	8
Bush-mallow, San Clemente Island	E	1	I	Y	F	3	8
Buttercup, autumn	E	6	D	Y	F	1	6
Butterwort, Godfrey's	T	4	S	Y	D	1	14
Button, Mohr's Barbara	E	4	I	Y	F	1	14
Button-celery, San Diego	E	1	U	N	U	1	3C
Cactus, Arizona hedgehog	E	2	U	Y	D	1	3
Cactus, Bakersfield	E	1	D	N	U	1	2
Cactus, black lace	E	2	D	Y	F	1	3
Cactus, Brady pincushion	E	2	U	Y	F	1	2
Cactus, bunched cory	T	2	D	Y	F	1	8
Cactus, Chisos Mountain hedgehog	T	2	D	Y	F	1	9
Cactus, Cochise pincushion	T	2	U	Y	F	1	8
Cactus, Davis' green pitaya	E	2	D	Y	F	1	3

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Cactus, Key tree	E	4	S	Y	F	3	5C
Cactus, Knowlton	E	2	S	Y	F	2	2
Cactus, Kuenzler hedgehog	E	2	S	Y	F	1	3
Cactus, Lee pincushion	T	2	S	Y	F	2	3
Cactus, Lloyd's hedgehog	E	2	U	NA	Exempt	1	8
Cactus, Lloyd's Mariposa	T	2	D	Y	F	1	2
Cactus, Mesa Verde	T	2	S	Y	F	1	8C
Cactus, Nellie cory	E	2	D	Y	F	1	2
Cactus, Nichol's Turk's head	E	2	U	Y	F	1	3
Cactus, Peebles Navajo	E	2	U	Y	F	1	3
Cactus, Pima pineapple	E	2	U	N	U	1	3
Cactus, San Rafael	E	6	D	N	U	1	5C
Cactus, Siler pincushion	T	2	U	Y	F	2	8
Cactus, Sneed pincushion	E	2	D	Y	F	2	9
Cactus, star	E	2	U	N	U	1	2
Cactus, Tobusch fishhook	E	2	D	Y	F	1	2
Cactus, Uinta Basin hookless	T	6	S	Y	F	3	8
Cactus, Wright fishhook	E	6	S	Y	F	3	8
Calyptranthes thomasiana (NCN)	E	4	D	N	U	1	11
Campion, fringed	E	4	D	N	U	1	8
Capa, Rosa (=pendula cimarrona)	E	4	D	Y	D	1	11
Cat's-eye, Terlingua Creek	E	2	U	Y	F	1	5C
Catchfly, Perlman's	E	1	U	Y	D	1	2
Centaury, spring-loving	T,CH	1	S	Y	F	2	8
Chaff-flower, round-leaved	E	1	D	Y	D	1	3
Chaffseed, American	E	5	S	N	D	1	7
Chamaecrista glandulosa var. mirabilis (NCN)	E	4	D	Y	F	1	2
Chamaesyce halemanui (NCN)	E	1	U	Y	D	1	2
Chamaesyce skottsbergii var. kalaeloana (NCN)	E	1	S	Y	D	1	9
Checker-mallow, Nelson's	T	1	D	N	U	1	8C
Checker-mallow, pedate	E	1	D	N	U	1	5C
Chumbo, higo	T	4	S	NA	NA	1	14
Cinquefoil, Robbins'	E,CH	5	S	Y	F	4	2
Cladonia, Florida perforate	E	4	S	N	U	1	2
Cliff-rose, Arizona	E	2	U	Y	D	1	2
Clover, running buffalo	E	3	I	Y	F	2	2
Cobana, Negra	T	4	S	N	U	1	5
Coneflower, smooth	E	4	D	Y	D	1	5
Coneflower, Tennessee purple	E	4	S	Y	R(1)	2	8
Coyote-thistle, Loch Lomond	E	1	S	NA	NA	4	14
Cranichis ricartii (NCN)	E	4	D	NA	NA	1	5
Cress, toad-flax (=shrubby reed-mustard)	E	6	D	Y	F	1	10C

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Cycladenia, Jones	T	6	S	N	U	1	9
Cypress, Santa Cruz	E	1	S	N	U	1	2
Daisy, lakeside	T	3	S	Y	F	2	6C
Daisy, Maguire	E	6	S	Y	D	4	6
Daisy, Parish's	T	1	D	N	U	1	8
Daphnopsis hellerana (NCN)	E	4	D	Y	F	1	5
Dawn-flower (=bitterweed), Texas prairie	E	2	D	Y	F	1	8C
Delissea rhytidosperma (NCN)	E	1	U	Y	D	1	2
Desert-parsley (=lomatium), Bradshaw's	E	1	I	Y	F	1	8
Diablo, pelos del	E	4	D	Y	F	1	5C
Diellia falcata (NCN)	E	1	U	Y	D	1	11
Diellia pallida (NCN)	E	1	U	Y	D	1	2
Diellia unisora (NCN)	E	1	U	Y	D	1	8
Dogweed, ashy	E	2	D	Y	F	1	5
Dropwort, Canby's	E	4	S	Y	F	2	5
Elaphoglossum serpens (NCN)	E	4	D	Y	D	1	5
Erubia	E	4	D	Y	F	1	2C
Eugenia woodburyana (NCN)	E	4	D	N	U	1	5
Evening-primrose, Antioch Dunes	E,CH	1	S	Y	R(1)	2	9
Evening-primrose, Eureka Valley	E	1	I	Y	F	2	9
Evening-primrose, San Benito	T	1	U	Y	D	1	5C
Fern, Alabama streak-sorus	T	4	S	N	U	1	9
Fern, Aleutian shield	E	7	S	Y	F	1	8
Fern, American hart's-tongue	T	4	D	Y	F	1	9
Fern, Elfin tree	E	4	D	Y	F	1	5
Fiddleneck, large-flowered	E,CH	1	D	Y	D	2	5
Fleabane, Zuni (=rhizome)	T	2	S	Y	F	2	8
Four-o'clock, MacFarlane's	E	1	I	Y	F	2	2
Frankenia, Johnston's	E	2	I	Y	F	1	5
Fringe-tree, pygmy	E	4	I	Y	F	2	2
Gahnia lanaiensis (NCN)	E	1	U	Y	D	1	5
Gardenia, Hawaiian (=na'u)	E	1	S	Y	R(1)	1	2
Geocarpon minimum (NCN)	T	4	S	Y	F	1	13
Gerardia, sandplain	E	5	S	Y	RD(1)	1	5C
Gilia, Monterey	E	1	U	N	U	1	3C
Goetzea, beautiful (matabuey)	E	4	D	Y	F	1	5
Goldenrod, Blue Ridge	T	4	U	Y	F	1	8
Goldenrod, Houghton's	T	3	S	Y	D	1	8
Goldenrod, Short's	E	4	S	Y	F	2	8
Goldenrod, white-haired	T	4	S	Y	F	1	8
Goldfields, Burke's	E	1	U	N	U	1	2C
Gooseberry, Miccosukee	T	4	S	NA	Exempt	1	14
Gouania, Hillebrand's	E,CH	1	S	Y	F	1	8

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Gouania meyenii (NCN)	E	1	U	Y	D	1	8
Gouania vitifolia	E	1	U	Y	D	1	5
Gourd, Okeechobee	E	4	S	N	U	1	3
Grass, California Orcutt	E	1	U	N	U	1	5C
Grass, Eureka dune	E	1	I	Y	F	3	7
Grass, Solano	E	1	D	Y	F	1	2
Grass, Tennessee yellow-eyed	E	4	I	Y	F	1	8
Ground-plum, Guthrie's	E	4	U	N	U	1	2
Groundsel, San Francisco Peaks	T,CH	2	U	Y	F	2	8
Gumplant, Ash Meadows	T,CH	1	S	Y	F	2	8
Ha'iwale (Cyrtandra crenata)	E	1	U	N	U	1	5
Ha'iwale (Cyrtandra giffardii)	T	1	U	N	U	1	2
Ha'iwale (Cyrtandra limahuliensis)	E	1	U	Y	D	1	14
Ha'iwale (Cyrtandra munroi)	E	1	U	Y	D	1	5
Ha'iwale (Cyrtandra polyantha)	E	1	U	N	U	1	5
Ha'iwale (Cyrtandra tintinnabula)	E	1	U	N	U	1	5
Haha (Cyanea asarifolia)	E	1	U	Y	D	1	5
Haha (Cyanea copelandii ssp. copelandii)	E	1	U	N	U	1	5
Haha (Cyanea grimesiana ssp. obatae)	E	1	D	N	U	1	2
Haha (Cyanea hamatiflora ssp. carlsonii)	E	1	U	N	U	1	5
Haha (Cyanea lobata)	E	1	U	N	U	1	5
Haha (Cyanea macrostegia ssp. gibsonii)	E	1	U	Y	D	1	6
Haha (Cyanea mannii)	E	1	U	N	U	1	2
Haha (Cyanea mceldowneyi)	E	1	U	N	U	1	2
Haha (Cyanea pinnatifida)	E	1	U	Y	D	1	5
Haha (Cyanea procera)	E	1	U	N	U	1	5
Haha (Cyanea shipmanii)	E	1	D	N	U	1	2
Haha (Cyanea stictophylla)	E	1	U	N	U	1	5
Haha (Cyanea superba)	E	1	U	Y	D	1	5
Haha (Cyanea truncata)	E	1	D	N	U	1	5
Haha (Cyanea undulata)	E	1	U	Y	D	1	11
Haplostachys, narrow-leaved	E	1	U	Y	D	1	2
Harebells, Avon Park	E	4	S	N	U	1	2C
Harperella	E	5	S	Y	F	1	8
Hau kuahiwi, Kauai	E	1	D	Y	D	1	2
Heartleaf, dwarf-flowered	T	4	S	N	U	1	14
Heather, mountain golden	T,CH	4	D	Y	F	2	8
Heau	E	1	U	Y	D	1	2
Hedyotis degeneri (NCN)	E	1	U	N	U	1	5
Hedyotis parvula (NCN)	E	1	U	Y	D	1	5
Hedyotis st.-johnii (NCN)	E	1	U	Y	D	1	11
Hesperomannia arborescens (NCN)	E	1	U	N	U	1	5
Hesperomannia arbuscula (NCN)	E	1	U	Y	D	1	5

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Hesperomannia lydgatei (NCN)	E	1	U	Y	D	1	11
Hibiscus, Clay's	E	1	U	Y	D	1	2
Higuero de Sierra	E	4	S	Y	F	1	5
Holei	E	1	U	N	U	1	5
Holly, Cook's	E	4	D	Y	F	1	5
Howellia, water	T	6	U	N	U	1	7
Hypericum, highlands scrub	E	4	I	Y	F	3	2
Ihi'ihi (Marsilea villosa)	E	1	I	Y	D	1	8
Ilex sintenisii (NCN)	E	4	D	Y	D	1	11
Iliau, dwarf	E	1	U	Y	D	1	5
Ipomopsis, Holy Ghost	E	2	U	N	U	1	5
Iris, dwarf lake	T	3	S	N	U	1	8
Irisette, white	E	4	D	Y	D	1	8
Ischaemum, hilo	E	1	U	N	U	1	8
Ivesia, Ash Meadows	T,CH	1	S	Y	F	2	8
Jacquemontia, beach	E	4	S	N	U	1	2
Jewelflower, California	E	1	S	N	U	1	2
Joint-vetch, sensitive	T	5	S	N	D	1	2
Kamakahala	E	1	U	Y	D	1	11
Kauila	E	1	D	N	U	1	5
Kaulu	E	1	U	Y	D	1	5
Kio'ele (Hedyotis coriacea)	E	1	U	N	U	1	2
Ko'oko'olau (Bidens micrantha ssp. kalealaha)	E	1	U	N	U	1	9
Ko'oko'olau (Bidens wiebkei)	E	1	U	N	U	1	2
Ko'okoa'ula (=Abutilon, Menzies')	E	1	I	Y	D	1	2C
Koki'o (=hau-hele'ula)	E,CH	1	D	Y	F	1	5
Koki'o ke'oke'o (Hibiscus arnottianus ssp. immaculatus)	E	1	U	N	U	1	3
Kokio, Cooke's	E	1	S	N	NA	1	5
Kulu'i	E	1	U	Y	D	1	8
Ladies'-tresses, Navasota	E	2	D	Y	F	1	2
Ladies'-tresses, Ute	T	6	D	N	U	1	2C
Larkspur, San Clemente Island	E	1	I	Y	F	3	8
Laukahi kuahiwi	E	1	U	N	U	1	5
Layia, beach (=Tidytips, beach)	E	1	U	N	U	1	2
Lead-plant, crenulate	E	4	S	Y	F	2	5C
Leather-flower, Alabama	E	4	S	Y	F	1	2
Leather-flower, Morefield's	E	4	D	Y	F	1	5
Lepanthes eltoroensis (NCN)	E	4	U	NA	NA	1	5
Leptocereus grantianus (NCN)	E	4	D	Y	D	1	5C
Liliwai	E	1	U	N	U	1	5
Lily, Minnesota dwarf trout	E	3	U	Y	F	2	8C
Lily, western (Lilium occidentale)	E	1	D	N	U	1	2

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Live-forever, Santa Barbara Island	E	1	S	Y	F	1	8C
Lobelia niihauensis (NCN)	E	1	U	N	U	1	11
Lobelia oahuensis (NCN)	E	1	U	N	U	1	5
Locoweed, Fassett's	T	3	I	Y	F	1	9
Loosestrife, rough-leaved	E	4	U	Y	D	1	8
Loulu (Pritchardia affinis)	E	1	U	N	U	1	5
Loulu (Pritchardia munroi)	E	1	S	N	U	1	2
Lousewort, Furbish	E	5	S	Y	R(1)	3	14
Lupine, clover (=Lupine, Point Reyes)	E	1	U	N	U	1	8
Lupine, scrub	E	4	D	Y	F	2	2C
Lyonia truncata var. proctorii (NCN)	E	4	D	Y	D	1	6C
Lysimachia filifolia (NCN)	E	1	U	Y	D	1	5
Lysimachia lydgatei (NCN)	E	1	U	N	U	1	2
Mahoe (Alectryon macrococcus)	E	1	D	N	U	1	5
Makou	T	1	U	Y	D	1	8
Mallow, Kern	E	1	S	N	U	1	2
Mallow, Peters Mountain	E	5	I	Y	F	3	5
Manioc, Walker's	E	2	U	Y	F	1	5
Manzanita, Presidio (=Raven's)	E	1	S	Y	F	2	12
Mariscus fauriei (NCN)	E	1	U	N	U	1	14
Maua (Xylosma crenatum)	E	1	U	Y	D	1	5
Meadowfoam, Butte County	E	1	D	N	U	1	2C
Meadowfoam, Sebastopol	E	1	D	N	U	1	2C
Meadowrue, Cooley's	E	4	S	Y	F	2	2
Milk-vetch, Applegate's	E	1	D	N	U	1	5
Milk-vetch, Ash Meadows	T,CH	1	S	Y	F	2	8
Milk-vetch, Cushenbury	E	1	D	N	U	1	8
Milk-vetch, Heliotrope	T,CH	6	U	N	U	1	17
Milk-vetch, Jesup's	E	5	S	Y	F	1	7C
Milk-vetch, Mancos	E	2	D	Y	F	1	5C
Milk-vetch, Osterhout	E	6	D	Y	F	2	2
Milk-vetch, sentry	E	2	D	Y	D	1	3
Milkpea, Small's	E	4	D	Y	F	1	5C
Milkweed, Mead's	T	3	D	N	U	1	8
Milkweed, Welsh's	T,CH	6	D	Y	F	1	5C
Mint, Garrett's (=scrub)	E	4	D	Y	F	1	2C
Mint, Lakela's	E	4	S	Y	F	2	2C
Mint, longspurred	E	4	D	Y	F	1	2C
Mint, San Diego mesa	E	1	D	N	U	1	5
Mint, Otay Mesa	E	1	U	N	U	1	2C
Mint, scrub	E	4	D	Y	F	1	2
Mitracarpus maxwellidae (NCN)	E	4	D	N	U	1	5
Mitracarpus polycladus (NCN)	E	4	D	N	U	1	5

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Monkey-flower, Michigan	E	3	S	Y	D	1	9C
Monkshood, northern wild	T	3	U	Y	RD(1)	2	8
Munroidendron racemosum (NCN)	E	1	U	Y	D	1	2
Mustard, Carter's	E	4	D	Y	F	1	2
Mustard, Penland alpine fen	T	6	U	N	U	1	11C
Mustard, slender-petaled	E	1	D	N	U	1	5C
Myrcia paganii (NCN)	E	4	U	N	U	1	8
Naupaka, dwarf	E	1	S	N	U	1	2
Na'ena'e (Dubautia herbstobatae)	E	1	U	Y	D	1	2
Na'ena'e (Dubautia latifolia)	E	1	U	Y	D	1	5
Na'ena'e (Dubautia pauciflorula)	E	1	U	Y	D	1	8
Nehe (Lipochaeta fauriei)	E	1	U	Y	D	1	2
Nehe (Lipochaeta kamolensis)	E	1	U	N	U	1	2
Nehe (Lipochaeta lobata var. leptophylla)	E	1	U	Y	D	1	6
Nehe (Lipochaeta micrantha)	E	1	U	Y	D	1	2
Nehe (Lipochaeta tenuifolia)	E	1	U	Y	D	1	8
Nehe (Lipochaeta venosa)	E	1	U	Y	D	1	5
Nehe (Lipochaeta waimeaensis)	E	1	U	Y	D	1	2
Neraudia angulata (NCN)	E	1	U	Y	D	1	5
Nioi	E	1	U	N	U	1	5
Niterwort, Amargosa	E,CH	1	S	Y	F	2	8
Nohoanu (Geranium arboreum)	E	1	U	N	U	1	2
Nohoanu (Geranium multiflorum)	E	1	U	N	U	1	8
Oak, Hinckley's	T	2	D	Y	F	1	8
Oha wai (Clermontia lindseyana)	E	1	U	N	U	1	2
Oha wai (Clermontia oblongifolia ssp. brevipes)	E	1	U	N	U	1	6
Oha wai (Clermontia oblongifolia ssp. mauiensis)	E	1	U	N	U	1	6
Oha wai (Clermontia peleana)	E	1	U	N	U	1	5
Oha wai (Clermontia pyrularia)	E	1	U	N	U	1	2
Ohe'ohe	E	1	U	N	U	1	5
Olulu	E	1	D	Y	D	1	2
Opuhe	E	1	U	Y	D	1	5
Orchid, eastern prairie fringed	T	3	U	Y	D	1	8
Orchid, western prairie fringed	T	3	S	Y	D	1	8
Oxytheca, Cushenbury	E	1	S	N	U	1	9
Paintbrush, San Clemente Island Indian	E	1	I	Y	F	1	8
Palma de, Manaca (=manac palm)	T	4	D	Y	F	2	8
Palo colorado	E	4	S	Y	D	1	11
Palo de jazmin	E	4	U	Y	D	1	5
Palo de nigua	E	4	D	Y	F	1	5
Palo de Ramon	E	4	D	Y	F	1	5
Palo de Rosa	E	4	S	Y	F	1	8
Pamakani	E	1	U	Y	D	1	3

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Panicgrass, Carter's	E,CH	1	S	Y	D	1	9
Pawpaw, beautiful	E	4	D	Y	F	1	2
Pawpaw, four-petal	E	4	S	Y	F	2	11
Pawpaw, Rugel's	E	4	D	Y	F	1	2
Pennyroyal, Todsen's	E,CH	2	I	Y	F	1	8
Penstemon, blowout	E	6	S	Y	F	2	11C
Peperomia, Wheeler's	E	4	S	Y	F	1	5
Phacelia, clay	E	6	D	Y	F	1	5
Phacelia, North Park	E	6	U	Y	F	2	5
Phlox, Texas trailing	E	2	U	Y	D	1	3
Phyllostegia glabra var. lanaiensis (NCN)	E	1	U	Y	D	1	3
Phyllostegia mannii (NCN)	E	1	U	N	U	1	2
Phyllostegia mollis (NCN)	E	1	U	Y	D	1	8
Phyllostegia waimeae (NCN)	E	1	U	Y	D	1	5
Pilo (Hedyotis mannii)	E	1	U	U	U	1	5
Pink, swamp	T	5	S	Y	F	1	7C
Pinkroot, gentian	E	4	D	N	U	1	2
Pitaya, Davis' green	E	2	D	Y	F	1	3
Pitcher-plant, Alabama canebrake	E	4	D	Y	F	1	6
Pitcher-plant, green	E	4	I	Y	RD(2)	2	8
Pitcher-plant, mountain sweet	E	4	S	Y	F	2	3
Plum, scrub	E	4	D	Y	F	2	2
Poa siphonoglossa (NCN)	E	1	D	Y	D	1	2
Po'e (Portulaca sclerocarpa)	E	1	U	N	U	1	2
Pogonia, small-whorled	E	5	I	Y	R(1)	3	14
Polygala, Lewton's	E	4	D	N	U	1	8
Polygala, tiny	E	4	S	Y	F	2	5C
Polystichum calderonense (NCN)	E	4	D	Y	D	1	5
Pondberry	E	4	S	Y	F	1	8
Pondweed, Little Aguja Creek	E	2	D	Y	F	1	5
Poppy-mallow, Texas	E	2	D	Y	F	1	2
Poppy, Sacramento prickly	E	2	U	Y	F	1	3
Potato-bean, Price's	T	4	S	Y	F	1	8
Prairie-clover, leafy	E	4	D	Y	F	1	5
Prickly-apple, fragrant	E	4	D	Y	F	1	3
Prickly-ash, St. Thomas	E	4	D	Y	F	1	2C
Primrose, Maguire	T	6	D	Y	F	2	5C
Quillwort, black-spored	E	4	S	Y	F	1	5
Quillwort, Louisiana	E	4	S	N	U	1	8
Quillwort, mat-forming	E	4	S	Y	F	1	8
Rattleweed, hairy (=wild indigo)	E	4	D	Y	F	1	8
Reed-mustard, Barneby	E	6	U	Y	F	1	5
Reed-mustard, clay	T	6	U	Y	F	1	14

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Remya kauaiensis (NCN)	E	1	U	Y	D	1	11
Remya mauiensis (NCN)	E	1	U	N	U	1	5
Remya montgomeryi (NCN)	E	1	U	Y	D	1	5
Rhododendron, Chapman's	E	4	D	Y	F	1	8C
Ridge-cress (=pepper-cress), Barneby	E	6	D	Y	F	1	5C
Rock-cress, McDonald's	E	1	S	Y	F	3	2
Rock-cress, shale barren	E	5	S	Y	F	2	11
Rollandia crispa (NCN)	E	1	U	N	U	1	5
Rosemary, Apalachicola	E	4	I	Y	F	1	8
Rosemary, Cumberland	T	4	U	N	U	1	8
Rosemary, Etonia	E	4	S	Y	F	1	2C
Rosemary, short-leaved	E	4	S	N	U	1	8C
Roseroot, Leedy's	T	3	S	Y	D	1	9
Rush-pea, slender	E	2	D	Y	F	1	2
Sand-verbena, large-fruited	E	2	D	Y	F	1	2
Sandalwood, Lanai (='iliahi)	E	1	S	Y	D	1	3
Sandlace	E	4	D	N	U	2	8
Sandwort, Cumberland	E	4	U	Y	D	1	8
Sandwort, marsh	E	1	D	N	U	1	5C
Sanicula mariversa (NCN)	E	1	U	Y	D	1	5
Schiedea apokremnos (NCN)	E	1	U	Y	D	1	8
Schiedea, Diamond Head	E	1	S	Y	F	1	2
Schiedea haleakalensis (NCN)	E	1	U	N	U	1	2
Schiedea kaalae (NCN)	E	1	U	Y	D	1	2
Schiedea lydgatei (NCN)	E	1	U	N	U	1	8
Schiedea spergulina var. leiopoda (NCN)	E	1	U	Y	D	1	5
Schiedea spergulina var. spergulina (NCN)	T	1	U	Y	D	1	8
Schoepfia arenaria (NCN)	T	4	D	Y	F	1	5C
Sedge, Navajo	T,CH	2	U	Y	F	1	8
Serianthus nelsonii [Hyun lagu (Guam), Trokon guafi (Rota)]	E	1	D	Y	F	1	5
Silene alexandri (NCN)	E	1	U	N	U	1	2
Silene hawaiiensis (NCN)	T	1	U	N	U	1	8
Silene lanceolata (NCN)	E	1	U	N	U	1	2
Silversword, Haleakala (='ahinahina)	T	1	S	Y	D	1	9
Silversword, Ka'u	E	1	U	Y	D	1	5
Silversword, Mauna Kea (='ahinahina)	E	1	D	Y	F	1	6
Skullcap, Florida	T	4	S	Y	F	1	2
Skullcap, large-flowered	E	4	S	Y	D	1	8
Snakeroot, scrub-celery	E	4	D	Y	F	2	2
Snowbells, Texas	E	2	I	Y	F	1	2
Spineflower, Ben Lomond	E	1	U	N	U	1	2C
Spineflower, Howell's	E	1	D	N	U	1	2

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Spineflower, Monterey	T	1	S	N	U	1	9C
Spineflower, robust	E	1	D	N	U	1	9C
Spineflower, slender-horned	E	1	U	N	U	1	1C
Spineflower, Sonoma	E	1	D	N	U	1	2
Spiraea, Virginia	T	5	S	Y	F	1	8
Spurge, deltoid	E	4	D	Y	F	2	6C
Spurge, Garber's	T	4	S	Y	F	2	8
Spurge, telephus	T	4	S	Y	F	1	2
Stenogyne bifida (NCN)	E	1	U	N	U	1	2
Stenogyne campanulata (NCN)	E	1	U	Y	D	1	2
Stenogyne, kanehoana	E	1	U	Y	D	1	2
Stenogyne, narrow-leaved	E	1	S	Y	D	1	2
Sumac, Michaux's	E	4	D	Y	F	1	2
Sunflower, Schweinitz's	E	4	D	Y	F	1	5
Sunray, Ash Meadows	T,CH	1	S	Y	F	2	9
Sunshine, Sonoma (=Stickyseed, Baker's)	E	1	D	N	U	1	5C
Tectaria estremerana (NCN)	E	4	U	Y	D	1	8
Ternstroemia subsessilis	E	4	5	Y	D	1	11
Tetramolopium arenarium (NCN)	E	1	D	N	U	1	5
Tetramolopium filiforme (NCN)	E	1	U	N	U	1	2
Tetramolopium lepidotum ssp. lepidotum (NCN)	E	1	U	Y	D	1	2
Tetramolopium remyi (NCN)	E	1	U	Y	D	1	5
Tetramolopium rockii (NCN)	T	1	U	N	U	1	14
Thelypteris inabonensis (NCN)	E	4	U	Y	D	1	5
Thelypteris verecunda (NCN)	E	4	U	Y	D	1	5
Thelypteris yaucoensis (NCN)	E	4	D	Y	D	1	5
Thistle, Pitcher's	T	3	D	Y	D	1	8C
Thistle, Sacramento Mountains	T	2	S	Y	F	1	2
Thornmint, San Mateo	E	1	D	N	U	1	6C
Torreya, Florida	E	4	D	Y	F	1	5
Townsendia, Last Chance	T	6	U	Y	F	1	5C
Trillium, persistent	E	4	S	Y	F	2	8
Trillium, relict	E	4	D	Y	F	1	8
Twinpod, Dudley Bluffs	T	6	S	Y	F	2	14
Uhiuhi	E	1	D	Y	D	1	5
Vernonia proctorii (NCN)	E	4	D	Y	D	1	5C
Vetch, Hawaiian	E	1	S	Y	F	1	2C
Viola helenae (NCN)	E	1	U	Y	D	1	8
Viola lanaiensis (NCN)	E	1	U	Y	D	1	2
Wahine noho kula (Isodendrion pyrifolium)	E	1	U	N	U	1	2
Wallflower, Ben Lomond	E	1	U	N	U	1	2C
Wallflower, Contra Costa	E,CH	1	S	Y	R(1)	2	6
Wallflower, Menzies'	E	1	D	N	U	1	2C

Listed Species	Listed As	Lead Region	Pop. Status	Rec. Plan	Plan Stage	Rec. Ach.	Rec. Prior.
Warea, clasping (=wide-leaf)	E	4	D	Y	F	1	2C
Water-plantain, Kral's	T	4	S	Y	F	1	5C
Water-willow, Cooley's	E	4	U	Y	F	1	8
Watercress, Gambel's	E	1	D	N	U	1	2C
Wawae'iole (Huperzia (=Lycopodium) nutans)	E	1	U	N	U	1	5
Wawae'iole (Huperzia (=Lycopodium) mannii)	E	1	U	N	U	1	5
Whitlow-wort, papery	T	4	D	Y	F	3	8
Wild-rice, Texas	E,CH	2	D	Y	F	1	2C
Wings, pigeon	T	4	U	N	U	1	14
Wire-lettuce, Malheur	E,CH	1	U	Y	F	2	2
Wireweed (=Polygonella basiramia)	E	4	D	Y	F	3	2
Woolly-star, Hoover's	T	1	I	N	U	1	2
Woolly-star, Santa Ana River	E	1	D	N	U	1	3C
Wooly-threads, San Joaquin	E	1	D	N	U	1	2
Ziziphus, Florida	E	4	S	Y	F	2	5

Species: *Chisos Mountain hedgehog cactus*
Listed As: *Threatened*
Population Status: *Declining*
NPS PHOTO

Species: *MacFarlane's four-o'clock*
Listed As: *Endangered*
Population Status: *Improving*
PAULA BROOKS

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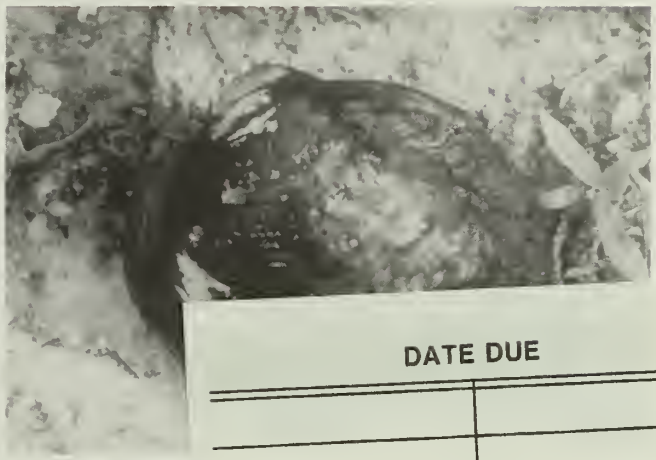
Species: *Oha wai*
Listed As: *Endangered*
Population Status: *Uncertain*
JOBY ROHRER

Species: *Tooth Cave spider*
Listed As: *Endangered*
Population Status: *Uncertain*
WYMAN MEINZER

Species: *Bay checkerspot butterfly*
Listed As: *Threatened*
Population Status: *Declining*
PAUL OPLER



Species: *Ouachita r*
Listed As: *Endanger*
Population Status
PAT MEHLHOP

Species: *Kentucky Cave shrimp*
Listed As: *Endangered*
Population Status: *Uncertain*
CHIP CLARK

Species: *Gray wolf*
Listed As: *Endangered*
Population Status: *In*
DAVE MECH

Report to Congress

Recovery Program

Endangered and Threatened Species ✧ 1994

July/August 1994 Vol. XIX No. 4

ENDANGERED SPECIES

Technical Bulletin

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

Restoration of the Bald Eagle and Gray Whale Marks Progress in Recovery

America's efforts to save rare species reached several important milestones recently. On June 30, the Fish and Wildlife Service (FWS) announced that most bald eagle *(Haliaeetus leucocephalus)* populations have recovered sufficiently to allow a proposed upgrading of its status from "Endangered" to the less critical category of "Threatened" in most of the Nation. This good news follows a June 15 publication in the *Federal Register* formally recognizing the recovery of the California gray whale *(Eschrichtius robustus)* and removing it from the List of Threatened and Endangered Species.

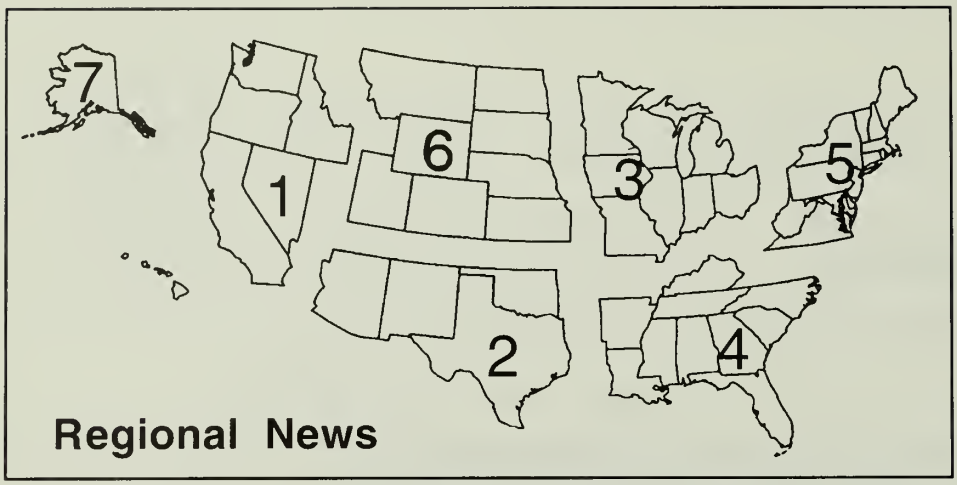
Giving Wing to Hope

In ceremonies at Blackwater National Wildlife Refuge in Maryland, FWS Director Mollie Beattie celebrated the bald eagle's improvement by releasing to the wild a 10-pound adult female nicknamed "Hope." The eagle had been rehabilitated at the Bal-

(continued on page 5)

Washington Post photo by James Thresher

Fish and Wildlife Service Director Mollie Beattie releases "Hope," a rehabilitated bald eagle, symbolizing the comeback of our national symbol. "The eagle's recovery is a tribute to the success of the Endangered Species Act and other conservation laws, and to the selfless efforts of the many, many people who have worked so hard to bring the eagle back from the brink of extinction," Beattie said.



Regional News

Regional endangered species contacts have reported the following news:

Region 2 - Fish and Wildlife Service (FWS) biologists braved unseasonably cold weather this spring to seine the Comal River near New Braunfels, Texas, in an effort to collect fish and invertebrate samples for a study of the Comal River system. Now in its third year and scheduled to continue for at least 2 more years, the study will result in the most in-depth biological information yet compiled about this unique river system.

*****

In response to the March 14 "not warranted" finding issued by the FWS on a petition to remove seven cave-dwelling invertebrate species from the Endangered Species List, Williamson County Commissioners filed a lawsuit against the FWS in the U.S. District Court in Austin, Texas. The suit contends that two of the invertebrates, the Tooth Cave ground beetle (*Rhadine persephone)* and Bone Cave harvestman (*Texella reyesi)*, are found at many sites in both Travis County and Williamson County and therefore do not warrant listing as Endangered.

The FWS based its decision not to delist the species on continuing threats to the invertebrates and the caves they inhabit, including: predation by, and competition with, non-native fire ants; habitat destruction and deterioration resulting from activities such as cave-filling and trash-dumping; an increase in impermeable ground-cover; potential contamination from septic effluents, sewer leaks, run-off, and pesticides; and cave vandalism.

Other invertebrate species listed in the petition are the Coffin Cave mold beetle (*Batrisodes texanus*), Tooth Cave spider (*Leptoneta myopica*), Tooth Cave pseudoscorpion (*Microcreagris texana*), Kretschmarr Cave mold beetle (*Texamaurops reddelii*), and Bee Creek Cave harvestman (*Texella reddelii*). As of mid-July, there was no specific date for Federal Court action on the lawsuit.

*****

The FWS Texas Ecological Services Office has assembled eight educational resource trunks stocked with videotapes, slide shows, books, brochures, and flashcards. Four of the eight trunks are devoted to fish and wildlife

(continued on page 22)

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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;* Janet Hohn, *Assistant Regional Director;* Dave McGillivary, *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.

Administrative Changes Will Make Endangered Species Act More "User-friendly" and Improve Benefits to Species

A series of new policies aimed at improving the Endangered Species Act's effectiveness in recovering listed species, while making it easier for people to work with and understand, were announced June 14 by Interior Secretary Bruce Babbitt and D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere.

Among the changes are policies that minimize the social and economic impact of recovery planning under the Act; provide independent scientific peer review of listing and recovery decisions; require agencies implementing the Act to identify quickly and clearly activities on private lands that may be affected by a listing decision; create cooperative, ecosystem-based approaches to conserve listed and candidate species before crises arise; establish guidelines to ensure that decisions made under the Act represent the best available scientific information; and provide a greater role for State agencies, along with a closer working relationship between Federal and State officials.

In addition, President Clinton has asked the Interior and Commerce departments to convene an interagency working group to recommend additional ways to improve administration of the Act.

"These reforms are a solid step in the right direction," said Senator Max Baucus (D-Montana), Chairman of the Senate Environment and Public Works Committee. "If implemented properly, this reform package should produce better conservation decisions that cost society less and win more public support."

"Critics of the Endangered Species Act have often said that listing decisions must be based on sound science," said Representative Gerry E. Studds (D-Massachusetts), Chairman of the House Merchant Marine and Fisheries Committee. "With today's announcement, the Administration is moving aggressively toward that goal."

To ensure that the scientific analysis of information used to list and recover species is as comprehensive as possible, a new policy establishes an independent peer review process. The government will solicit expert opinion of three independent specialists to analyze data on which listings are based. The peer review process will also be used during development of recovery plans. In addition, guidelines have been established to guarantee that the information used to implement the Act represents the best data available.

Under another new policy, designed to minimize social and economic effects from recovery planning, the composition of recovery planning teams will be expanded beyond the scientific community to include other areas of expertise. Public input during recovery planning has always been solicited, but including representatives of local interests on recovery teams will ensure that recovery decisions are both scientifically sound *and* sensitive to human needs. The goal is to reduce the likelihood of economic disruption caused by recovery activities, while ensuring species recovery.

Another policy, designed to ease concern about private land uses when one or more listed species is present, requires the government to identify immediately those actions permissible under the Act and those that could be violations. The information would be provided in the final listing rule, along with a Service contact for landowners uncertain about activities not delineated in the rule. This policy will apply to all plants and animals listed after October 1, 1994.

A statement from one of the Nation's largest private timberland owners was presented at the announcement. "We applaud the leadership of Secretary Babbitt and Under Secretary Baker," said John F. Rasor, Vice-President of the Georgia Pacific Corporation. "Georgia Pacific stands ready to provide leadership to the much-needed dialogue to make the Endangered Species Act work faster and better."

In an effort to improve coordination, the Fish and Wildlife Service and the National Marine Fisheries Service will work closely with other Federal agencies, the States, Tribal governments, and private groups to conserve listing candidates before listing is needed. Both agencies will consult States on candidate species identification and conservation; listing decisions; and recovery activities, including development of recovery plans.

The government will also emphasize multi-species listings and recovery plans for species sharing the same ecosystem. "Communities, businesses, and landowners need to plan their futures with reasonable confidence, and that is why we are shifting the focus away from individual species and toward the concept of ecosystems," Secretary Babbitt said. "By looking at the big picture, by focusing our resources and efforts on ecosystems rather than individual species, we can get away from crisis management where our choices are limited and our costs are high," added Mollie Beattie, Director of the Fish and Wildlife Service.

The interagency working group established to review the Endangered Species Act and suggest further improvements will seek the participation of all other Federal agencies to identify additional administrative changes. Input from the States, county and local governments, and private citizens will also be sought.

Except as noted above, these new policies became effective upon their publication in the July 1, 1994, *Federal Register.*

Senate Subcommittee Hears Testimony on Administration of the Endangered Species Act

by Denny Lassuy

The improvements in administration of the Endangered Species Act announced by Interior Secretary Babbitt and Commerce Under Secretary Baker on June 14 were presented to Congress the next day in a hearing before the Senate Environment Subcommittee on Clean Water, Fish and Wildlife. This was the first in a series of hearings planned by the Senate Environment Committee on reauthorization of the Endangered Species Act.

Chairman Graham of Florida opened the hearing by applauding the new policies, particularly noting his support for ecosystem-based approaches. He also said while he recognizes species loss is a natural event, he believes the rate of loss has been sharply accelerated by human activity.

Senator Baucus of Montana referred to the Act as "critically important" but cited the "mixed reviews" it has received of late. He pointed out that controversy is the exception rather than the rule under the Act and went on to explain aspects of S. 921, a reauthorization bill he and Senator Chafee have introduced that has been endorsed by the Western Governor's Association.

Senator Chafee of Rhode Island, the subcommittee's ranking Republican, called the Act "a terrific law," referred to its historically strong support in the Senate, and stressed the need to protect the ecosystems upon which Threatened and Endangered species depend.

Senator Kempthorne of Idaho noted that his State has an economy based on resource use and that most of those resources are found on Federal lands. He suggested that implementation of the Act has been based on "inaccurate science" and resulted in "incessant planning."

In his testimony, Secretary Babbitt said the Act is a strong, yet flexible law, and he cited the new policy directives announced the previous day. He briefly explained the new directives and said that he operated on three principles: 1) use comprehensive, unimpeachable science, 2) get involved early, and 3) maintain an ecosystem focus. He noted four specific cases (Pacific Northwest Forest Plan, habitat conservation planning in California, Platte River water use, and working with Georgia-Pacific on red-cockaded woodpeckers) that he had learned from, and which formed much of the basis for the new directives.

Assistant Commerce Secretary Hall said that "Commerce shares the principles cited by Secretary Babbitt," and that the challenge is to reduce the need for species listings by properly implementing other Federal conservation laws. Commerce, through the National Marine Fisheries Service, has jurisdiction under the Act for most marine species.

Senator Chafee referred to the Secretary's accounting of over 118,000 interagency consultations carried out under Section 7 of the Act, with only 33 halting projects, as "an astounding and reassuring statistic." Secretary Babbitt said this clearly shows that the process works, and he suggested that many Federal actions may well have been improved to the mutual benefit of both the project and the species through Section 7.

Dr. E.O. Wilson, the noted authority on biodiversity from Harvard University, also testified at the hearing. He said that all nations have three sources of wealth — material, cultural, and biological — and that the latter was "pathetically unknown." A typical pinch of forest soil, he noted, may contain thousands of species, most of them unknown. This, Dr. Wilson said, is the "vast nexus of life that is protected when we save an ecosystem." He added that America's aquatic ecosystems are its most endangered, and closed by asking people to "look to the human mind" and realize the psychological and spiritual value of our biological heritage.

Testimony was also presented by Michael Bean of the Environmental Defense Fund. He recounted the decline and recovery of the whooping crane, and said its example illustrated three lessons: 1) although steady progress is possible, there is no instant recovery for species on the edge; 2) getting involved in species recovery late is more risky and costly; and 3) while some people use species like the crane to "whoop up controversy and excite fear," there have been very few conflicts under the Act.

Former Senator McClure, speaking for the National Endangered Species Act Reform Coalition, said his organization is not seeking to repeal but to reform the Act by making it "more useful, more economical, and more democratic." He also said he disagreed with a Supreme Court decision that the Act has primacy over other Federal laws, and suggested that Congress had not intended the Act to have such power.

During his questioning of the witnesses, Senator Baucus cited an Environmental Protection Agency risk assessment study that pointed to species loss and ecosystem disruption as greater long-term risks to human activity than particular pollutant risks, and he asked Mr. McClure for his opinion. Mr. McClure suggested "science is ambiguous" and risk assessment "needs work."

Senator Chafee asked Mr. Bean if the fact that no Constitutional takings

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photo by D.W. Rice

California gray whale

Recovery Progress

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timore Zoo and Tri-State Bird Rescue and Research in Newark, Delaware, after suffering a broken wing.

"With the release of this bird, we rejoice in the recovery of not just this eagle, but the recovery of bald eagle populations in most of the Nation," Beattie said. "The recovery of this species is a great success story. This Independence Day we will have additional reason to celebrate with the return of the bird that symbolizes our country's freedom and fierce pride."

Hope's release accompanied an announcement that the FWS would propose to reclassify the Nation's symbol from "Endangered" to Threatened" throughout its listed range (the conterminous 48 States), except in the Southwest. Bald eagle numbers in the lower 48 States have climbed from about 417 nesting pairs in 1963 to more than 4,000 pairs of adult birds in 1993. In addition, biologists estimate there are 5,000 to 6,000 juvenile bald eagles in this part of North America. Under the proposed rule, the "Threatened" classification will be retained until full recovery is achieved.

Currently, eagles are listed as Endangered in 43 States and as Threatened in Minnesota, Michigan, Oregon, Washington, and Wisconsin. The FWS proposal would reclassify the eagle to "Threatened" throughout the lower 48, except in Arizona, New Mexico, western Texas, and a small portion of southeastern California, where the species' recovery has been slower. The bald eagle would remain listed as Endangered in this area until the population is more secure. Under the Endangered Species Act, an "Endangered" species is one that is likely to become extinct, while a "Threatened" species is one likely to become Endangered. Eagle populations in Alaska and Canada are considered healthy, and are not listed as Endangered or Threatened.

A Threatened designation more accurately reflects the species' improving status, but does not remove the protection afforded the bald eagle under the Endangered Species Act. The eagle is also protected under the Eagle Protection Act and the Migratory Bird Treaty Act, as well as under various State laws. Its protection under these statutes would not be affected by the reclassification proposal.

Historically, bald eagles nested throughout most of North America, but habitat loss, uncontrolled shooting, and poisoning by the pesticide DDT reduced the species' population to the point that it was listed as Endangered in 1967. Recovery activities carried out since that time have included protecting nesting sites, including other important habitat in the National Wildlife Refuge System, and reintroducing eagles into unoccupied habitat. Many States have reestablished nesting populations by translocating young eagles from areas where populations are healthy, raising them, and releasing them to the wild. When mature, these eagles often return to the area to nest. These ongoing

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Senate Hearing

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of private property under the Act have ever been determined by any court indicated that court action was simply out of the reach of small landowners. Mr. Bean said he imagined some are without the means to go to court, but he added that no claim of such taking had even been filed by any citizen, including large landowners.

Senator Kempthorne asked if the term "ecosystem management" was even in the Act. Mr. Bean indicated that it is not, but that the protection of ecosystems is among the statements of purpose of the Act. The Senator closed by lauding the beauty of his home State of Idaho, to which Dr. Wilson volunteered "and may you lose not a single species." On that note, Chairman Graham adjourned the hearing.

Other subcommittee hearings this summer and fall are to focus on endangered species conservation on private property, implementation of the Act by Federal land management agencies, recovery planning, and preventing endangerment. Reauthorization of the Act is not expected until next year.

Denny Lassuy is a Legislative Specialist with the FWS Office of Legislative Services.

Report Chronicles Progress in Endangered Species Recovery

by Jennifer Heck

Nearly 40 percent of all species listed federally as Threatened or Endangered are now stable or improving, according to a report recently released by the U.S. Fish and Wildlife Service (FWS). *Endangered and Threatened Species Recovery Program - Report to Congress*, the second such report prepared in compliance with the 1988 amendments to the Endangered Species Act, provides information on population status and recovery plan development for the 711 species listed in the United States as of September 30, 1992, that are under FWS jurisdiction.[1]

As a result of recovery efforts, 10 percent of the 711 species are reported as improving and an additional 28 percent are considered stable. The number of species considered to be in decline is 33 percent. The percentage of species whose status is unknown is 27 percent, and the remaining 2 percent of the 711 listed species are believed to have gone extinct prior to listing.

It is FWS policy to prepare a recovery outline within 60 days of listing a species, a draft plan within 1 year of listing, and a final recovery plan within 2.5 years of the date of listing. Recovery plans also are reviewed and revised every 5 years or more often if necessary. Because recovery efforts are carried out under a fixed budget, the FWS employs a priority system when allocating funds for species recovery. Under this system, each species is assigned a priority rank based on its degree of threat, recovery potential, taxonomy, and degree of conflict with development activities.

According to the 1992 Recovery Report, 58 percent of the 711 species had final recovery plans and an additional

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[1] Federal species listings through September 1992 totaled 728 but 17 of these are under primary jurisdiction of the National Marine Fisheries Service of the Department of Commerce.

More than half of the species listed as Endangered or Threatened are plants. In recent years, cooperative management efforts involving Federal, State, local, and private partners have resulted in notable progress in plant recovery. Between September 1992 and June 1994, three plant species have been delisted and one has been reclassified from Endangered to Threatened. Delisted plant species include the Tumamoc globeberry *(Tumamoca macdougalii)*, spineless hedgehog cactus *(Echinocereus triglochidiatus inermis)*, and McKittrick pennyroyal *(Hedeoma apiculatum)*. The Siler pincushion cactus *(Pediocactus sileri)*, reclassified to Threatened in 1993, is one of several cactus species showing improvement in the southwestern United States. Four additional plant species have been proposed for reclassification — the Loch Lomond coyote thistle *(Eryngium constancei)*, small whorled pogonia *(Isotria medeoloides)*, Virginia round-leaf birch *(Betula uber)*, and MacFarlane's four-o'clock *(Mirabilis macfarlanei)*.

photo by Peggy Olwell

Cooperative recovery efforts involving the Bureau of Land Management, Fish and Wildlife Service, New Mexico Department of Game and Fish, and The Nature Conservancy have improved the status of the Knowlton cactus* (Pediocactus knowltonii), *a small species with a very restricted range.

The FWS faced a challenge in the case of the Peter's Mountain mallow *(Iliamna corei)*, a plant that occurs naturally at only one known site in southwest Virginia. Only three individuals of this species remained when it was listed in 1986, and they were not producing seeds. Botanists from Virginia Tech University recovered viable seeds from leaf litter at the site and succeeded in producing many healthy plants and thousands of seeds, allowing for additional research on the germination process of this species. It was determined by botanists at the University of Kentucky that, under natural conditions, the seed coats were broken by the heat from fires. Fire suppression had therefore contributed to the decline of this species. Its site is now owned and protected by The Nature Conservancy. Prescribed burning is being used successfully by the Virginia Department of Conservation and Recreation, in cooperation with the U.S. Fish and Wildlife Service, U.S. Forest Service, and Virginia Department of Agriculture and Consumer Services, to further promote the species' recovery.

Report Chronicles Recovery

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8 percent had draft plans as of September 30, 1992. Most of the remaining species without recovery plans had been listed for less than 3 years and recovery plans for these species were under development. By September 1996, the FWS plans to eliminate the backlog of species listed longer than 2.5 years that lack recovery plans. Recognizing that several listed species may share geographic locations and/or face common threats, the FWS will continue to seek opportunities to combine several listed, proposed, and/or candidate species in one recovery plan. This approach, known as the "multi-species" or "ecosystem" approach, can improve the rate, fiscal efficiency, and effectiveness of recovery planning.

The Recovery Report documents recovery achievements in each of the 50 States. These achievements extend across taxonomic lines to include plants, mammals, birds, fish, insects and other invertebrates, reptiles, and amphibians. The Aleutian Canada goose (*Branta canadensis leucopareia*) was reclassified from Endangered to the less critical category of Threatened in 1990. The FWS is considering upgrading the classification of several other species, including the American peregrine falcon (*Falco peregrinus anatum*), Columbian white-tailed deer (*Odocoileus virginianus leucurus*), and the bald eagle (*Haliaeetus leucocephalus*). The Threatened greenback cutthroat trout (*Oncorhynchus clarki stomias*), first listed as Endangered in 1967, is nearing its recovery goals and could be delisted by the year 2000.

Other species, though not under formal consideration for reclassification or delisting, have improved notably since publication of the first Recovery Report in 1990. As detailed in the 1992 Recovery Report, the grizzly bear (*Ursus arctos horribilis*), red wolf (*Canis rufus*), black-footed ferret (*Mustela nigripes*), least Bell's vireo (*Vireo bellii*

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photo by Chris Lucash

After a close brush with extinction in the early 1970's, the red wolf is well on the way toward recovery.

The following information was provided by Gary Henry, FWS Red Wolf Recovery Coordinator in Asheville, North Carolina.

The red wolf is one of the most significant success stories of the endangered species recovery program. When the Endangered Species Act became law in 1973, the red wolf was on the verge of extinction, with an estimated population of 100 animals or fewer. These wolves were being genetically swamped by interbreeding with the coyote *(Canis latrans)* in their last habitat in southwestern Louisiana and southeastern Texas. To prevent extinction of the last few red wolves, a decision was made to remove them from the wild, place them in captivity for breeding purposes, and later reintroduce them to historic habitats. After capturing as many as possible and screening them for genetic purity, a founder population of 14 red wolves began the long process of recovery.

Recovery goals were established at 550 animals, with 330 in captivity in at least 30 breeding facilities and 220 animals in the wild in at least 3 populations. At the close of 1993, the red wolf population had recovered to 233-247 animals, with 187 in 31 captive breeding facilities and 2 island propagation projects, and 46-60 in the wild in 2 populations. The Red Wolf Recovery Program is now more than halfway to its captive breeding goal and over one-fourth of the way to its wild population goal.

In addition, the methodology and techniques used in this recovery effort have been adopted by recovery programs for a variety of species including the California condor *(Gymnogyps californianus)*, black-footed ferret, Mexican wolf *(Canis lupus baileyi)*, and Rocky Mountain wolf *(Canis lupus irremotus)*.

Recovery Progress

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programs (many of them funded through Section 6 of the Endangered Species Act), coupled with the 1972 ban on DDT, have helped boost eagle numbers in much of the species' range. Vigorous law enforcement and public awareness campaigns to reduce illegal shooting of eagles also have contributed. Many private groups have dedicated themselves to rehabilitating injured eagles so that they can be released to the wild again.

The reclassification proposal was published in the July 12, 1994, *Federal Register*, and a final decision will be made by the FWS within one year. Public comments on the reclassification proposal are welcome, and should be sent by October 11, 1994, to the Chief, Division of Endangered Species, U.S. Fish and Wildlife Service, Bishop Henry Whipple Federal Building, One Federal Drive, Fort Snelling, Minnesota 55111-4056.

California Gray Whale

The California or eastern North Pacific population of the gray whale was officially removed from the List of Threatened and Endangered Species on June 15. A 1992 review by the National Oceanic and Atmospheric Administration (an agency of the Department of Commerce) showed that the population has increased from fewer than 10,000 animals in the late 1930's to about 21,000 animals, and is estimated to be about as large as in pre-whaling days.

"This is a great success story and a cause for celebration," said Commerce Secretary Ronald H. Brown. "Two tough Federal laws from the 1970's — the Marine Mammal Protection Act and the Endangered Species Act — have helped bring this animal back from a critically low population." Although the gray whale is no longer considered in danger of extinction, it will remain safeguarded by the Marine Mammal Protection Act. In addition, both the Mexican government, which has jurisdiction over the species' breeding area, and the International Whaling Commission have instituted protective policies.

Each winter, the California gray whale migrates 13,000 miles (20,900 kilometers) down the North American coast from its feeding grounds in the Bering Sea off Alaska to its breeding and calving ground grounds off Baja California, Mexico. It returns north in the spring at a rate of about 50 miles (80 km)per day.

Like other great whale species, the gray whale was extensively hunted for its oil, meat, hide, and baleen. The European population may have disappeared as early as 500 A.D., and the western Atlantic population probably survived no longer than the early 1700's. A geographically isolated population in the western North Pacific remains in serious peril and will remain listed as Endangered.

Report Chronicles Recovery

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pusillus), and Smoky madtom (*Noturus baileyi*) have responded favorably to management efforts. Progress has also been made in the recovery of plant species. Between 1989 and 1992, 79 percent of species added to the List of Endangered and Threatened Species were plants. Corresponding increases in plant research and recovery planning have produced encouraging results.

Much of this progress would not have been possible without the help of partnerships between the FWS and other Federal, State, and local governments and private organizations. The 1992 Recovery Report provides examples of many successful partnerships. In Michigan, cooperative efforts involving the U.S. Forest Service, Michigan Department of Natural Resources, and Michigan Audubon Society resulted in a 1992 increase in the Kirtland's warbler (*Dendroica kirtlandii*) population by 14 percent over the previous year, yielding the largest population of this species since 1961.

A similar partnership is paving the way for recovery of the Knowlton cactus (*Pediocactus knowltonii*) in New Mexico. The Bureau of Land Management, the New Mexico Department of Game and Fish, and The Nature Conservancy have worked with the FWS to reduce the threats of habitat loss and over-collection to this species by reintroducing two populations in the area surrounding its 10-acre (4-hectare) natural range. Another successful partnership formed in 1993 when the Georgia-Pacific Corporation entered an agreement with the Department of the Interior to protect Endangered red-cockaded woodpeckers (*Picoides borealis*) on over 4 million acres (1.6 million ha) of southern timberland. According to FWS Director Mollie Beattie, continued formation of partnerships will be critical to successful implementation of the ecosystem approach to fish and wildlife conservation.

Copies of the 279-page illustrated report (stock number 024-01000703-6) are available for $17.00 through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Credit card orders may be placed by calling 202/783-3238.

Jennifer Heck, a biologist with the FWS Endangered Species Division in Washington, D.C., is Associate Editor of the Endangered Species Technical Bulletin.

Plant Conservation Blossoms With Creation of Native Plant Conservation Committee

by Joan E. Canfield

Most of our Nation's Endangered and Threatened species are plants, and the prospects for their survival brightened recently. On May 25, 1994, representatives of seven Federal agencies joined in Washington, D.C., to announce a new partnership to conserve native plants and their habitats.

The partnership, formalized under a Memorandum of Understanding, created the Federal Native Plant Conservation Committee (Committee). Interior Department agencies included in the partnership are the Fish and Wildlife Service, National Biological Survey, Bureau of Land Management, and National Park Service. The Department of Agriculture's Agricultural Research Service, Forest Service, and Soil Conservation Service also joined.

Recognizing the esthetic, ecological, educational, recreational, and scientific value of native plants, the signatories agreed "...to conserve and protect our native plant heritage by ensuring that, to the greatest extent feasible, native plant species and communities are maintained, enhanced, restored, or established on public lands, and that such activities are promoted on private lands."

To help accomplish this ambitious goal, the Committee will work with State and local organizations to identify and address key conservation needs for native plants and their habitats. It will also encourage education on the importance of plant resources, coordinate research, and provide a mechanism to share information among cooperating interests.

Why single out the plant kingdom? "The future of our public lands depends on native plants and plant communities," Fish and Wildlife Service Director Mollie Beattie said the day of the signing ceremony. "Plant biodiversity is the basis for healthy ecosystems, upon which all life depends. By working in a cooperative spirit, we can better manage these resources and avoid future conflicts."

photo by Joan Canfield

Lehua makanoe* (Lysimachia daphnoides), *a rare primrose with burgundy petals, is known only from bogs on the Hawaiian island of Kaua'i. Cooperative protection agreements developed as a result of the Memorandum may keep this miniature shrub, and many of the other 1,900 U.S. plants that are candidates for listing, from needing Endangered Species Act protection.

"Healthy ecosystems and sustainable development depend on native plants and plant communities," added Bureau of Land Management Acting Director Mike Dombeck. "The conservation and recovery of threatened and endangered species is a tremendous challenge. This partnership offers exciting opportunities for recovering species. We can work to prevent species from becoming threatened and endangered, which will provide great fiscal savings."

U.S. Senator Daniel K. Akaka of Hawaii, who hosted the May 25 ceremony, also praised the new program. "The agreement represents an important commitment to preserving our rich, living heritage of native plants for future generations. Because all the major Federal land managers will be party to this document, we can do a better job of preventing threatened native species from falling through the cracks." The enthusiastic audience of over 200 expressed delight at the strongly proactive role the Federal agencies took by signing this agreement.

Partnerships

Other Federal agencies with land or resource management responsibilities are expected to join the Committee in the near future. The Memorandum also encourages non-Federal organizations, whether State or private groups, to become official cooperators. Five organizations signed on at the May 25 ceremony: the Center for Plant Conservation, National Association of Conservation Districts, Soil and Water Conservation Society, Society for Ecological Restoration, and The Nature Conservancy. The Garden Club of America became a cooperator on June 30 at the Committee's second meeting, and many more such groups are expected to join in the near future. Cooperator status will provide a network through which organizations interested in plant conservation can pool and access plant databases, learn

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Heads of all seven Federal agencies voiced full support for the Memorandum of Understanding and its goals for native plant conservation. Seated, from left: John Reynolds, National Park Service; Jack Ward Thomas, Forest Service; Mike Dombeck, Bureau of Land Management; Mike Spear, Fish and Wildlife Service; Essex Finney, Jr., Agricultural Research Service. Standing, from left: Jeffrey Cooper-Smith, U.S. Botanic Garden (host); Agatha Hughes, Society for Ecological Restoration; Gerald Talbert, National Association of Conservation Districts; Norman Berg, Soil and Water Conservation Society; Paul Johnson, Soil Conservation Service; Bill Truslow, Center for Plant Conservation; Deborah Jensen, The Nature Conservancy; and Ron Pulliam, National Biological Survey.

Plant Conservation Blossoms

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how to duplicate locally successful projects, and discover new potential funding sources.

The initial goals of the Committee are to bring in additional partners, develop a strategic plan, and help set up regional task forces and national working groups. Regional groups will be the focal point for developing a prioritized list of sites for concerted plant conservation efforts. National working groups will focus on the four major program areas: conservation actions, databases/information exchange, education/public outreach, and research.

The Memorandum of Understanding was drafted at the North American Native Plant Conservation Strategy Workshop, held in March 1994 in Phoenix, Arizona. Over 80 participants from 34 organizations attended the highly successful meeting. They envisioned the creation of a public/private partnership to mobilize agencies, organizations, scientists, native plant societies, garden clubs, and amateur botanists throughout North America into a cohesive force to support local, national, and international habitat conservation efforts for plants. In that respect, the hope is to do for plants what the successful Partners in Flight program is doing for neotropical migratory birds.

Celebrating Wildflowers

The Memorandum was signed at a reception sponsored by the National Park Foundation at the U.S. Botanic Garden to celebrate National Wildflower Week (May 23 to May 29, 1994). Jack Ward Thomas, Chief of the Forest Service, said "The Forest Service is proud of our role as stewards of much of the nation's best wildflower habitat on Federal lands. We are anxious to convey to the public the special wonder and beauty of our plant resources, and the importance of native plant conservation to our overall mission of applying ecosystem management on National Forest System lands."

Already, several agencies have joined under the banner "Celebrating Wildflowers" to enhance public appreciation and knowledge of native plants. During National Park Week (May 23-May 29), National Park Service Director Roger Kennedy said "I can't think of a better way to celebrate the diversity of our park lands than through `Celebrating Wildflowers.' To conserve the diversity within the 365 units of the National Park System, it will take a concerted effort of managing ecosystems, building partnerships, and sharing information and resources; exactly the things that are incorporated into this Memorandum of Understanding. We are proud to have played a part in making this happen."

The Committee looks forward to working with the growing number of partners. For details, including information on how to join as a cooperating organization, please contact the Federal Native Plant Conservation Committee. Write or call Ken Berg, Wildlife-Fisheries Division, Bureau of Land Management, Washington, D.C. 20240 (telephone 202/452-7764), or Joan Canfield, Division of Endangered Species, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 452, Arlington, Virginia 22203 (telephone 703/358-2105).

Dr. Canfield, the Fish and Wildlife Service's representative on the Federal Native Plant Conservation Committee, is a biologist with the Division of Endangered Species.

Every Species Counts: Endangered Species in the National Forests and Grasslands

by Valerie C. Guardia

When Threatened and Endangered species and the U.S. Forest Service come to mind, many people think of spotted owls *(Strix occidentalis)* and the forest management controversy in the Pacific Northwest. But behind the headlines, the Forest Service has an important and growing conservation program — *Every Species Counts* — that reaches throughout the agency and is increasing its responsiveness to the needs of rare animals and plants.

Established in 1905, the Forest Service is a multiple-use agency within the U.S. Department of Agriculture. The agency manages 191 million acres (77 million hectares) of public land throughout the U.S. and its territories on 156 national forests and 20 national grasslands. The diversity of life and habitats found on these lands is incredible, ranging from subarctic tundra to tropical rainforest. Approximately 3,000 species of animals and 10,000 species of plants are known to live on these lands. Of those, more than 260 are federally listed as Threatened or Endangered. Approximately one-third of all federally listed species in the United States have at least some habitat on national forests and grasslands.

Program Overview

The *Every Species Counts* program was established in 1990. It brings together the resources and commitment of the Forest Service, other Federal and State agencies, private organizations, and concerned individuals to ensure that the habitats of Threatened, Endangered, and "sensitive" species on National Forest System lands are managed to enhance species conservation and recovery. "Sensitive" is a Forest Service term for species whose population viability is a concern and those that are official candidates for Federal listing under the Endangered Species Act.

With the help of the *Every Species Counts* program, the numbers of bald eagles *(Haliaeetus leucocephalus)*, grizzly bears *(Ursus arctos horribilis)*, peregrine falcons *(Falco peregrinus)*, and many other species on national forests and grasslands have increased significantly in recent years. Partnerships with The Nature Conservancy, State Natural Heritage Inventory Programs, the Garden Clubs of America, the World Wildlife Fund, and other organizations and individuals across the country are making possible hundreds of projects to inventory, monitor, and restore rare species and their habitats, and to conserve rare ecosystems.

Plant conservation is one of three areas of emphasis under the *Every Species Counts* program. (See article in this edition of the *Bulletin* by Christopher Topik.) Nearly 100 federally listed and about 1,600 sensitive plants are found on national forest lands.

Another priority of *Every Species Counts* is aquatic wildlife, including rare fishes, amphibians, and aquatic reptiles, mollusks, and insects. Recent events, such as the listing of several Columbia and Snake River salmon *(Oncorhynchus* spp.) runs, have emphasized the importance and growing public awareness of rare fishes. Habitat for over 150 listed or sensitive fish species is managed by the Forest Service.

Terrestrial species comprise the third priority. This section of the program evolved around a relatively few well-known species, such as the spotted owl, grizzly bear, gray wolf *(Canis lupus)*, and red-cockaded woodpecker *(Picoides borealis)*. However, hundreds of other species have important needs as well, including the sandhill crane *(Grus canadensis)*, wolverine *(Gulo gulo luscus)*, and Uncompahgre frittilary butterfly *(Boloria acrocivena)*. The *Every Species Counts* program is expanding to conserve these lesser known rare species.

Recovery

Recovery of listed species is a primary concern of the *Every Species Counts* program. The Forest Service works with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to develop and carry out recovery plans for species occurring on national forests and grasslands. In the Pacific Northwest, for example, a recovery plan for the marbled murrelet *(Brachyramphus marmoratus)* is now being completed. Efforts to restore the grizzly bear and gray wolf continue in selected recovery areas of the western U.S. In the Southeast, recovery of the red-cockaded woodpecker is being attempted through such practices as the installation of artificial nest cavities and improved habitat management.

In a major shift, however, the Forest Service is joining the Fish and Wildlife Service in moving from an emphasis on single species towards a practice of

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Conserving the Oregon Silverspot Butterfly on Siuslaw National Forest

by Michael D. Clady

photo by Paul Opler

Oregon silverspot butterfly

The Oregon silverspot butterfly *(Speyeria zerene hippolyta)* is restricted to cool, wet, marine grasslands along the Pacific Ocean from southern Washington to northern California. Aspects of the species' one-year life cycle, in particular a prolonged adult stage from June to September, help it adapt to persistent foggy and windy weather. Some adults emerge during periods of sunny, relatively calm weather. The females lay their eggs on or near common blue violet plants *(Viola adunca)*, which are the sole food source for the larvae.

The habitat of this butterfly and its foodplant, which must include low-growing, patchy grasses that do not crowd out the violets, is disappearing along the coast. Vegetational succession has turned many sites to brushy shrub and forest land, while others have been destroyed for homesites, towns, and tourist and recreational facilities.

By 1980, when it was listed by the Fish and Wildlife Service as a Threatened species, the silverspot was known only from one site, which was located on the Siuslaw National Forest along the central Oregon Coast. Since then, the species has been found at six other small sites on Federal, State, and private land. The butterfly is not abundant anywhere, and in a typical year there are fewer than 4,000 individuals distributed along 350 miles (560 kilometers) of coastline.

In 1983, the National Forest began to restore about 100 acres (40 hectares) of meadow habitat. In consultation with the Fish and Wildlife Service, we tried burning, introducing violet seeds and plants, mowing grass thatch, and removing invading trees and shrubs by machine or hand. A cautious approach was used. Treatments were confined to small plots outside of prime habitat where there was little risk of killing butterfly larvae.

Mowing several times a year (every fourth or fifth year), particularly after the initial surge of growth in late spring or early summer, reduces grass thatch and often produces spectacular stands of blooming blue violets. Removing scattered stands of invading woody plants and maintaining shelter areas in the forest fringe has been relatively easy, and has opened up more areas for mowing. At present, burning is restricted largely to removing mowing residue and to clearing steep slopes where mowing is impossible.

Although efforts have not always been successful, results so far have exceeded our expectations. Adult silverspots heavily use many of the renovated areas, and three populations now are reasonably secure on the Siuslaw National Forest. A fourth, introduced population has maintained itself at a low level for 4 years. Overall, it seems that the species is on the way to recovery in Oregon.

Recent proposals for improving management of national forests in the region should promote biodiversity by perpetuating grasslands that support not only the butterfly but many other scarce animals and plants.

Micheal D. Clady is the Forest Fisheries Biologist and Silverspot Butterfly Coordinator for the Siuslaw National Forest in Corvallis, Oregon.

Every Species Counts

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managing by groups of species and/or communities. Addressing ecosystem conservation on a broad basis is being aided by a new Forest Service tool, the Habitat Conservation Assessment. Teams of researchers and managers compile information on a species' population status and trends, its habitat requirements, limiting factors, and effects of Forest Service activities on the species. This concept builds on the successes achieved with similar efforts, such as the Interagency Grizzly Bear Committee.

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Red-cockaded Woodpecker Management on Southern National Forests

by Dennis L. Krusac

Historically, red-cockaded woodpeckers *(Picoides borealis)* could be found throughout the pine forests of the southeastern United States from southern Oklahoma, Kentucky, and Maryland southward to Florida and westward to eastern Texas. Due to widespread habitat loss, however, the bird's range has been reduced primarily to public lands (mainly national forests) in the southern United States.

Although National Forest System lands comprise only about 6 percent of the forested lands in the South, 80 percent of the recovery objectives identified for this species are planned for Forest Service lands. Because this habitat is so critical, the Forest Service has developed a specific red-cockaded woodpecker management strategy for the southern national forests.

Habitat management first involves delineating areas that encompass the desired future area for a red-cockaded woodpecker population at a landscape scale. The intent is to manage an area large enough to avoid or overcome the adverse effects of habitat fragmentation and to reduce the risks inherent with small populations. The average size of such a habitat management area is 74,475 acres (30,140 hectares). These habitat management areas may total more than 3 million acres (1.2 million ha).

Small, widely dispersed populations are more susceptible to extirpation than large populations. For this reason, red-cockaded woodpecker populations with fewer than 40 potential breeding pairs receive more intensive management on national forests, and their habitat receives greater protection from competing uses (such as logging). Populations with more than 400 potential breeding pairs are considered secure. They receive less intensive management, and there are fewer restrictions on other activities.

photo © John and Karen Hollingsworth

Red-cockaded woodpecker

One example of habitat management for the red-cockaded woodpecker is the use of prescribed burning. When naturally occurring wildfires are suppressed, a dense hardwood midstory can develop, altering the more open habitat conditions favored by the woodpecker. The recovery plan emphasizes prescribed burning for midstory control every 3 to 5 years. This mimics the natural fire regime and improves habitat conditions.

Habitat management at a landscape scale with a more natural disturbance regime will not only help the woodpecker, but should have benefits to overall biological diversity. Another 167 Threatened, Endangered, or sensitive plant and animal species should benefit from the proposed management strategy. Its implementation could preclude the need to list some of these species.

Extended timber harvest rotation cycles in southern forests also can benefit the woodpecker. The recovery strategy sets a 120-year rotation for longleaf and shortleaf pine, and a 100-year rotation for loblolly and slash pines. These extended rotations are based on the bird's preference for older trees in which to excavate nesting cavities. It is essential that proper rotations be implemented and a balanced tree age/size class distribution achieved to provide adequate habitat in the future.

Providing artificial nesting cavities will be used to increase the number of potential breeding sites and to stimulate colonization of unoccupied habitat. Artificial cavities have also proven effective in stabilizing populations following nesting tree loss from natural causes, such as hurricanes.

Another form of intensive management involves the translocation of juvenile birds to create potential breeding pairs. Translocations have been successful, but they must be used in conjunction with artificial cavities and midstory control to be truly effective.

These actions, as outlined in the red-cockaded woodpecker management strategy, are a substantial contribution to the recovery of the longleaf pine ecosystem and other southern pine-dominated ecosystem types.

Dennis L. Krusac is an Endangered Species Specialist with the Forest Service at its Southern Regional Office in Atlanta, Georgia.

Recovering Citico Creek Fishes in the Cherokee National Forest

by Jim Herrig

The Southern Appalachian Mountains are widely known for their ecological diversity. The phrase "...the greatest variety of plants in North America occurs in these mountains..." is often cited by authors to emphasize the richness of species that occur here. Frequently, however, the equally diverse aquatic fauna goes unrecognized.

Citico Creek is a moderately sized, but biologically rich, stream in the mountains of eastern Tennessee. At least 51 species of fish have been collected from its watershed. These, plus the many salamander, frog, insect, and mussel species, are enough to keep aquatic ecologists busy for years.

With all of these species competing in the same body of water, ecological niches are very narrow. Consequently, habitat for many of the species is limited. Five of these species have such restricted habitat requirements in Citico Creek and throughout their range that they are federally listed as Threatened or Endangered. Two of these species are catfish, the Smoky madtom *(Noturus baileyi)* and yellowfin madtom *(Noturus flavipinnis)*.

Since the early 1980's, biologists with the Cherokee National Forest have studied and monitored the populations of these fish in cooperation with the University of Tennessee, Tennessee Wildlife Resources Agency, U.S. Fish and Wildlife Service, Great Smoky Mountains National Park, and a private organization, Conservation Fisheries, Inc. Research on the life histories of both species was funded by these cooperators. Annual population monitoring began in 1986. Collection of nests with eggs, followed by captive propagation in aquariums, came next.

Both catfish are tiny, nocturnal bottom-dwellers that spend most of their lives under rocks. They spawn during June in excavated cavities. Males guard the eggs and provide some protection from scavenging crayfish, salamanders, and other fish. The guarding instinct is so strong that when the slab rock is lifted for inspection of the nest, the male does not leave the area. This trait enables biologists to collect both the nest and the male madtom.

snorkling for madtoms in Citico Creek

Photo by J.R. Shute, Conservation Fisheries, Inc.

Although successful spawning in aquariums has not yet been achieved, wild-collected eggs of both species have hatched in captivity, and fry have been reared to a size large enough for release. The fry are being stocked into Abrams Creek in the Great Smoky Mountains, another stream in which both species are believed to have occurred. If populations can be established in Abrams Creek, these species will be brought a step back from the brink of extinction.

Intensive surveys of the yellowfin and Smoky madtoms are expensive and might be detrimental to the fish. Therefore, careful surveys with minimum potential for adverse impacts are conducted. These surveys take place under low flow conditions at night using snorkel gear and spotlights.

In 1990, the population trend for the yellowfin madtom appeared to be steeply downward. The cooperators therefore decided 1) to take only one yellowfin nest from Citico Creek in 1991, 2) to stock all of the juveniles that were reared back into Citico Creek (68 total), and 3) not take any nests from Citico Creek in 1992.

In 1993, the yellowfin madtom population index suggested a strong upward trend. Two nests were collected, and all 113 of the juveniles produced were released back into Citico Creek. The 1994 survey has begun, and the number of yellowfins looks promising.

Because Citico Creek holds the only known Smoky madtom population, it is imperative to reestablish this species in another stream within its historic range. Since the Smoky madtom population trend from 1990 through

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The National Forest System Rare Plant Conservation Program

by Christopher Topik

From forests to grasslands, the National Forest System contains some of America's best habitats for wildflowers and other plants. We estimate these lands support more than 10,000 species of vascular plants and untold numbers of non-vascular plants.

Nearly 100 of these plants are listed federally as Endangered or Threatened, and more than 1,700 others have been designated by the Forest Service as sensitive. Over half the Threatened and Endangered plant species we manage are found within our southeastern region, which ranges from Virginia to Texas, and includes the Caribbean National Forest in Puerto Rico. Although most of the national forests in this region are small, their importance is magnified by the fact that they comprise a large proportion of the public land in the southeast that is managed for conservation purposes.

The National Forest Management Act commits our agency to maintaining a diversity of plant and animal communities throughout the National Forest System. In recent years, the National Forest Service's rare plant program has grown tremendously. Over 120 full-time botanists in the agency are now involved primarily with plant conservation, and they provide a wealth of local field botany expertise. We work closely with other Federal and State agencies, and collaborate extensively with State natural heritage programs and The Nature Conservancy on survey and data management. Cooperation with volunteer groups (such as the Garden Club of America) and botanical gardens associated with the Center for Plant Conservation also increases our ability to inventory and conserve rare plants. We welcome conservation partnerships with others interested in plant conservation.

Because conservation efforts are more effective when they are launched before species become Endangered or Threatened, the Forest Service is compiling habitat management strategies for sensitive species. Over 100 such plant conservation strategies have been completed or are well under way. This number will increase as we work with fellow Federal agencies to implement a Memorandum of Understanding (MOU) signed January 25 by agency heads of the Forest Service, Bureau of Land Management, Fish and Wildlife

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Recovering Citico Creek Fishes

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1994 appeared stable to upward, the cooperators decided to continue with attempts to restore the species to Abrams Creek in the Great Smoky Mountains National Park. Aquarium-reared fry were released each year from 1990 to 1992. Night snorkeling surveys in Abrams Creek located a few surviving Smoky madtoms in 1990 and 1991, but none were observed in 1992. No evidence of natural reproduction has been documented. Once successful spawning occurs, the likelihood of finding individual Smoky madtoms will increase greatly.

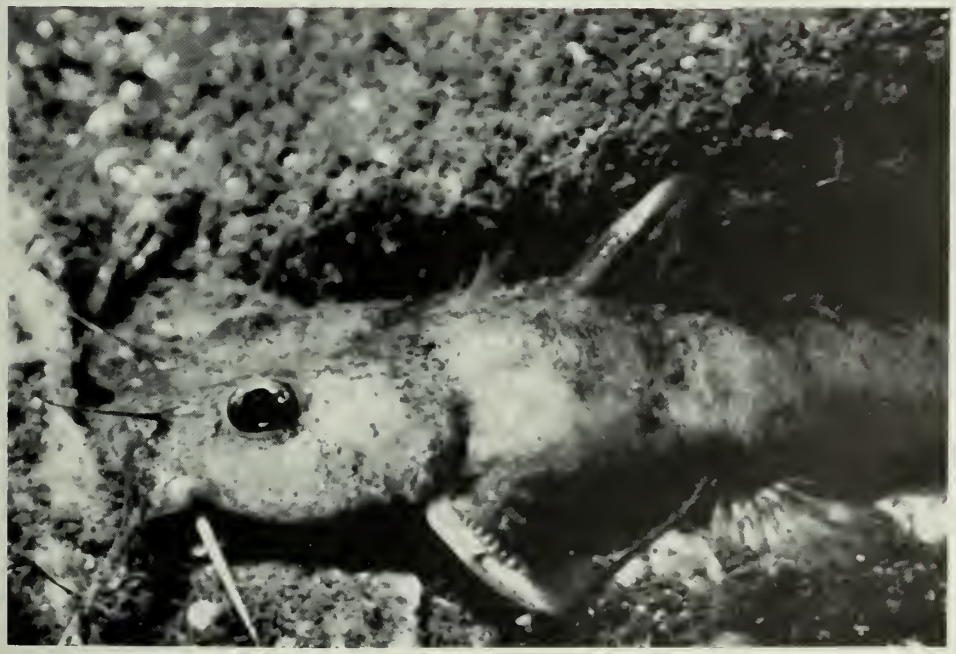

photo by J.R. Shute, Conservation Fisheries, Inc

yellowfin madtom

During 1989-1991, when the yellowfin madtom population index was so low, it was comforting to know that some individuals were being held in an experimental captive breeding program. Because of the success in rearing these fish in captivity, we were able to contribute significantly to the status of the Citico Creek population. Full recovery of this species and several others in the southern Appalachian Mountains will be assured only by habitat restoration, successful captive breeding programs, and the establishment of reintroduced populations.

Jim Herrig is the Forest Biologist for the Cherokee National Forest in Cleveland, Tennessee.

Rare Plant Conservation

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Service, National Park Service and National Marine Fisheries Service. Its purpose is to address the needs of vulnerable species — animals as well as plants — in time to secure sustainable populations, thereby making Endangered Species Act protection unnecessary.

Recently, the Forest Service joined a number of Federal agencies in another conservation effort, this time to develop an integrated strategy aimed specifically at native plants. The agreement was formalized by creation of the Federal Native Plant Conservation Committee. The Committee will promote the sharing of expertise and resources, assist in the development of consistent scientific methodologies, encourage collaborative training programs, and support new ecosystem management efforts.

photo by Paula Brooks

The status of MacFarlane's four-o'clock, a wildflower native to parts of Idaho and Oregon, is now more secure because of Forest Service changes in habitat management and recovery efforts carried out in cooperation with the Bureau of Land Management and the Fish and Wildlife Service.

Plant conservation on the national forests and grasslands can include many different kinds of activities:

• **Inventories** — Although botanists conduct species inventories on the National Forest System for specific project areas, they also participate in integrated searches of larger ecosystem or management jurisdictions. New species are still found every year, and range extensions are not uncommon. For instance, two of our regional botanists, Duane Atwood from Ogden, Utah, and Jim Shevock from San Francisco, have discovered numerous new species, and they each have seven species named in their honor.

• **Recovery** — Implementing recovery plans for listed species is an important part of the Forest Service rare plant program. For example, our botanists have conducted prescribed burns to create open habitat needed by the mountain golden heather *(Hudsonia montana)* in North Carolina, and reintroduced Mead's milkweed *(Asclepias meadii)* in southern Illinois. Working with several other agencies, we have helped secure MacFarlane's four-o'clock *(Mirabilis macfarlanei)*, enabling the Fish and Wildlife Service to propose reclassifying this wildflower from Endangered to the less critical category of Threatened.

• **Resource coordination** — Forest Service botanists are now participating on interdisciplinary teams to guide such activities as timber harvest, livestock grazing, mining, road building, forage or wildlife habitat enhancement, land exchanges, and recreational development. By becoming involved early in the process, the needs of plants and rare habitats can usually be accommodated.

• **Restoration and rehabilitation** — On Earth Day 1994, President Clinton called for use of regionally native species in Federal landscaping and restoration projects. We are collaborating with native plant experts, such as the Redwood City Seed Company in California and the Soil Conservation Service, to develop local stock for planting in damaged areas. As we move forward with ecosystem management, watershed restoration will be a growing role for the Forest Service, and the use of native species for rehabilitation will increase.

• **Special forest products** — The collection of forest botanical products for personal and commercial uses is increasing, and in some areas could play a large role in rural economic diversification. A surprisingly long list of vascular plants, bryophytes, and fungi have high economic value. It is imperative that development of this industry be preceded by resource inventories and estimates of sustainable harvest levels. Monitoring plant population impacts and potential plant misidentifications also will be important roles for botanists.

• **Exotic species control** — The introduction and spread of non-native plants and animals is emerging as one of the greatest threats to the integrity of national forest and grassland ecosystems. Forest Service botanists are increasingly being called upon to assist

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Rare Plant Conservation

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other resource managers with identifying problem areas and planning treatments.

• **Public education, recreation, and outreach** — Two years ago, the Forest Service's Pacific Northwest Region created a new event, "Celebrating Wildflowers - Wildflower Week," as an umbrella to foster appreciation for native plants and the role of public lands in their conservation. This effort has now gone national, with the Bureau of Land Management and National Park Service as full partners. Several hundred activities — from hikes to classroom presentations, festivals, restoration projects, and displays — took place this spring and summer. We look forward to continued growth in this effort as we welcome new partners.

• **Ecosystem management planning** — With the shift toward ecosystem management, Forest Service botanists are becoming involved in a variety of planning projects, ranging from evaluating natural communities to prioritizing the special needs of unique habitats. At the San Bernardino National Forest in California, for example, we collaborated with The Nature Conservancy to protect the rare "pebble plains" habitat in the Big Bear Lake area. These unusual, shallow-soil prairies are home to more than 10 endemic plants.

Although there may be many definitions of "ecosystem management," its success will be measured by how well the soil, water, and populations of native plants and animals are conserved for future generations to use and enjoy.

Dr. Topik is Leader of the Forest Service's National Botany Program, USDA-Forest Service, P.O. Box 96090, Washington, D.C. 20090-6090.

Endangered Species Information Now Available Through Internet

The Fish and Wildlife Service recently placed several electronic information items on its Information Resources Management Library Server, which makes these items accessible to users of Internet and the Service's Wide Area Network. These items include:

- The List of Threatened and Endangered Species (entitled, "Endangered and Threatened Wildlife and Plants"), current as of June 30, 1994, and to be updated monthly;
- The Plant Notice of Review (entitled "Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review"), as published September 30, 1993;
- The Endangered Species Act of 1973, as amended through the 100th Congress;
- Species Maps that indicate listed species and proposed species by state and territory, current as of June 1, 1994;
- Species Maps that indicate Category 1 listing candidates and candidate species by state and territory, current as of December 31, 1993.

The Library Server can be accessed through cc:mail within the Service and through Internet E-mail software from outside the Service. If you address a new cc:mail message to R9IRMLIB (the Library Server's cc:mail address), type the retrieval command — Send ES Instructions — on the subject line and send the message, you will receive the complete list of "send" messages (retrieval commands) available on the Library Server for the Endangered Species Program. This list will change over time as more information is added to the Library Server. For example, the new Animal Notice of Review will be added once it has been published in the *Federal Register.*

Those from outside the Service with Internet E-mail capabilities should use R9IRMLIB@mail.fws.gov (the Library Server's Internet address) to access the above information.

Every Species Counts

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Preventing the Need to List

Habitat Conservation Assessments are being completed for such species as the bull trout *(Salvelinus confluentus);* the inland cutthroat trout *(Oncorhynchus* spp.); the northern goshawk *(Accipiter gentilis);* the great gray owl *(Strix nebulosa),* flammulated owl *(Otus flammeolus),* and boreal owl *(Aegolius funereus);* and carnivores such as the fisher *(Martes pennanti pacifica),* pine marten *(Martes americana),* lynx *(Felis lynx canadensis),* and wolverine. By acting early and adapting land management activities when necessary, we hope to foster secure populations of these species, avoiding the need to list them as Endangered or Threatened.

Conserving species before they decline to the point of needing Endangered Species Act protection is a major goal of *Every Species Counts.* The Forest Service addresses this goal through its sensitive species program, which began in 1982. By identifying sensitive species and taking voluntary actions to reduce impacts to their habitat, we can reduce the number of future listings. National forest lands provide habitat for 2,344 species designated as sensitive.

In some situations, large-scale habitat management policies are adopted. The case of the northern goshawk *(Accipiter gentilis)* provides a good example. This raptor is designated as a sensitive species in five of the Forest Service's nine regions, and is considered a Category 2 listing candidate by the Fish and Wildlife Service. Because of continued threats to goshawks and their habitat in the southwest (Arizona and New Mexico), the Forest Service established an interim management policy to protect known nesting sites and provide management guidelines for a 6,000-acre (2,430-ha) area around each site. An environmental impact statement is being completed to formally adopt this policy and amend forest management plans regionwide. In addition, the Forest Service is a member of the Goshawk Interagency Implementation Team, which is developing policy for managing the species on all Federal lands.

In January 1994, the Forest Service joined four other Federal agencies (Bureau of Land Management, Fish and Wildlife Service, National Park Service, and National Marine Fisheries Service) in signing a Memorandum of Understanding on vulnerable wildlife. All five agencies agreed to cooperate in managing these species to prevent the need for listing them under the Endangered Species Act. Specific conservation agreements have been developed for such animals as the Coeur d'Alene salamander *(Plethodon idahoensis),* northern bog lemming *(Synaptomys borealis sphagniaola),* bull trout, and Wet Canyon talussnail *(Sonorellax macrophallus).* The Forest Service is also helping to develop a new strategy for conserving North America's native plants. (See the article in this edition of the *Bulletin* by Joan Canfield.)

Research

Forest Service scientists are conducting research on more than 75 Threatened, Endangered, and sensitive species in aquatic and terrestrial systems. For example, agency scientists have worked with the Fish and Wildlife Service to study the Puerto Rican parrot *(Amazona vittata)* and factors related to its nesting success, competition, predation, pair formation, and genetics. In addition, they helped develop techniques for artificial cavities to improve nesting habitat. In 1968, the Forest Service also started research on the red-cockaded woodpecker. Research on artificial nesting cavities led to their use as an intensive management tool in red-cockaded woodpecker recovery. These structures have been key to a significant increase in the species' population after it was devastated by Hurricane Hugo.

Learning From Controversy

Despite the efforts of the *Every Species Counts* program, controversy surrounding the management of some listed and sensitive species continues. Fortunately, this challenge often results in improved policies and management. The situation in the Pacific Northwest is an example. Public concern for old-growth forests and the species they support, including the northern spotted owl, generated a great deal of forest research. The findings confirmed that the spotted owl is only one of many species dependent on old-growth forests.

This research on the northern spotted owl enabled the Clinton Administration and the Forest Service to propose far-reaching changes in the management of national forests in this region. These proposed changes are embodied in the "Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl," otherwise known as "The President's Northwest Forest Plan." What began as a set of guidelines for a single species was expanded to address the needs of over 1,000 species associated with old-growth forests.

A Challenging Future

Knowledge of many vulnerable species and ecosystems on lands managed by the Forest Service is still limited. Our emphasis in coming years will be on completing much-needed inventories, research studies, and population and habitat monitoring. This new information will enable us to focus on recovery and restoration in 14 major ecological areas, from the Great Basin to the tropical forests of Puerto Rico. Many new partnerships will be forged and strengthened between the *Every Species Counts* program and other agencies, conservation organizations, civic groups, and individuals as we shift to an ecosystem-based approach to conservation.

Valerie C. Guardia is Assistant National Program Manager for the Forest Service's Threatened, Endangered, and Sensitive Species Program in Washington, D.C.

Listing Proposals — April/May 1994

Eleven species — five animals and six plants — were proposed by the Fish and Wildlife Service (FWS) during April and May 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Saint Francis' Satyr *(Neonympha mitchellii francisci)*

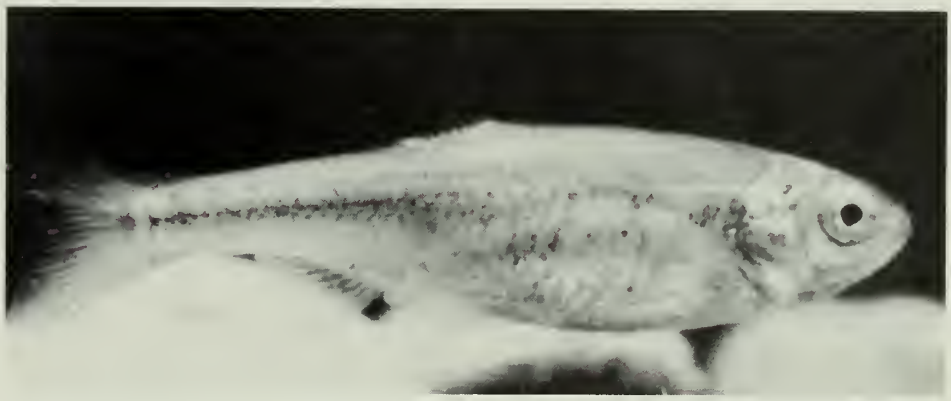
One of the rarest butterflies in North America, the Saint Francis' satyr is endemic to the sandhills region of North Carolina. After this subspecies was described in 1989, collectors flocked to the site where it was first found, and the satyr was soon reported to be extinct. Fortunately, a small population was found recently. Because of its low numbers, restricted range, and continuing vulnerability to collection, the Saint Francis' satyr was proposed April 18 for listing as Endangered. The potential threat posed by collectors, including commercial dealers, is so severe that the FWS also issued an emergency rule giving the butterfly immediate protection for a period of 240 days, during which the FWS will seek permanent protection for the species. Biologists hope this unusual action will enable the satyr to survive its 1994 flight season.

Saint Francis' satyr habitat consists of open, wet meadows dominated by sedges. This butterfly likely had a broader distribution before widespread environmental changes in the southern coastal plain altered or destroyed much of the habitat. Its northern relative, Mitchell's satyr *(Neonympha mitchellii mitchellii)*, was listed in 1992 as Endangered, also because of overcollection and habitat loss.

Periodic fires associated with silvicultural practices, wildlife habitat management, and other activities are the main reason the Saint Francis' satyr survives in this area. No serious conflicts with existing land use practices are expected.

photo by Steve Hall/North Carolina Natural Heritage Program

Saint Francis' satyr is a fairly small, dark brown butterfly with conspicuous "eyespots" on the lower surfaces of the wings. The spots are dark maroon brown in the center, surrounded by a straw yellow band.



FWS photo

The Virgin spinedace is a small fish up to 5 inches (2 centimeters) in length, with a broad, flat, silvery body.

Virgin Spinedace *(Lepidomeda mollispinis mollispinis)*

The Virgin spinedace is a small fish in the minnow family. As its common name suggests, this subspecies is endemic to the Virgin River system, which drains parts of southwestern Utah, northwestern Arizona, and southeastern Nevada. Widespread habitat fragmentation, introductions of non-native fish species, and dewatering due to agriculture, mining, and urbanization have eliminated the Virgin spinedace from approximately 40 percent of its historical habitat. Because these factors pose continuing threats, the FWS proposed May 18 to list the spinedace as Threatened.

Although its habitat preferences may vary, the Virgin spinedace is usually found in clear, cool, free-flowing streams that are interspersed with pools, runs, and riffles. Much of this habitat has been fragmented or destroyed by impoundments. Diversion structures have removed most or all of the water from some other areas. Livestock and mining operations in floodplains and riparian zones can further degrade the habitat by contaminating surface water.

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Listing Proposals

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Predation and competition from introduced non-native fishes is a significant threat to several fish species in the Virgin River system, including the spinedace. Control of harmful exotic species is expected to play an important part in its restoration, along with rehabilitating and protecting important habitat.

Three California Insects

Three species of insects limited to a small portion of the Santa Cruz Mountains in Santa Cruz County, California, were proposed May 10 for listing as Endangered:

• **Mount Hermon June beetle** ***(Polyphylla barbata)*** - a small scarab beetle with a black head, dark blackish-brown front wings clothed with scattered long hair, and a striped body.

FWS photo

Mount Hermon June beetle

• **Zayante band-winged grasshopper** ***(Trimerotropis infantilis)*** - a small grasshopper with a pale gray to light-brown body, and dark crossbands on the forewings.

• **Santa Cruz rain beetle** ***(Pleocoma conjugens conjugens)*** - a large beetle that is reddish-brown to black in color, with long hairs on the ventral surface.

All three insects are restricted to small, pockets of a unique habitat type — ponderosa pine sand parklands — that are scattered within a 20-square-mile (52-square-kilometer) area. Because of their disjunct distribution, these areas have been referred to as "biological islands." The amount of habitat historically occupied by the three insects totalled only about 500 acres (200 hectares). By 1992, however, human activities in the Santa Cruz Mountains had reduced the range to less than 100 acres (40 ha).

Urbanization, off-road vehicle use, recreational development, sand mining, certain agricultural practices, and alteration of natural fire regimes have contributed to the degradation or destruction of the insects' habitat, and pose continuing threats.

Five California Plants

Five plant taxa native to the foothills of the central Sierra Nevada were proposed April 20 for Endangered Species Act protection. Listing as Endangered was proposed for the four in most immediate danger:

• **Stebbins' morning-glory** ***(Calystegia stebbinsi)*** - a perennial herb in the family Convolvulaceae with white flowers and distinctively lobed leaves.

• **Pine Hill ceanothus** ***(Ceanothus roderickii)*** - a prostrate evergreen shrub in the buckthorn family (Rhamnaceae) that has whitish flowers tinged with blue.

• **Pine Hill flannelbush** ***(Fremontodendron californicum* ssp. *decumbens)*** - a speading shrub in the cacao family (Sterculiaceae) with light orange to reddish flowers.

• **El Dorado bedstraw** ***(Galium californicum* ssp. *sierrae)*** - a small perennial herb in the coffee family (Rubiaceae) with pale yellow flowers clustered at the tips of its stems.

Because the situation facing the fifth plant is not as critical, it was proposed for the classification of Threatened:

• **Layne's butterweed** ***(Senecio layneae)*** - a perennial herb in the aster family (Asteraceae) with several yellow flower heads, each having 5 to 8 ray flowers.

All five plants are found primarily on gabbro or serpentine soils within chaparral or oak woodlands in western El Dorado County. There are also a few isolated locations in Nevada and Tuolumne Counties. The primary threat facing these plants is continuing habitat loss. Many sites have been fragmented, damaged, or even destroyed by one or more of the following: urbanization, road construction and maintenance, off-road vehicle use, land clearing, and mining. El Dorado County, which has a projected growth rate of over 50 percent between 1990 and 2005, is one of the most rapidly growing counties in California.

Fire suppression, which accompanies development, has altered natural ecological processes within a number of plant communities in California. It poses a threat to four of the proposed plants, which evolved within fire-adapted habitat. Periodic fire is important for germination of their seeds and eliminates shading from competing vegetation. In a study of controlled burning at a site in El Dorado County, fire caused a 22-fold increase in germination of the Pine Hill ceanothus. In addition, the growth rate of seedlings was greater in the burned site than in a nearby unburned area.

Golden Paintbrush *(Castilleja levisecta)*

Brilliant golden yellow flower bracts give this perennial herb its common name. A member of the snapdragon family (Scrophulariaceae), the golden paintbrush grows to a height of about 20 inches (0.5 meter). It occurs in low-elevation grasslands on glacially derived soils of the Puget Trough.

Historically, the plant could be found from the Willamette Valley in Oregon north to Vancouver Island in British Columbia. Only 10 disjunct populations remain, some of them very small, and the species is now extirpated in Oregon. On May 10, the FWS proposed to list the golden paintbrush as Endangered.

Although some paintbrush sites were destroyed by urbanization or agricultural conversion, the loss of grassland habitat to encroachment by native and exotic woody plants is the main reason for the decline. Open coastal prairies once were maintained by periodic

(continued on next page)

Final Listing Rule Approved for Two Aquatic Snails

Two species of freshwater snails were listed April 15, 1994, as Endangered. The royal snail *(Pyrgulopsis ogmorphaphe)* is known only from two spring runs within the Sequatchie River system in Marion County, Tennessee. It is small, usually less than 0.25 inch (5 millimeters) in length, has a conical shell, and is dark brown to black in color. Two small populations of Anthony's riversnail *(Athearnia anthonyi)* occur at sites in the Sequatchie River (also in Marion County) and Limestone Creek in Limestone County, Alabama. This species once had considerably wider range.

Both species are vulnerable to habitat degradation. Threats to water quality include siltation; road construction; logging; cattle grazing; and pollution from agricultural, municipal, and industrial runoff.

photo by John Gamon/Washington Natural Heritage Program

The golden paintbrush is named for its brilliant golden yellow flower bracts.

Listing Proposals

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wildfires, but fire suppression has allowed the spread of invasive shrubs that shade the golden paintbrush and compete for space and nutrients. Efforts to remove competing vegetation mechanically or by hand have been attempted, but these methods have proven expensive and labor intensive.

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from being jeopardized by Federal activities; restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take conservation actions; 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 posses, 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.

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conservation — that is, they illustrate the importance of wetlands and highlight the enjoyment of outdoor activities such as hunting, fishing, and birding. Through "hands-on" items, including a coffee filter and a sponge, these trunks help show how wetlands absorb pollutants and prevent floods, benefitting the environment and its inhabitants, including people.

The other four trunks show the need to protect Endangered species, demonstrating their appeal through such specimens as ocelot *(Felis pardalis)* pelts and mounted hawskbill sea turtles *(Eretmochelys imbricata)*. Provided by the FWS Forensics Laboratory in Ashland, Oregon, these wildlife articles were confiscated after being involved in violations. "Recycled," they have become valuable teaching aids.

Like "Project Wild," another educational program, these resource trunks are funded through Federal Aid accounts. The trunks are designed for use by students in grades K through 12, and are available to teachers in public, private, and parochial schools, as well as home-schoolers and youth conservation organizations. For more information, contact Dorothy Deas in the FWS Austin Office, 300 E. 8th Street, Room G-167, Austin, Texas 78701 (telephone 512/482-5454).

*****

The Houston toad (*Bufo houstonensis*) was the subject of a Population and Habitat Viability Analysis Workshop held May 23-25, 1994, in Austin, Texas. The 3-day seminar involved public and private organizations in consensus-building to promote the survival and recovery of this Endangered species. Participants included the National Fish and Wildlife Foundation, the Lower Colorado River Authority, and the FWS, among others. The result was a revised recovery plan that will lay the biological groundwork for habitat conservation planning for this species.

The FWS Austin Office recently conducted two public meetings in Bastrop County, Texas, to discuss ways protect the toad while allowing development of a growing community.

*****

Region 3 - Officials at Crab Orchard National Wildlife Refuge in Illinois plan to turn two World War II era munitions bunkers into artificial bat caves. Plans include altering the surface on the bunker ceilings and walls to give them a more "attachable" surface for roosting bats. Temperature regulation in the bunkers may enable them to provide breeding and wintering habitat for the little brown bat (*Myotis lucifugus*), the Endangered gray bat (*Myotis grisescens*), and the Endangered Indiana bat (*Myotis sodalis*).

*****

The Rock Island, Illinois, and the Twin Cities, Minnesota, Field Offices have worked together to reformulate a Higgins' eye pearly mussel (*Lampsilis higginsi*) recovery team. The team will revise the 1978 recovery plan and help develop a multi-year study to determine the distribution, abundance, and status of this Endangered species. Impacts of the 1993 flood and the impending spread of a harmful nonnative species, the zebra mussel (*Dreissena polymorpha*), will be investigated.

*****

A public hearing on the proposed listing of the northern copperbelly water snake (*Nerodia erythrogaster neglecta*) was held April 5 in Indianapolis, Indiana. About 25 people attended. Opposition to listing was voiced by the Western Kentucky Coal Association, although its representative offered to work cooperatively with the FWS if the snake is listed. Others in attendance were concerned that snake research activities may negatively affect snake populations. Most people, however, were in favor of listing this nonvenomous snake as Threatened.

*****

The FWS Columbia, Missouri, Field Office teamed up with the Missouri Department of Conservation to monitor sites of the federally listed Missouri bladderpod (*Lesquerella filiformis*) and geocarpon (*Geocarpon minimum*) in southwestern Missouri. The team also collected tissue samples of another plant, the Ozark wake robin (*Trillium pusillum* var. *ozarkanum*), which is a candidate for listing protection. Genetic analyses will help researchers determine if it is distinct from other varieties of *T. pusillum*.

The Ozark wake robin is rare in both Missouri and Arkansas. Unfortunately, the six known sites in Missouri are not protected, and a few sites have experienced further degradation since the last time they were monitored.

*****

The City of Dayton, Ohio, is working with the FWS Reynoldsburg, Ohio, Field Office and the Ohio Division of Natural Areas and Preserves to explore protection for Ohio's second largest population of eastern prairie fringed orchids (*Platanthera leucophaea*). The orchids are growing on land owned by the City of Dayton, which plans to install water pumps that could lower the water table at the site and eliminate the orchids.

*****

FWS personnel from the FWS Twin Cities Regional Office and Green Bay, Wisconsin, Field Office attended a taxonomy and field ecology workshop hosted by the Ottawa National Forest. The central focus of the workshop was those species of *Botrychium*, or moonworts, known to occur in the Great Lakes area. Several species of these small ferns are candidates for listing under the Endangered Species Act, and more needs to be learned about their biology and ranges. This sum-

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Regional News

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mer, through funds provided to the States under Section 6 of the Endangered Species Act, the Minnesota Department of Natural Resources will invite biologists to visit several Minnesota and Wisconsin sites of *B. mormo*, a category 2 listing candidate.

*****

Region 4 - A new population of the striped newt (*Notophthalmus perstriatus*), a listing candidate, was found in Baker County, Georgia. The site is approximately 70 miles west of the nearest population in that State and about the same distance north of the nearest historical location in Florida. A 2-year survey (1991-1993) verified only three other populations of the striped newt in Georgia. University of Florida researchers report striped newts from 27 localities in Florida, all in the vicinity of Tallahassee and peninsular Florida on or near Trail Ridge.

Striped newts are restricted to dry longleaf pine forests of the southeastern coastal plain in Georgia and Florida. They share their habitat with two listing candidates, the gopher frog *(Rana areolata)* and the eastern population of the gopher tortoise *(Gopherus polyphemus)*. Little is known of the striped newt's natural history because it is secretive and unlikely to be encountered far from the small, shallow, grassy ponds in which it breeds. These ponds may have an open canopy, composed primarily of pond cypress, slash pine, and blackgum, or they may be depressions totally devoid of trees. The ponds usually fill in late autumn or early winter and dry completely by May or June. Threats to the species appear to be loss of habitat through forest conversion to agriculture and real estate development, destruction of wetland breeding sites, and intensive silvicultural practices.

*****

The FWS Asheville, North Carolina, Field Office worked with the staff of Chimney Rock Park in the mountains of western North Carolina to design a boardwalk around a poplation of rock gnome lichen *(Gymnoderma lineare)*, a plant that was proposed recently for listing as Endangered. This privately owned park, operated as a commercial recreational facility, is visited by thousands of people each year. Two Endangered species, the peregrine falcon *(Falco peregrinus)* and white irisette *(Sisyrinchium dichotomum)*, along with a candidate plant *(Monotropsis odorata)*, thrive at this site due to the protection and management provided by park personnel.

*****

Biologists from the North Carolina Arboretum and the FWS Asheville Office have collected cuttings and a seedling from the largest surviving Florida torreya (*Torreya taxifolia*) tree. This tree, planted on a North Carolina farm in the 1800's, is well outside the species' native range, which is limited to three counties in the Florida panhandle (Gadsden, Liberty, Jackson) and Decatur County, Georgia. All of these wild populations have been decimated by a fungal disease. The North Carolina tree is one of the few disease-free specimens left. Although there are no other specimens within several hundred miles, the North Carolina tree has produced fertile seeds at least once, and seedlings are now growing around it. The seedling collected from this tree has been planted in a disease-free environment on the Arboretum grounds. The cuttings will be rooted and cultivated at the Arboretum to preserve the tree's genetic material.

*****

Region 5 - In May, the National Biological Survey sponsored a 2-day workshop in Leetown, West Virginia, on the status of freshwater mussels of the Atlantic slope and Ohio-Tennessee River drainages. About 70 biologists representing State and Federal agencies (including many FWS representatives from Regions 4 and 5), conservation organizations, and the academic community participated. The informal and interactive workshop included discussion on the status, current research, threats, and conservation activities centered on freshwater mussels.

Increasing concern for the future of freshwater mussels was voiced throughout both days. Some of the main topics discussed were water quality, habitat alteration, water regulation, and the impacts of beavers on small streams containing mussels. The group also discussed the potential of newly identified threats, including use of the poison Rotenone, toxic ammonia concentrations from periodic Asiatic clam *(Corbiculata fluminea)* die-offs, impacts to host fish species from introduced fish species, and the invasion of the zebra mussel.

There was some good news. Dick Neves of the Virginia Cooperative Fish and Wildlife Research Unit presented a progress report on research the unit at Virginia Tech University is conducting. Dr. Neves is exploring the development of techniques for the creation of artificial mussel refuges (holding ponds) and propagation sites. In addition, the Leetown Science Center is offering to serve as a central repository of mussel tissues. These tissues would be available to geneticists and other researchers.

A number of biologists are investigating the breeding of freshwater mussels in laboratories. Research is focused on developing culture media that would enable glochidea (mussel larvae) to skip the host fish stage of mussel reproduction. This would possibly allow biologists to raise mussels for future reintroduction as habitat is restored.

Throughout the meeting, a watershed approach to conservation, rather

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than single species management, was stressed. Many participants felt that because of the successful information exchange and unexpectedly large interest, more workshops for freshwater mussels should be organized.

*****

The recovery plan for the Plymouth redbelly turtle *(Pseudemys rubriventris)* was revised recently. A limited number of copies are available from the FWS New England Field Offices at 22 Bridge Street, Concord, New Hampshire 03301 (Attn: Michael Amaral), or from the Fish and Wildlife Reference Service at 5430 Grosvenor Lane, Suite 110, Bethesda, Maryland 20814.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	16	63	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	63	11	38	0	112	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	388	1	83	2	474	184
TOTAL	700	494	195	38	1,427*	483**

Total U.S. Endangered	700	(312 animals, 388 plants)
Total U.S. Threatened	195	(112 animals, 83 plants)
Total U.S. Listed	895	(424 animals, 471 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 386 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: 122

July 1, 1994

July/August 1994 Vol. XIX No. 4

ENDANGERED SPECIES

Technical Bulletin

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

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September/October Vol. XIX No.5

ENDANGERED SPECIES

Technical Bulletin

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

Can CITES Save the Box Turtle?

by Susan Lieberman

photo by Allen Salzberg

Box turtles play an important role in seed dispersal for a variety of native forest plants. In the wild, these animals can live more than 100 years, but most of those captured for the pet trade do not survive for long.

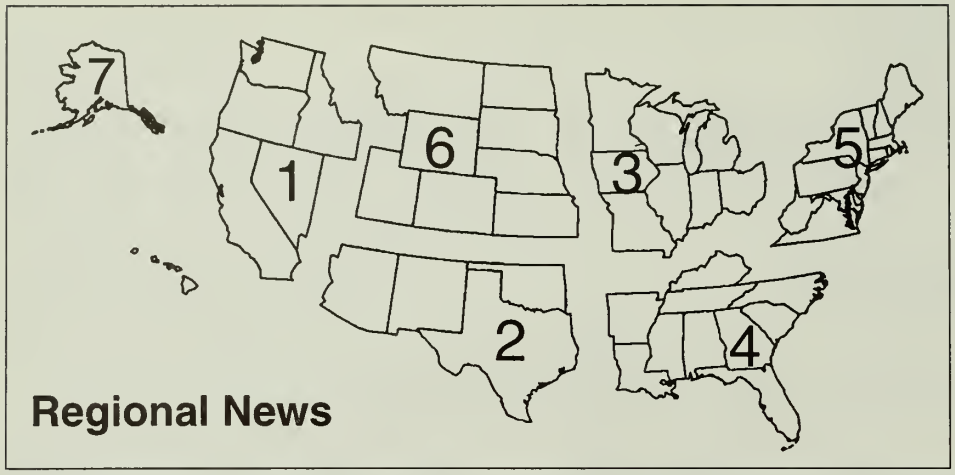
Everyone, it seems, likes turtles. Talk to people who grew up in the Northeast, South, or Midwest of the United States about box turtles, however, and they'll likely say the same thing: "Yes, they used to be common, but you don't see as many any more." Where have all the box turtles gone?

Certainly there have been significant population declines due to habitat degradation and destruction. But a more direct threat has come to light. The Fish and Wildlife Service (FWS) has learned that tens of thousands of North American box turtles (Terrapene spp.) are being taken out of the wild — and lost to the species — every year for the international pet trade.

Turtles and tortoises are highly prized by many pet keepers and hobbyists. The international demand for box turtles is always increasing, particularly in Europe, where trade in many rare tortoise species is banned by the European Community. In any pet shop in Western Europe, one is likely to see North American box turtles for sale, sometimes for up to $100 each.

Based on data gathered by the FWS Division of Law Enforcement, almost 27,000 box turtles were exported in 1992 *alone*. The 1993 records are still being compiled, but incomplete data show that more than 18,000 were exported last year. Wildlife import/export inspectors reported that 8,000-14,000 individuals of a single species, *Terrapene carolina*,

(Continued on Page 16)



Regional News

Region 1 — Fish and Wildlife Service (FWS) biologists recently assisted Joel Satori, a National Geographic photographer working on a feature article on the Endangered Species Act. National Geographic was seeking photos of extremely rare and declining plant species. Unfortunately, it was too late in the season to photograph many of our species in bloom. The photographer was most interested in the last locality of Orcutt's spineflower *(Chorizanthe orcuttiana)*. Fewer than 50 individuals of this species (which was proposed in October 1993 for listing as Endangered) were noted last year, and it failed to germinate this year. Sites visited included Encinitas, Otay Mesa vernal pools, Torrey Pines State Park, and the Santa Ana River wash in San Bernardino. National Geographic is scheduled to publish the endangered species feature early in 1995.

*****

As detailed in *Bulletin* Vol. XIX No. 3 (1994), the Pacific pocket mouse *(Perognathus longimembris pacificus)* was emergency-listed as Endangered on February 2 because of imminent threats to the only known population. A proposal to give the animal long-term protection was published in the *Federal Register* with the emergency rule. In response, the FWS received 71 comments from the public, the majority of which supported listing the species and/or preserving its only known occupied habitat. No new detections of the Pacific pocket mouse were reported.

*****

On June 26-27, fire (reportedly started by a cigarette or fireworks) ravaged the Moapa National Wildlife Refuge in southern Nevada. The refuge was established to preserve the Moapa dace *(Moapa coriacea)*, an Endangered desert fish endemic to Nevada's Muddy (Moapa) River system. Streams on and immediately below the refuge provided the only remaining spawning habitat for this fish. Prior to the fire, the refuge supported more than 500 Moapa dace. On July 5, however, only one could be found on the refuge.

Intensive management will be needed to prevent the loss of this monotypic genus. Personnel from the Desert National Wildlife Refuge complex, FWS Reno Office, and the Reno Field

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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.

Killer Pigs, Vines, and Fungi: Alien Species Threaten Native Ecosystems

by Faith Thompson Campbell

Alien species — those introduced by human action into environments they have not reached by natural means — have transformed entire ecosystems throughout the United States. The American chestnut *(Castanea dentata)*, once one-quarter of the standing volume in the eastern deciduous forest, is now reduced to root sprouts and a few adults by the ravages of the introduced chestnut blight fungus *(Cryphonectria parasitica)*. A survey of 8 million acres (3,239,000 hectares) of southern Florida's "river of grass" — the Everglades ecosystem — by the South Florida Water Management District found 488,000 acres (198,000 hectares) to be infested with dense monocultural stands of the Australian tree, *Melaleuca quenquinervia*. *Melaleuca* stands displace the native sawgrass prairies that support the region's unique wading bird populations, and they transpire large amounts of water, thus exacerbating the increasing dryness of this marsh. In the West, the Bureau of Land Management reports that more than 10 million acres (4,049,000 hectares) of grassland in northern California has been overrun by yellow star thistle *(Centaurea solstitialis)*.

Before being attacked by a non-native fungus, the American chestnut was one of the dominant tree species in the eastern deciduous forest.

The resources of at least 96 national parks are being harmed by exotic animals, and invasive plants are damaging the resources of at least 109 parks. Alien species also threaten many national wildlife refuges. Loxahatchee National Wildife Refuge in Florida alone is contributing $75,000 a year to a joint Federal-State effort to contain the invading *Melaleuca*.

Many of our crown jewels of biological diversity are under severe threat. In the Hawaiian Islands, more than 200 birds, invertebrates, and plants are being pushed toward extinction by non-native species, including feral cats *(Felis cattus)*, rats (*Rattus* spp.), goats *(Capra hircus)* and pigs *(Sus scrofa)*; other harmful animals such as mosquitos, rats, and ants; and a variety of vines, grasses, and other alien plants. Another example is represented by the Mississippi River drainage, which is a globally important center of diversity for mollusks. Many listed mussels from that system, already threatened with extinction by habitat alteration, now face being smothered by the zebra mussel *(Dreissena polymorpha)*. This rapidly spreading pest was introduced into the Great Lakes in ship ballast water during the 1980's (see *Bulletin* Vol. XV, No. 11), and is spreading rapidly.

At least three species of plants once found on the Channel Islands off southern California already have become extinct as a result of grazing by introduced livestock, especially goats. According to the California Native Plant Society, another 30 plant species in California that are listed or proposed for listing under the Act are also threatened by alien species, often competition from non-native plants.

Among species of animals and plants listed since January 1991, alien species are considered to be a threat to 18 species found in the continental United States. The most vulnerable species are those found on islands — true islands, such as the Hawaiian Islands or the Channel Islands, or the isolated mountain peaks or bodies of water that can form "biological islands."

Not all species threatened by invading alien species are found in such obvious-

(Continued on next page)

photo courtesy of The Nature Conservancy

Hawaii is our only state with tropical rain forests, but almost half of this important resource has been destroyed, and much of what remains is threatened. Feral animals are the greatest threat to the native plants and animals of the Hawaiian forests. Feral pigs, for example, uproot native plants, promote the spread of non-native plants, cause erosion, and eat the nestlings of ground-nesting birds. Pig wallows also serve as breeding sites for introduced mosquitoes, which spread diseases to endangered Hawaiian birds.

Alien Species

(Continued from Page 3)

ly isolated habitats. Along the northern California coast, the yellow-flowered Menzies' wallflower *(Erysimum menziesii)* is losing out in competition with European beachgrass *(Ammophila arenaria)* and other alien plants. Lowered water tables, probably exacerbated by the planting of eucalyptus trees from Australia, led to rapid drying of marsh sandwort *(Arenaria paludicola)* habitat. On the banks of Peter's Creek in Virginia and North Carolina, the small-anthered bittercress *(Cardamine micranthera)* is smothered by a blanket of honeysuckle *(Lonicera japonica)*. In Kentucky and Tennessee, the displacement of the herbaceous plant layer by the European garlic mustard *(Alliaria petiolata)* is a threat to a native rock cress, *Arabis perstellata*, that was proposed recently for listing as Endangered.

Even species that are endangered primarily by other causes can be put under further stress as a result of alien species. For example, the spread of *Melaleuca* throughout the Everglades, if not checked, will eliminate the habitat of the Endangered snail kite *(Rostrhamus sociabilis plumbeus)* by replacing open water and sawgrass prairies with an impenetrable tangle of tree branches.

Alien species pose a double threat to the food supply of grizzly bears *(Ursus arctos horribilis)* in Montana. The large seeds of the whitebark pine *(Pinus albicaulis)* provide about half the fat in the diet of the bear in the Yellowstone ecosystem.[1] Their nutritional importance is probably similar farther north in Glacier National Park and the Bob Marshall Wilderness, where more than 80 percent of the whitebark pine trees in some study plots are infected by an introduced disease, white pine blister rust (caused by the fungus *Cronartium ribicola).*[2] In this region, whitebark pine mortality due to blister rust exceeds 90 percent.[3]

At lower elevations, herbaceous species eaten by the grizzly and its prey[4] are beginning to be displaced by invading rangeland "noxious weeds". Knapweed (*Centaurea* spp.) already occupies thousands of acres of the Selway-Bitterroot Wilderness, and outbreaks have been found in portions of the Bob Marshall Wilderness.[5] Research has shown that once several small populations are established, invasive plants can explode across the landscape.[6]

As the Congressional Office of Technology Assessment said in its 1993 report, *Harmful Non-Indigenous Species in the United States,* the Federal government's efforts to prevent introductions of additional alien species or to contain the damage of those already here is "a largely uncoordinated patchwork of laws, regulations, policies, and programs." Funding is another factor. The National Park Service has identified control or mitigation projects costing a total of $61.25 million, but only $11.07 million has been budgeted over four fiscal years to carry out the projects. In Congress, strengthening amendments to the Lacey Act and Federal Noxious Weed Act are being considered, but no bills have been introduced.

Most readers are probably familiar with the story of the chestnut blight and Dutch elm disease. Fewer know about the balsam and hemlock woolly adelgids, butternut canker, and Port-Orford-cedar root disease.[7] Interestingly, none of the trees struck by these introduced pests have been listed under the Endangered Species Act, despite 75 percent mortality for the American elm *(Ulmus americana)* and nearly 100 percent mortality for mature chestnuts. Two besieged tree species, the butternut *(Juglans cinera)* and the Fraser fir *(Abies fraseri)*, are candidates for listing. A recent petition to list the whitebark pine has been denied because the species is still healthy in much of its widespread range, and the Act does not allow listing of plants by populations.

Some species, such as the chestnut and Fraser fir, have so far persisted as root sprouts or seedlings, although most of the full-grown specimens have died. It has not been tested whether such species meet the definitions of "Endangered" or "Threatened" in the Act. Is it legally acceptable that trees persist as immature shadows of the historical giants? In any case, time appears to be running out for the elm, chestnut, and butternut. A more virulent form of elm blight and the inevitable death of the chestnut root crowns are pushing these species closer to oblivion. Butternuts do not resprout once the fungus *(Sirococcus*

(Continued on next page)

Alien Species

(Continued from previous page)

clavigignenti-juglandacearum) has killed the crown and trunk.

Species dependent on forest habitat are threatened indirectly by the damage caused by introduced pests. As reported in *Bulletin* Vol. XIX, No. 2 (March/April 1994), the spruce fir moss spider *(Microhexura montivaga)* and rock gnome lichen *(Gymnoderma lineare)* were proposed for listing as Endangered because of the decline of Fraser fir *(Abies fraseri)* and red spruce *(Picea rubens)* forests that once cloaked peaks of the southern Appalachians. The loss of tree canopy has exposed the formerly wet habitats needed by the spider and lichen to the drying effects of the sun. A major factor in the the decline of the fraser fir is believed to be an alien insect, the balsam woolly adelgid (*Adelges piceae).*

Further information about the threats posed to ecosystems and individual species by invasive alien species is available from the following sources:

United States Congress. Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. Executive Summary (57 pages) available from OTA at 202-224-8996; order the full report (391 pages) from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburg, PA 1520-7954; 202-783-3238. GPO number 052-003-01347-9; $21.

McKnight, Bill N. Editor. 1993. *Biological Pollution.* Bill N. McKnight, IAS Publications, 1102 North Butler Avenue, Indianapolis, IN 46219; 317-352-1970. $26.50.

Grazing Lands Forum. 1994. *An Explosion in Slow Motion: Noxious Weeds and Invasive Plants on Grazing Lands.* Dan Undersander, American Society of Agronomy, 1575 Linden Drive, 353 Moore Hall, Madison, WI 53706-1597; $2.

Campbell, F.T. and S.E. Schlarbaum. 1994. *Fading Forests: North American Trees and the Threat of Exotic Pests.* Natural Resources Defense Council, 40 West 20th Street, New York, New York 10011; 212-727-2700. $8.95.

References:

[1]Schmidt, W.C. 1992. Effect of White Pine Blister Rust on Western Wilderness. American Forestry: An Evolving Tradition. Society of American Foresters National Convention, Richmond, VA. October 1992.

[2]Keane, R.F. and S.F. Arno. 1993. Rapid Decline of Whitebark Pine in Western Montana: Evidence from 20-Year Measurements. Western Journal of Forestry, Vol. 8, No. 2, April 1993; Schmidt.

[3]Kendall, K.C. and S.F. Arno. 1990. Whitebark Pine — An Important But Endangered Wildlife Resource. Presented at the Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. Bozeman, MT. March 1989.

[4]Kummerow, M. 1992. Weeds in Wilderness: A Threat to Biodiversity. Western Wildlands. Summer 1992; Bedunah, D.J. 1992. The Complex Ecology of Weeds, Grazing and Wildlife. Western Wildlands. Summer 1992.

[5]Kummerow.

[6]Kummerow; Mack; Hobbs, R.J. and S.E. Humphries. The Ecology and Management of Plant Invasions: An Integrated Approach. Submitted to Conservation Biology, 1994.

[7]see Campbell, F.T. and S.E. Schlarbaum. 1994. Fading Forests: North American Trees and the Threat of Exotic Pests. Washington, D.C. Natural Resources Defense Council. 1994.

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The opinions expressed by Dr. Campbell are not necessarily those of the Fish and Wildlife Service. Her article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, 310 ARLSQ, Washington, D.C. 20240, or call 703/358-2390.

Final Listing Rules

Final rules extending Endangered Species Act protection to five species — four plants and one fish — were published in June and July of 1994:

Three Hawaiian Plants

Three species of plants native to the Wai'anae Mountains on the island of O'ahu were listed June 27 as Endangered:

- ***Gouania vitifolia*** - a climbing shrub or woody vine in the buckthorn family (Rhamnaceae);
- ***Diellia unisora*** - a fern in the family Polypodiaceae; and
- ***Cyanea grimesiana ssp. obatae*** - a shrub in the bellflower family (Campanulaceae).

All three plants have declined in range and numbers due to urbanization, habitat degradation and possible predation by non-native feral animals, and heavy competition from introduced plant species for living space, light, water, and nutrients.

Water Howellia *(Howellia aquatilis)*

A small aquatic plant in the bellflower family, the water howellia historically grew in ephemeral wetlands over much of the Pacific northwest. Activities that alter the hydrology of these wetlands, such as timber harvest, livestock grazing, and urbanization, have eliminated the water howellia from most of its former habitat. The species' known range has been reduced to scattered sites in Washington, Idaho, and Washington totalling less than 150 acres (60 hectares). Because of continuing threats, the water howellia was listed July 14 as Endangered.

Rio Grande Silvery Minnow *(Hybognathus amarus)*

This species was once one of the most widespread and abundant fishes in the Rio Grande, occurring from northern New Mexico to the Gulf of Mexico. It was also found in much of the Pecos River, a major Rio Grande tributary in New Mexico and Texas. But water removal, channelization, regulation of natural river flows for irrigation purposes, water pollution, and competition or predation from non-native introduced fish species have reduced the Rio Grande silvery minnow to about five percent of its former range. It now survives only in a 170-mile (275 kilometer) reach of the middle Rio Grande in New Mexico. The vulnerability of the remaining habitat led to the listing of the Rio Grande silvery minnow on July 20 as Endangered.

Jaguars in the United States

by Ron Nowak

photo by Denver Bryan

The jaguar often is not considered native to this country, yet much of the southern United States is well within its historical range. Intriguing reports of jaguar sightings in the southwest are still received periodically. A 1986 jaguar kill in southeastern Arizona added to the interest in extending Endangered Species Act protection to any of these animals that might remain or someday recolonize former habitat in the U.S.

Investigations into the 1986 jaguar kill continued until March 1993, when a taxidermist's mount of the cat was sold in New Mexico. As a result, two men have been charged with felony violations of the Lacey Act. This Federal law prohibits interstate commerce in wildife protected by State law. Evidence gathered for the case verified that the jaguar was killed in the Dos Cabezas Mountains of Cochise County, Arizona, and that it was not a released captive. The case is being based on the Lacey Act violation because the jaguar does not yet have Endangered Species Act protection in the U.S.

Since the 1986 incident, several other accounts of jaguars in Arizona have been received, including two sightings in Pima County. One observation took place in 1988, and another was reported in December 1993 from the Buenos Aires National Wildlife Refuge. Much suitable habitat remains in the region.

Although the jaguar does seem to have become a rare border animal by the 1970's, such was not always the case. Fossil evidence shows that at the end of the Ice Age, about 10,000 years ago, the species occurred throughout the southern half of the conterminous U.S. and was especially abundant in Florida. The writings of several early naturalists (including Audubon) and the discovery of certain Indian artifacts indicate that the jaguar still occupied part of the southeastern U.S. as late as the 19th century. In 1886, there was a newspaper report of a jaguar being killed near New Orleans. The species also seems to have been well known in southern California in early historical times, though the last jaguar reported in that State was killed near Palm Springs in 1860.

By the time scientific surveys began in the late 1800's, the U.S. range of the jaguar was restricted to Arizona, New Mexico, and Texas. In this region, the animal was not then especially rare. Substantial breeding populations could still be found in Arizona as far north as the Grand Canyon, and in Texas to the south and east of San Antonio. By this period, however, the southwest was undergoing rapid settlement, sheep and cattle were being established in great numbers, natural habitat and prey species were disappearing, and the jaguar was being intensively hunted as a predator of livestock.

Shortly after the turn of the century, the jaguar seems to have been extirpated in New Mexico and Texas, except as an occasional wanderer. Nonetheless, a recent assessment of records by David E. Brown, a field biologist and author of several books on southwestern wildlife, suggests that a resident breeding population survived in Arizona at least through the 1950's. He calculated that a minimum of 64 jaguars have been taken in the State since 1900. Prior to the 1986 incident, the last known kill of a naturally occurring jaguar in the U.S. happened near Nogales, Santa Cruz County, Arizona in 1971.

According to Brown, jaguars also were taken in the northern Mexico state of Sonora, near the U.S. border through the 1960's. The species still is present in the Sierra Bacate near Guyamas, Sonora, about 200 miles (320 kilometers) south of Arizona, and that area may be the source of the individuals that cross into Arizona. However, destruction of natural forest cover is rampant in northern Mexico, and there is doubt as to how long a viable jaguar population can survive in the face of increasing agricultural activity and human accessibility. In contrast, environmental conditions seem to have improved on the U.S. side of the border. Numbers of deer and javelina, prime jaguar prey, are at high levels, and there are still enough large tracts of brush and canyon woodland to provide cover for a few of the cats. Brown has suggested that the species could be restored in parts of the Coronado National Forest in southeastern Arizona.

Dr. Nowak is a mammalogist with the FWS Office of CITES Scientific Authority.

Listing Proposals — June/July 1994

Eight species — seven animals and one plant — were proposed by the Fish and Wildlife Service (FWS) during June and July 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Jaguar (Panthera onca)

Jaguars, the largest cats native to the Western Hemisphere, historically occurred from northern Argentina through Central America and Mexico into the southern United States. Within the U.S., they have been recorded most commonly in Arizona, but there are also records from California, New Mexico, Texas, and Lousiania. Currently, no known breeding populations remain in this country, although occasional reports of individual jaguars in Arizona persist. David Brown, an Arizona field biologist, has calculated that at least 64 jaguars have been taken in Arizona since 1900. (See accompanying article.) Breeding populations still exist in parts of northern Mexico.

After commercial fur hunting and predator control led to the decline of the species over most of its range, the jaguar was listed under the Act in 1972 as Endangered. Due to an oversight, the listing rule applied only to other countries, and did not give protection to any jaguars that may remain in — or in the future enter — the U.S. On July 13, 1994, the FWS proposed to correct this oversight by extending the Endangered classification to jaguars throughout their historical range, including California, Arizona, New Mexico, Texas, and Louisiana.

photo by Denver Bryan

Jaguars historically inhabited parts of the southern United States, and sightings continue to be received from Arizona.

Five Freshwater Mussels

The Ohio River drainage, which includes the Tennessee and Cumberland Rivers, is a center for freshwater mussel evolution and historically contained about 127 distinct mussel species and subspecies. In less than 100 years, however, 44 percent of this once rich mussel fauna has disappeared or drastically declined as its habitat was dammed, dredged, and polluted. Eleven species are now extinct, 28 are classified as Endangered or Threatened, and 18 others (including the following five species) are listing candidates. No other wide-ranging faunal group in the continental U.S. has experienced this degree of loss in so short a period of time.

On July 14, the FWS proposed to add another five taxa from the Cumberland and Tennessee River systems to the growing list of Endangered freshwater mussels in the southeast:

- **Cumberland elktoe** *(Alasmidonta atropurpurea)* - a species with a smooth, somewhat shiny shell covered with green rays;
- **oystershell mussel** *(Epioblasma capsaeformis)* - characterized by a yellowish to green shell with narrow, dark green rays;
- **Cumberlandian combshell** *(Epioblasma brevidens)* - a mussel with a thick, solid, yellow to tawny-brown sheil marked by green, broken rays;

(Continued on next page)

Listing Proposals

(Continued from Page 7)

• **purple bean** *(Villosa perpurpurea)* - usually dark brown to black in outer shell color with numerous fine, closely-spaced rays; and

• **rough rabbitsfoot** *(Quadrula cylindrica strigillata)* - a subspecies distinguished by an elongated, heavy, rough textured shell that is yellowish to greenish in color and marked with green rays, blotches, and chevron patterns.

The Cumberland elktoe survives in short sections of the Cumberland River system in Kentucky and Tennessee. Oystershell mussels and Cumberlandian combshells occur at extremely low numbers in portions of the Cumberland and Tennessee River basins in Kentucky, Tennessee, and Virginia. The purple bean and rough rabbitsfoot are still found in a few sections of the upper Tennessee River system in Tennessee and Virginia.

All five taxa have been reduced significantly in range and now exist only as small, isolated populations. Much of their former free-flowing stream habitat has been inundated by impoundments. Continuing threats are posed by water quality degradation, primarily from agricultural, urban, and coal mining runoff.

Steller's Eider *(Polysticta stelleri)*

The smallest of four eider species, the Steller's eider breeds in coastal areas of arctic Alaska and Russia. A few hundred thousand Steller's eiders are believed to exist worldwide, but the species has disappeared from most of its breeding range in Alaska in recent years.

The current breeding range of the Steller's eider in Alaska includes the arctic coastal plain. In Russia, the species breeds along the arctic coast from the Chukotski Peninsula west to the Kheta River, and along the western Siberian coast (including the Taimyr, Gaydan, and Yamal Peninsulas). Steller's eiders nest on tundra near ponds and lakes, where they feed on insects, plants, and crustaceans. During winter, they move into marine areas, diving and dabbling in shallow water to feed on mollusks

FWS photo

The Steller's eider has disappeared from most of its Alaskan breeding grounds in recent years.

and crustaceans. Only a small portion of the world's Steller's eiders nest in North America, but most that breed in Asia move into the near-shore marine waters of southwestern Alaska to winter.

Steller's eiders formerly nested in Alaska in the eastern Aleutian Islands, coastal areas of the Alaska Peninsula, the Yukon-Kuskokwim Delta, and along the northern coast east to the Canadian border. In recent decades, however, the species has disappeared as a breeder from all areas in Alaska except the western arctic coastal plain (although the first nest found in many years on the Yukon-Kuskokwim Delta was located this year). Steller's eiders occur at low densities in this vast, remote region, and biologists are uncertain as to how many currently nest there.

Counts of Steller's eiders wintering in Alaska suggest that the worldwide population may have declined by as much as 50 percent, although wintering population estimates are imprecise. To date, biologists have not identified the factor or factors causing the species' decline. However, other marine organisms in Alaska have declined in recent years as well. The spectacled eider *(Somateria fischeri)* and Steller sea lion *(Eumetopias jubatus)* are both currently listed as Threatened species, and declines have been noted in populations of red-legged kittiwakes *(Rissa brevirostris)*. Because the factors causing Steller's eider numbers to decline remain unknown, further research will be required before conservation measures for the species can be formulated.

The FWS proposed July 14 to list the Alaska breeding population of this bird as Threatened. Researchers hope to determine soon if the problems facing the Alaska breeding population also threaten the worldwide population of Steller's eiders.

(Information for this account was provided by Ted Swen, a biologist in the FWS Fairbanks, Alaska, Ecological Services Office.)

Delissea undulata

This Hawaiian plant, which has no common name, is a palm-like tree in the bellflower family (Campanulaceae) that grows to about 30 feet (10 meters) tall. Its leaves are long and narrow, with undulating margins, and the flowering stalk bears 5 to 20 greenish-white, slightly downcurved flowers. Historically, *D. undulata* grew on the islands of Ni'ihau, Kau'i, Maui, and Hawai'i, but now only a single plant remains.

The unique native flora of the Hawaiian Islands has declined tremendously since the archipelago was settled. Like the other 164 Hawaiian plants already listed as Threatened or Endangered (as of August 31, 1994), *D. undulata* was reduced in range and numbers because of urbanization, ranching and agricultural development, and the introduction (accidental as well as intentional) of non-native animals and plants. Predation and/or habitat degradation by feral cattle, pigs, and goats are responsible for much of the decline, as is competition from alien plants for space, water, light, and nutrients. *Delissea undulata* was feared to be extinct until a single plant was found in 1992 on the island of Hawai'i.

New Poster Features Oklahoma's Endangered Species

by Erich Langer

Endangered species education outreach received a big boost recently with the unveiling of a new full-color poster, *Oklahoma's Threatened and Endangered Species.* Working with several partners, the Fish and Wildlife Service's Oklahoma Field Office produced 30,000 of the posters for distribution to schools, libraries, and educators.

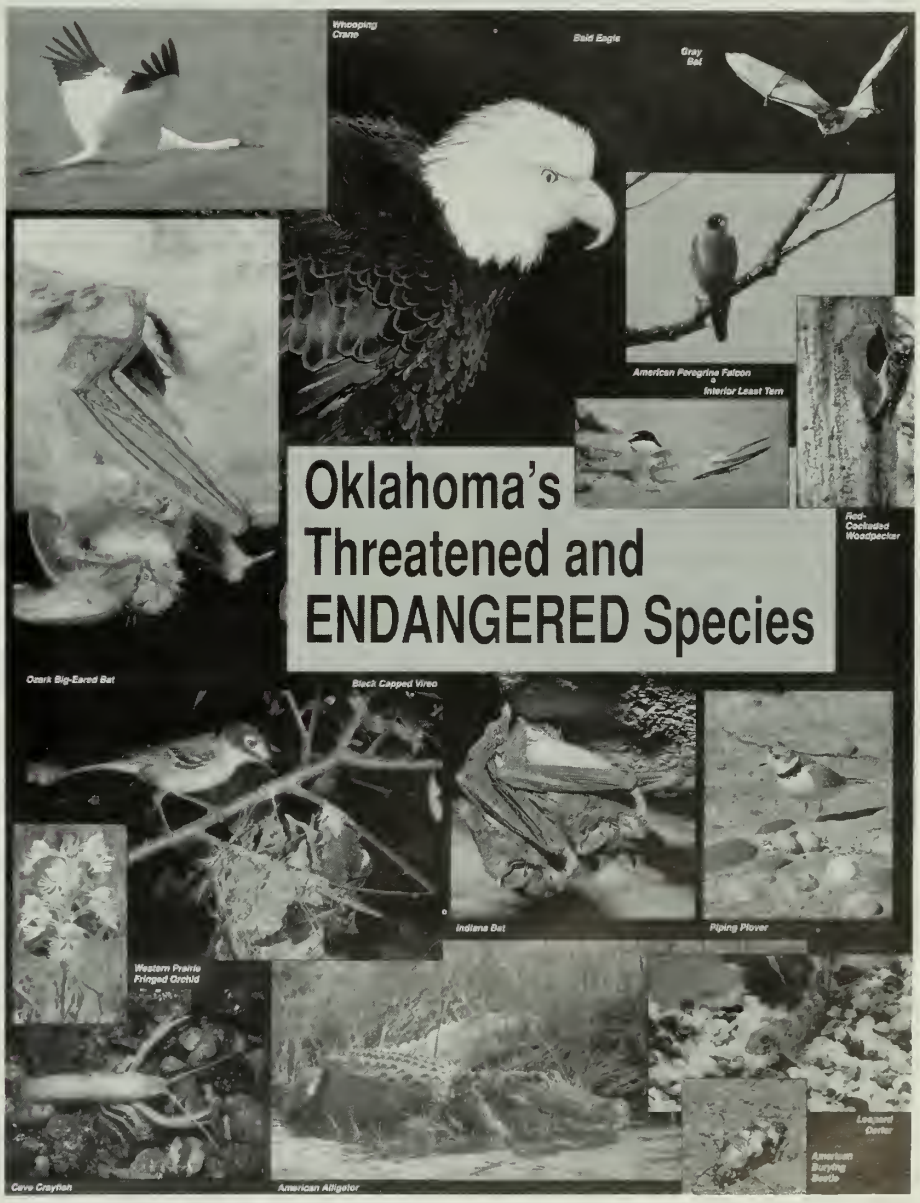
The colorful poster shows most of Oklahoma's 22 federally-listed species, including the whooping crane *(Grus americana)*, bald eagle *(Haliaeetus leucocephalus)*, American peregrine falcon *(Falco peregrinus anatum)*, red-cockaded woodpecker *(Picoides borealis)*, black-capped vireo *(Vireo atricapillus)*, interior least tern *(Sterna antillarum)*, piping plover *(Charadrius melodus)*, gray bat *(Myotis grisescens)*, Ozark big-eared bat *(Plecotus townsendii ingens)*, Indiana bat *(Myotis sodalis)*, cave crayfish *(Cambarus zophonastes)*, leopard darter *(Percina pantherina)*, American burying beetle *(Nicrophorus americanus)*, and western prairie fringed orchid *(Platanthera praeclara)*.

The poster puts a strong emphasis on providing important biological information. On the back of the poster, the authors provide natural history information for all listed species, including their current status, description, range, diet, reason(s) for decline, and other notes of interest.

Educators will find the poster is an excellent tool for stimulating discussion about how habitat loss, pesticide poisoning, and certain land use practices have put these species in danger of extinction. "We wanted to provide Oklahomans with an informative, educational, and visually pleasing product that would help teach folks about our State's threatened and endangered species," said FWS Assistant Field Supervisor Charlie Scott. "By teaming up with wildlife and education specialists with the Oklahoma Department of Wildlife Conservation, Oklahoma Chapter of The Nature Conservancy, Oklahoma State University Extension Service, and Army Corps of Engineers, we were able to develop an excellent poster for a little over 20 cents each."

The posters are being distributed free to schools, libraries, and teachers. They are also available to Federal, State and local agency offices. For a copy, contact the U.S. Fish and Wildlife Service, Oklahoma Field Office, 222 South Houston, Suite A, Tulsa, Oklahoma 74127; telephone 918/581-7458.

Erich Langer is a public outreach specialist with the FWS Oklahoma Field Office.



Sea Turtle Survey: Cooperative Effort in the Mansfield Channel

by Donna J. Shaver

According to numerous historical accounts, large numbers of green turtles *(Chelonia mydas)* once occupied Texas inshore waters (bays, estuaries, and passes). In the mid-1800's, these waters were the site of a green turtle fishery. During peak years of operation, more than 500,000 pounds (230,000 kilograms) of sea turtles were taken from the area each year. Over-harvesting and severe freezes in the late-1800's apparently decimated the area's green turtle population. Today, all five sea turtle species occurring in Texas waters — the green, Kemp's ridley *(Lepidochelys kempii)*, loggerhead *(Caretta caretta)*, hawksbill *(Eretmochelys imbricata)*, and leatherback *(Dermochelys coriacea)* turtles — are federally listed as either Threatened or Endangered. Current human-related threats to sea turtles in this area include take incidental to dredging, boating, and fishing activities.

In June 1989, the Padre Island National Seashore initiated the first systematic field survey of sea turtles in Texas inshore waters. Funding has been provided by the U.S. Fish and Wildlife Service (FWS), National Park Service, Southwestern Parks and Monuments Association, and National Biological Survey. These agencies hope the survey will aid in development of protective measures for sea turtles present in the Mansfield Channel, which is located at the southern end of Padre Island National Seashore. This channel is one of only two direct passages that connect the Laguna Madre and the Gulf of Mexico.

One day per month since June 1989, researchers have placed a 100 yard (91 meter) long tangle net at the mouth of the Mansfield Channel to capture turtles for tagging and temporary study. Data on species composition, seasonality, residency, temporal patters, size classes, growth, and several other topics have been collected. Blood samples have been removed from many of the turtles to determine gender and breeding colony of origin.

During 565 hours of netting from June 1989 through December 1993, 56 green turtles were caught, some more than once, and one hawksbill turtle was captured once. The estimated capture rate calculated for this study was similar to those recorded during previous netting studies conducted in Florida waters identified as green turtle developmental habitat (Guseman and Ehrhart 1990). All of the green and hawksbill turtles captured in Texas were juveniles. Twenty-four of the 56 green turtles (43 percent) were caught more than once, and the mean interval from the first to the last capture of these 24 individuals was 5 months. Green turtles were caught during all months of the year except January, and no turtles were caught when the average daily water temperature was below 59.5°F (15.5°C).

No Kemp's ridley sea turtles were netted in the Mansfield Channel, but a copulating pair of this critically endangered species was sighted 6.1 miles (9.8 km) west of the netting location in June 1991 (Shaver 1992). This siting was the first documented observation of mating Kemp's ridleys in Texas waters, and one of only a few records of this species in the Laguna Madre and the two connecting passageways to the Gulf of Mexico.

The data gathered during this study reveal the importance of the Mansfield Channel as habitat for green turtles along the Texas coast. Transient and seasonally resident green turtles apparently use the Mansfield Channel for foraging and resting habitat during the spring, summer, and fall months, but leave the area during winter in favor of deeper, warmer waters. Green turtles may stop at the Mansfield Channel before they pass through to access feeding areas, after they exit inshore feeding areas, or prior to continuing their travels in offshore waters. Based on high recapture rates, it appears that many of the turtles that arrive at the Mansfield Channel in spring and summer become residents for a few months. These individuals may use the area as an intermediate developmental habitat between their pelagic and lagoonal stages.

In 1992, the National Park Service and National Marine Fisheries Service used data from the survey to formulate recommendations for minimizing sea turtle take during dredging in the Mansfield Channel. The information is also being used by the FWS during development and implementation of sea turtle recovery plans. Information from this study should continue to help guide management decisions affecting protection of sea turtles in Texas inshore waters.

References:

Guseman, J.L., and L.M. Ehrhart. 1990. Green turtles on Sabellariid worm reefs: initial results from studies on the Florida Atlantic coast. pp. 125-27 in T.H. Richardson, J.I. Richardson, and M. Donnelly, compilers. Proceedings of the Tenth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-278, Miami, Florida.

Shaver, D.J. 1992. *Lepidochelys kempii* (Kemp's ridley sea turtle) reproduction. Herpetological Review 23(2):59.

Donna Shaver is a Research Biologist with the National Biological Survey at the Southern Science Center on Padre Island National Seashore.

Habitat Model Identifies Potential Orchid Sites

by Molly Sperduto

The small whorled pogonia *(Isotria medeoloides)* is the rarest orchid in eastern North America, north of Florida. This small, green orchid has a wide distribution, and appears to grow in mixed deciduous, secondary woods, which are fairly common throughout the eastern United States. Finding the small whorled pogonia is difficult in large areas of habitat or in dense understory. But a new computerized model using a geographical information system (GIS) is helping botanists narrow the search for undiscovered populations of this rare orchid.

photo by Irene Stuckey

small whorled pogonia

A GIS incorporating remotely sensed and other data was used to determine 1) whether small whorled pogonia populations in New Hampshire and Maine prefer particular site conditions and 2) if combinations of these conditions could be used to identify potential habitat. In 1993, the model assisted biologists in locating nine previously undiscovered populations of small whorled pogonia, and helped lead to the Fish and Wildlife Service's proposal to reclassify the species from Endangered to Threatened.

To develop this model, the locations of 26 small whorled pogonia sites were digitized, and general habitat characteristics at each site were identified. Among the habitat features analyzed were topography (using U.S. Geological Survey data), soil types (as characterized by the U.S. Department of Agriculture's Soil Conservation Service), and forest reflectance (from LANDSAT satellite imagery). The importance of each habitat characteristic was evaluated with a chi-square test of habitat features at sites with and without small whorled pogonias.

The following general characteristics were associated with small whorled pogonia sites and assigned the highest weights: soils with a pan layer, slopes between 11 and 17 percent, and a specific degree of canopy reflectance in the near infra-red wavelengths that is related to species composition and the amount of canopy closure. Field surveys to each of the 26 small whorled pogonia sites corroborated the general habitat findings. In addition, these surveys provided researchers with information concerning the herbaceous species, micro-topography, and light levels at the sites.

The GIS assisted researchers in locating each of three general habitat features — soils, slopes, and forest reflectance — on five pilot USGS topographic quadrangles in New Hampshire and one town in Maine. Potential habitat was ranked according to the sum of the weights received for each habitat feature at each location. Locations containing each of the important habitat features received the highest rank.

Researchers surveyed approximately 90 of the highest ranked potential small whorled pogonia sites during the 1993 field season. Previously unknown populations were discovered at 10 percent of the predicted sites. In one representative quadrangle, the GIS model was able to determine that 94 percent of the total acreage was unsuitable for small whorled pogonias. It identified the six percent that contained the best potential habitat, allowing biologists to focus their surveys on the most promising sites. In another test of the model, it was applied to 23 known sites and correctly predicted 78 percent of them as potential habitat.

The small whorled pogonia habitat model continues to be used in the New England region. The Vermont and New Hampshire Natural Heritage Programs plan to survey potential habitat identified by the model, and the U.S. Forest Service is funding a thorough search for small whorled pogonias in the White Mountain National Forest. Use of the model to locate potential habitat may streamline informal interagency consultations carried out under Section 7 of the Endangered Species Act for Forest Service activities in the pogonia's range.

Molly Sperduto is a biologist with the Fish and Wildlife Service's New England Field Office in Concord, New Hampshire. She developed the small whorled pogonia habitat model while working for the Service as a graduate co-op student.

Recovery Updates

The recovery of imperiled plants and animals to a secure status in the wild is the ultimate goal of the Fish and Wildlife Service's endangered species program. In recognition of the growing interest in species recovery, we have created a new *Recovery Updates* section. The recovery news is arranged by region, and we encourage all offices to bring their success stories to light.

Region 1

• least Bell's vireo *(Vireo bellii pusillus)* - Numerous detections of this Endangered bird throughout southern California in the spring and early summer of 1994 suggest that it is expanding its range and may be on the road to recovery. Management of the largest vireo populations is responsible for significant population increases and has contributed to recolonization of areas that had not previously accommodated vireos. Vireos that were color-marked by managers in San Diego County continue to appear and breed in areas 80 miles or more to the north in Riverside and Orange Counties.

In the Prado Basin (Riverside County), at least 150 vireo pairs have been detected thus far in 1994 in an area where 19 pairs were detected in 1986. Preliminary data suggest that at least two large populations elsewhere have similarly increased in size. It has become clear that management of the vireo (including habitat preservation/restoration and cowbird abatement) is also benefitting other bird species, including yellow warblers *(Dendroica petechia)* and southwestern willow flycatchers *(Empidonax trailii extimus)*.

Region 2

• white bladderpod *(Lesquerella pallida)* - This spring, two new populations of this Endangered plant, which is endemic to Texas and is now limited to one county, were discovered through efforts supported by the FWS Clear Lake, Texas, Field Office. All other known historic locations were visited to determine if the species is still present. Specimens were found at all sites, but in limited numbers in most locations due to invasions of exotic plants. Species experts were consulted to determine management needs, and landowners of most of the known sites have been contacted regarding the potential for management work on their land.

The FWS Clear Lake, Texas, Field Office has also initiated an experimental effort to encourage community protection of the white bladderpod in exchange for the potential to promote ecotourism. City and county officials and local schools were contacted and informed of the species' presence in their area. The uniqueness of the species was emphasized; it is limited to exposed outcrops of a specific geologic formation, forming alkaline island habitats within the normally acidic Texas pineywoods. In addition, the white bladderpod may be of significant economic importance. High-quality industrial oils have been extracted from the seeds of *Lesquerella* species, and a natural gum found in them is currently being investigated for potential use in food products.

photo by Jeanne Tinsman

immature California condor

• California condor *(Gymnogyps californianus)* - The FWS Region 2 Office hired a biologist in November 1993 to begin investigating the potential for releasing condors in Arizona and New Mexico. Establishing additional, disjunct populations in historically occupied areas is a high priority for the recovery team. The FWS has identified two potential areas in Region 2 for condor reintroductions. The Grand Canyon/Vermilion Cliffs region in northern Arizona is a remote area characterized by broad plateaus and deep canyons. Most of the land is in Federal or Native American ownership. Condors were observed in the Grand Canyon and other parts of Arizona as late as the turn of the century. Although no modern records exist for condor sightings in New Mexico, there is suitable habitat in the eastern foothills of the Gila National Forest. FWS officials are

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investigating the 300,000-acre Ladder Ranch as a potential condor release area.

Because of the large number of land management agencies and potentially affected groups, particularly in the Grand Canyon/Vermilion Cliffs area, the FWS is holding a series of informational meetings for agencies and the general public. Recovery team members have played an important role in these early efforts by giving presentations on the status of the program and establishing a rationale for additional condor populations. The meetings have also provided an opportunity for meeting participants to provide input directly to the recovery team. The FWS is also cooperating with Federal and State agencies in data collection and preparation of an environmental assessment of the proposed condor release areas.

• **Lee pincushion cactus** (***Coryphantha sneedi leei)*** - A new population of this Threatened plant was found recently in Carlsbad Caverns National Park. The discovery was made during planning efforts for a prescribed burn.

Region 3

• **decurrent false aster** ***(Boltonia decurrens)*** - Staff from the Mark Twain National Wildlife Refuge in Illinois discovered hundreds of seedlings of this Threatened plant species on a site affected by the 1993 flood. The staff, along with a professor from Southern Illinois University who has an FWS grant for post-flood assessment of the species, will monitor the population.

Region 4

• **Heller's blazing star** (***Liatris helleri)*** - Nearly 3,000 seedlings of this Threatened plant have been returned to wild populations in North Carolina. Seeds were collected from these populations as part of a genetic research project conducted by the University of Georgia with FWS funding. The seedlings were by-products from the research project.

The North Carolina Arboretum in Asheville held the seedlings over the winter until they were ready to be transplanted into the wild. Employees of the National Park Service (Blue Ridge Parkway), U.S. Forest Service, and FWS Asheville Field Office, along with several volunteers, donated time on their days off for the transplanting. The seedlings will significantly augment seven Heller's blazing star populations, almost all of which have been showing serious declines due in part to heavy recreational use of the rocky cliffs where they grow.

photo by Charlie McDonald

Lee pincushion cactus

Region 5

• **piping plover** ***(Charadrius melodus)*** - Protection of this bird by Federal, State, and private organizations has resulted in Maine having the highest average productivity (1.95 chicks per pair) of any State along the Atlantic Coast from 1988 to 1993.

• **northern flying squirrel** ***(Glaucomys sabrinus fuscus)*** - This Endangered mammal is found mainly in the mountains of West Virginia and adjacent portions of Virginia. Only 10 specimens were known from West Virginia prior to its listing in 1985, but since that time biologists have documented 69 site records. It has been reported from four of the five "geographic recovery areas" identified in the recovery plan, with all West Virginia occurrences in the Monongahela National Forest. The FWS is considering whether to propose reclassifying this subspecies as Threatened.

• **running buffalo clover** ***(Trifolium stoloniferum)*** - Also in West Virginia, significant new populations of this Endangered plant have been located and protected in the Monongahela National Forest. Landowner contacts are being made in an effort to gain the cooperation of private citizens in conserving the species on property near the national forest.

• **American burying beetle** ***(Nicrophorus americanus)*** - The third year of a pilot effort to reintroduce this Endangered insect at historical habitat on Penikese Island, Massachusetts, is now complete. Additional lab-reared beetles were released, and trapping confirmed that some of last year's release stock reproduced. This summer, the FWS also secured protection for habitat on Block Island, Rhode Island, that will be managed as part of the Ninigret National Wildlife Refuge. One of the purposes of the new unit is to provide protection for the only known natural population of the American burying beetle in the eastern United States.

A new fact sheet on the American burying beetle is now available from the

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Recovery Updates

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FWS New England Field Office at 22 Bridge Street, Concord, New Hampshire 03301 (603/225-1411; fax 603/225-1467).

• **Virginia big-eared bat** ***(Plecotus townsendii virginianus)*** - Known population levels of this subspecies have increased steadily from 1,300 to more than 13,000 in West Virginia and North Carolina since the bat's listing in 1979 as Endangered. Biologists believe that cave gating, which reduces the disturbance of roosting or hibernating bats, is responsible for much of the population increase.

photo by Merlin D. Tuttle, courtesy of Bat Conservation International

Two subspecies of Townsend's big-eared bat **(Plecotus townsendii),** ***including*** **P.t. virginianus,** ***are listed as Endangered.***

Endangered Species and Wetlands Conservation

by Angela V. Graziano

Across the continent, a great diversity of bird, mammal, fish, and plant species, many of which are listed as Threatened or Endangered, depend on wetlands for survival. The North American Wetlands Conservation Act, signed into law in December 1989, helped secure a future for this wealth of wildlife by establishing a program that stimulates partnerships and leverages funds to protect, restore, and enhance wetland habitats in the United States, Canada, and Mexico. Partnerships established under the North American Wetlands Conservation Program may prevent the need for some future listings by benefitting a multitude of species on an ecosystem basis.

Since 1989, the program has launched 275 wetlands conservation projects in North America. It has conserved more than one million acres of wetland ecosystems in the U.S. and Canada alone. These wetlands and adjacent uplands are host to countless species of wildlife, including such federally-listed migratory birds as the whooping crane *(Grus americana)* in the Cheyenne Bottoms, Kansas, and Quill Lakes, Saskatchewan, and the piping plover *(Charadrius melodus)* at Quill Lakes. The program also benefits Threatened plants, such as the sensitive joint vetch *(Aeschynomene virginica)* along the Maurice River in New Jersey, and listing candidates like the paddlefish *(Polyodon spathula)* at Caddo Lake, Texas. In addition, projects funded through the program affect large bioreserves in Mexico, such as the Delta Area of the Colorado River and the Upper Gulf of California. This region supports four species in danger of extinction: the totoaba or seatrout *(Cynoscion macdonaldi)*, the vaquita or Gulf of California harbor porpoise *(Phocoena sinus)*, the Yuma clapper rail *(Rallus longirostris yumanensis)*, and the desert pupfish *(Cyprinodon macularius)*.

The North American Wetlands Conservation Fund (Fund) is a multimillion dollar matching funds account authorized by the act and allocated by the public-private North American Wetlands Conservation Council. The Fund has provided more than $105 million in grants, which have been matched by more than $202 million in partner funds. These cooperative ventures focus on long-term actions such as acquisition, restoration, and education. A few of the many projects sponsored by the Fund that benefit rare and vulnerable species follow:

Alberta, Canada — The rich grasslands, parklands, ponds, and marshes that dot Canada's provinces of Manitoba, Saskatchewan, and Alberta account for 50 percent of the continent's sensitive migratory bird species, including Baird's sparrow *(Ammodramus bairdii)* and the ferruginous hawk *(Buteo regalis)*, both of which are listed in Canada as Threatened. Another bird of this region, the piping plover *(Charadrius melodus)*, is listed as Endangered in the U.S. and Canada. To conserve vital habitat in Alberta, partners pooled their resources, which were supplemented with three grants from the Fund totalling more than $3 million. By working closely with grazing associations, 13 irrigation districts, oil companies, and hundreds of individual ranchers and farmers, the part-

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Wetlands Conservation

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ners will secure 4,550 acres of existing wetlands, and will restore and manage another 4,036 acres of former wetlands. The Alberta Habitat Diversity Project marks the first time Alberta partners will implement a multi-species plan specifically designed to include habitat protection and enhancement for Threatened and Endangered species.

Cheyenne Bottoms, Kansas — A marshy basin in southcentral Kansas known as the Cheyenne Bottoms is the subject of another wetlands conservation project with benefits for vulnerable species (see sidebar). This area provides important habitat for the whooping crane *(Grus americana)*, bald eagle *(Haliaeetus leucocephalus)*, peregrine falcon *(Falco peregrinus)*, least tern *(Sterna antillarum)*, and piping plover. All five of these birds are listed in the U.S. as Endangered. Three Fund grants totalling $5.5 million, with matching partner dollars of $11.5 million, will finance projects to restore, enhance, and protect wetlands at the Bottoms that support a magnificent diversity of wildlife.

Mexico — In Mexico, where Fund projects affect large biosphere reserves, a Fund grant of $23,500 and matching partner contributions of $16,000 support a conservation education program in the Sian Ka'an Biosphere Reserve. This project is designed to educate local communities about their natural resources and encourage involvement in conservation. The information provided includes the importance of conserving habitat for the jaguar *(Panthera onca)* and several listed species of sea turtles.

The Federal share of program funding comes from a number of sources: general Congressional appropriations; interest from the Pittman-Robertson account for Federal Aid in Wildlife Restoration; the Coastal Wetlands Planning, Protection, and Restoration Act; and fines, penalties, and forfeitures resulting from enforcement of the Migratory Bird Treaty Act. Funds from the Coastal Wetlands Planning, Protection, and Restoration Act are limited to U.S. coastal States (including those bordering the Great Lakes). Reflecting the program's international scope, at least 50 percent of each fiscal year's total funds (minus Coastal funds) must support wetlands conservation projects in Canada and Mexico.

The Federal share of fiscal year 1994 funding included general appropriations of $12 million, Federal Aid interest of $6 million, and $7.5 million from the Coastal Wetlands Planning, Protection, and Restoration Act. So far in 1994, 42 wetlands conservation projects have been recommended for funding consideration by the Council. The Migratory Bird Conservation Commission has approved these projects, providing more than $19 million in grants to support wetlands conservation efforts that affect more than 4.9 million acres in the U.S., Canada, and Mexico. The 1994 grant dollars have been matched by partner dollars of more than $33 million.

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Cheyenne Bottoms

Cheyenne Bottoms is a vitally important wetland ecosystem for shorebirds and waterfowl. Forty-five percent of the shorebirds in North America, including more than 90 percent of 5 species, stop at Cheyenne Bottoms during spring migration. Designated a "Wetland of International Importance" under the Ramsar Convention, a "Hemispheric Reserve" by the Western Hemisphere Shorebird Network, and Critical Habitat for the whooping crane, the Bottoms is one of only three great wetlands complexes left in Kansas. It is a vital link for migratory birds as they travel between their breeding and wintering grounds. In addition, the Bottoms supports 9 species of fish, 17 reptiles, 8 amphibians, and 254 other bird species.

Efforts to conserve this area are supported by a diversity of partners, whose contributions have ranged from a few dollars to gifts worth more than $3 million. Additional support has come from the North American Wetlands Conservation Fund. The results to date are impressive: more than 6,000 acres of existing wetlands are protected, another 35,000 have been restored, and 13,000 more have been enhanced. Specific habitat enhancement actions have focused on water delivery and management, including the construction of a central water storage pool, hubs and water control gates, and pump stations to move water from pool to pool. A shorebird nesting island complex also was developed.

Nearly 100 partners contributed to the successful acquisition of private lands and the restoration and enhancement of existing wildlife areas in the Bottoms. In addition to the North American Wetlands Conservation Fund, major funding partners include the State of Kansas, The Nature Conservancy, the U.S. Fish and Wildlife Service, Ducks Unlimited, the National Fish and Wildlife Foundation, and the Western Hemisphere Shorebird Reserve Network.

photo by Mike Blair/Kansas Department of Wildlife and Parks

The whooping crane is one of 254 species of birds that use the Cheyenne Bottoms, Kansas.

Wetlands Conservation

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Any individual, group, or agency with a qualifying project and matching funds can apply for a wetlands conservation grant through the Fund. Grants are available for protection, restoration, and enhancement of wetlands in the U.S. and Canada. Grants are also available for wetlands restoration, management, research, and conservation education and training in Mexico. All proposals must describe the planned action, the need and location of the project, and the contributions and responsibilities of cooperating partners. Proposals are carefully reviewed by the North American Wetlands Conservation Council to ensure that each project will support and benefit long-term wetlands conservation, other wetlands values, partnerships, and biological diversity — including nongame animals, waterfowl, and endangered species.

As a result of Fund-supported wetlands conservation projects, the prospects for some of North America's biological resources are looking brighter, but much remains to be done to secure a wildlife legacy rich in diversity. Endangered species partners are encouraged to learn more about the Fund by contacting the Council Coordinator at 4401 North Fairfax Drive, Suite 110, Arlington, Virginia 22203. Deadlines for U.S. and Mexican grant proposals are the second Fridays in April and August of each year. Canadian proposal deadlines are January 1 and May 1. Brochures and grant applications are available from the U.S. Fish and Wildlife Service, Publications Unit, Mail Stop 130 WEBB, Arlington, Virginia, 22203, or by calling (703) 358-1711.

Until recently, Angela Graziano was a communications specialist with the Fish and Wildlife Service's North American Waterfowl and Wetlands Office. She is now the outreach specialist for the Service's New Jersey Ecological Services Field Office in Pleasantville, New Jersey.

Box Turtle

(Continued from Page 1)

were exported each year prior to 1992. Officials at the port of Chicago (which exports the largest number of box turtles) believe that 5,000 to 10,000 *T. carolina* are exported annually, mainly to Western Europe, Canada, and Japan.

After receiving information about the increasing international demand for box turtles, along with information about declining populations due to removal for export, the FWS recently began exploring options for the benefit of the species. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides an excellent opportunity to address the problem. This treaty, which 124 countries have signed, was established to control the impact of international trade on species of animals and plants, and to prevent their extinction due to international trade. At the biennial conferences of CITES Parties, discussions typically focus on high-profile animals such as elephants, rhinos, and tigers, but species here in the United States are also affected by international trade. Therefore, on June 10, 1994, the FWS submitted a proposal to list all species of North American box turtles in CITES Appendix II. The proposal will be considered at the November 7-18, 1994, Conference of CITES Parties in Fort Lauderdale, Florida.

CITES regulates trade in species that are listed on appendices to the treaty. Appendix I includes species that are threatened with extinction, and international trade in these animals and plants for commercial purposes is prohibited. Appendix II species are those that may become threatened with extinction unless trade is properly managed and regulated. After reviewing the available literature and comments received from the public, including State wildlife agencies and scientists with expertise in box turtle populations, the FWS concluded that box turtles qualify for inclusion on CITES Appendix II. We do not expect opposition from other governments to this proposal, which will become effective 90 days after the CITES meeting in November.

Currently, Federal regulations on box turtle exports from the United States do not exist. Even though take and commercial trade in box turtles are prohibited by law in many States, some States still allow exports. Without a CITES listing, box turtles from States that prohibit exports can be "laundered" through other States, and officials in importing countries are unable to determine the legality of a shipment. In addition, regulating the numbers of box turtles taken from the wild for international trade currently is not possible on a nationwide level.

The treaty also requires that all shipments of CITES-listed species be transported according to International Air Transport Association (IATA) regulations on the humane shipment of wild animals. This is critical because there is evidence that many box turtles have been exported under severe transport conditions, resulting in high mortalities.

Inclusion of box turtles on Appendix II will mean that an exporter must obtain an export permit from the FWS Office of CITES Management Authority (OMA). No CITES Parties will allow imports into their country without an export permit issued by OMA. Such an export permit can only be issued if a scientific determination is made by the FWS Office of CITES Scientific Authority that the export will not be detrimental to box turtle populations, and that the specimens are legally obtained. OMA will work closely with State wildlife agencies to ensure that commercial exports will be considered only from States that allow exports and have sustainably managed populations.

Although the Federal government places no restrictions on box turtle exports at this time, most States do protect these animals. However, many U.S. States with box turtle populations (e.g., Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Oklahoma, Virginia, West Virginia, and Pennsylvania) believe there is extensive

Box Turtle

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illegal trading in box turtles. In Illinois, for example, a recent undercover investigation resulted in 23 arrests for illegal sales of reptiles and amphibians, a number of which were box turtles.

In response to a notice published in the January 27, 1994, *Federal Register,* the FWS received information on population declines in box turtle populations in several States, including Connecticut, Florida, Illinois, Indiana, Iowa, Maryland, Massachusetts, Missouri, New Jersey, New York, Ohio, Oklahoma, Tennessee, Virginia, West Virginia, and Wisconsin. Over-collection for export is a serious factor in much of this decline, and may exacerbate the impacts of habitat loss.

The FWS sees the inclusion of the North American box turtles on CITES Appendix II as an excellent opportunity for cooperation in species conservation between the States and the Federal government. Comments received from the States in response to the notice indicated no opposition to CITES protection; indeed, many State wildlife agencies were extremely supportive. The FWS has also received hundreds of letters from nongovernmental organizations, scientists, and private citizens, all of whom have raised their voices in support of CITES protection for the box turtles. Together, we can all work to benefit box turtle populations, while at the same time preventing populations that have experienced recent declines from becoming candidates for listing under the Endangered Species Act.

Most significantly, perhaps CITES action will galvanize public attention to the conservation needs of this once-common species so that the day will never come when box turtles disappear from the woodlands, meadows, hills, and grasslands of North America.

Dr. Lieberman is Chief of the Branch of Operations, Office of CITES Management Authority, U.S. Fish and Wildlife Service, Washington, D.C.

Box turtles are members of the family Emydidae, genus *Terrapene.* The species proposed for CITES Appendix II are *Terrapene carolina, Terrapene ornata,* and *Terrapene nelsoni.* An exclusively Mexican species, the Coahuilan box turtle *(Terrapene coahuila),* is already on CITES Appendix I, and the FWS proposal would retain it there.

The most widely distributed box turtle, *Terrapene carolina,* is found from Canada to Mexico. It is predominantly a species of open woodlands, although in the northeast it also occurs in pastures and marshy meadows and edge areas between woods and fields. The range of *T. carolina* extends from southern Maine southward to the Florida Keys and westward through Canada (Ontario) to Michigan, Illinois, eastern Kansas, Oklahoma, and Texas. In Mexico, two subspecies are found along the east coast; *Terrapene carolina mexicana* occurs in southern Tamaulipas, eastern San Luis Potosi, and northern Veracruz, while *T. carolina yucatana* is found in the northern part of the Yucatan peninsula.

A prairie turtle, *T. ornata* inhabits treeless plains and gently rolling grasslands with scattered low, brushy vegetation. One of two recognized subspecies, *Terrapene ornata ornata,* ranges over large sections of the midwestern United States and the Great Plains, from Texas north to southern South Dakota, and eastward to Indiana. The other, *T. ornata luteola,* has a much narrower range, from western Texas, southern Arizona, and New Mexico south to the northern Mexican states of Chihuahua and Sonora.

Terrapene nelsoni has a very small and fragmented range, scattered among widely disjunct high altitude localities on the west coast of Mexico. *Terrapene nelsoni* occurs in the Mexican state of Nayarit. Very little is known about the status or distribution of *T. nelsoni klauberi,* which is found in the states of Sonora and Sinaloa.

Urbanization, agricultural development, logging, and road construction have fragmented or eliminated box turtle habitats, especially in the northeast. When coupled with habitat loss and the species' naturally low reproduction rate, over-collection becomes a serious threat. Because most box turtles in trade are adults, commercial trade may have its greatest impact on the reproductive portion of box turtle populations.

Several State wildlife officials report that all box turtles in commercial trade are wild-caught. It is not commercially feasible at this time to breed box turtles in captivity to marketable size, due to the fact that they are slow growing and take 10 to 20 years to reach sexual maturity.

Regional News

(Continued from Page 2)

Office of the National Biological Survey (NBS) have been removing fire debris from the stream channels in an attempt to accelerate rehabilitation of Moapa dace habitat. NBS biologists will monitor habitat conditions and the populations of affected aquatic species.

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The FWS Reno Office and Desert National Wildlife Refuge Complex staff met with invertebrate specialists Dan and John Polhemus at the Ash Meadows National Wildlife Refuge to discuss management needs of the Ash Meadows naucorid *(Ambrysus amargosus)*. This flightless aquatic insect has been relegated to a fraction of its historically limited range at Point of Rocks Spring due to habitat alteration or destruction. Population levels are extremely low. Improving the status of this species may require a temporary shut-down of new habitat created for another Endangered species, the Devils Hole pupfish *(Cyprinodon diabolis)*. The water supply for this created habitat is piped from one of the springs that still support Ash Meadows naucorids. The Southern Nevada Desert Springs Recovery Team will be consulted in the near future on this issue.

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Region 2 — The FWS Field Office in Clear Lake, Texas, participated with local U.S. Forest Service biologists in activities for "Celebrating Wildflowers Week" this spring. The office assisted in arranging a day-long series of educational presentations, workshops, and nature walks that emphasized the importance of native wildflowers, including listed species and listing candidates. A visual display identified the rare species of eastern Texas, the reasons for their endangerment, and things the general public can do to help. The display was also erected at the grand opening of an Endangered Species Garden at Houston-based Mercer Arboretum and Botanic Gardens. The Mercer center is a participating member of the Center for Plant Conservation, and houses cultivated populations of several listed and candidate plant species. A number of public officials were present at the grand opening and offered positive comments on the display.

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The FWS Arizona Ecological Services Office is developing a conservation agreement to benefit the Ramsey Canyon leopard frog *(Rana subaquavocalis)*. This species, which was described just last year, is currently known to breed at only two sites, including a livestock tank and a cement cistern in the Huachuca Mountains of southeastern Arizona. The total number of adult frogs at both sites is estimated at no more than 120. A team consisting of representatives from the Coronado National Forest, U.S. Army (Fort Huachuca), The Nature Conservancy, Arizona Game and Fish Department, a private landowner, and the herpetologist who described the species is developing a conservation strategy to ensure the maintenance of existing habitat and plan for the development of new habitat for establishing additional populations.

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The proposed reclassification of the bald eagle *(Haliaeetus leucocephalus)* announced by Director Beattie on June 30, 1994, (see *Bulletin* Vol. XIX No. 4) will not upgrade the southwestern population from Endangered status. This small population continues to face threats and requires intensive management to be maintained at its current level. It is comprised of approximately 35 nest territories, with all but two in Arizona. Most of Arizona's eagles are concentrated along the Salt, Verde, and Gila Rivers just east of the large Phoenix metropolitan area. In 1994, 27 (81 percent) of Arizona territories were occupied, but only 12 (36 percent) were successful, fledging a total of 18 young. This performance of 0.66 fledglings per occupied territory is below the 0.81 average over the preceding 20 years. The two territories in New Mexico were both successful in 1994, fledging a total of three young. The population faces continued threats of habitat degradation, accidental and malicious harassment, chemical contamination, and lethal entanglement of adults and nestlings in discarded fishing line and tackle. The population has expanded recently, with five new territories becoming established in the last

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photo by Tom Woods

The Ramsey Canyon leopard frog, first described in 1993, is known to breed at only two sites in the Huachuca Mountains of southeastern Arizona.

Regional News

(Continued from previous page)

three years. Unfortunately, two of those have since gone unoccupied. The southwestern population is largely maintained by intensive, cooperative management through the Southwestern Bald Eagle Management Committee, which includes representatives from various Federal and State agencies, Indian Nations, and private organizations.

The Phoenix Zoo reports that 34 black-footed ferret *(Mustela nigripes)* kits were born at the zoo's breeding facility this year. Of the 34 kits born, 17 survived. Because the losses may have been connected to temperature related factors, a new cooling system was installed. The zoo has not lost a kit since the new system was put in place. This breeding facility has produced some of the largest black-footed ferret litters in the nation (up to nine kits).

The New Mexico Endemic Salamander Team is in the final stages of completing a draft management plan for the Jemez Mountain salamander *(Plethodon neomexicanus)* in accordance with a Conservation Agreement signed by FWS, the New Mexico Department of Game and Fish, and the U.S. Forest Service. As a result, a petition to list the species was found "not warranted," and its position as a candidate for possible future listing was moved from category 1 to category 2.

Region 3 — In June, one of the rarest birds in the world, the Kirtland's warbler *(Dendroica kirtlandii)*, was honored during the 1st Annual Kirtland's Warbler Festival. Sponsored by the Chamber of Commerce in Oscoda County, Michigan, the 10-day festival included activities for all age groups. Members of Congress and agency representatives participated in the festival parade and officially opened a 48-mile self-guided auto tour route during a ribbon-cutting ceremony. On Friday, June 10, media were invited to accompany biologists to record the sounds and sights of male warblers returning to stake out their territories and search for mates. Secretary Babbitt made a visit to the county on June 17 and was pleased by a close-up view of a singing male warbler.

Region 4 — A new exhibit entitled *Our Threatened Ecosystems* has been developed by the FWS Asheville, North Carolina, Field Office and the FWS Southeast Region's Division of Public Use Management (Refuges and Wildlife). The exhibit defines an ecosystem, gives examples of various ecosystems and the listed species found within them, shows threats to ecosystems, and gives reasons why we should care about conservation. Fact sheets are being developed to accompany the exhibit. Approximately 2,000 people have seen the exhibit, which has been on display at seven public events. Comments about the exhibit from natural resource professionals and the public have been positive.

Region 7 - FWS biologists in Region 7 have been pleasantly surprised to learn that news travels well even through the far reaches of western Alaska. In the past six months, two spectacled eiders *(Somateria fischeri)* were rescued by Native Alaskans in remote villages. Since these birds were listed as Threatened in 1993, FWS biologists have worked to inform rural residents that populations of spectacled eiders have declined drastically. These eiders breed in western and northern Alaska and along the arctic coast of Siberia. Spectacled eiders are thought to winter on open ice in the Bering Sea.

In early January, a Wales resident noticed a lone bird perched on a snow drift. The bird seemed oblivious to snow machines buzzing around it. "At first I thought she was resting before moving on," said Vincent Okpealuk, the rescuer. Upon closer investigation, Okpealuk found the bird was injured and could not fly. He immediately called the FWS Anchorage Regional Office and asked what he should do. "I knew that she was on the endangered species list and I wasn't sure if I should approach her," Okpealuk said. Following instructions from FWS biologists, Okpealuk captured the eider and placed her in a cardboard box. He then located a helicopter pilot who flew the bird to Nome, where an Alaska Airlines crew took over and flew the bird to Anchorage. The eider was placed in the care of a local veterinarian who diagnosed her as suffering from a broken wing and dehydration. Three weeks later, the eider was shipped to the Franklin Park Zoo in Tacoma, Washington. Despite apparent good health, the bird died in April.

A second spectacled eider was rescued in the village of Savoonga on St. Lawrence Island. This bird had been seen flying into a snow bank. Upon inspecting the eider, local resident Terry "Stormy" Kiyuklook realized that its eyes were frosted over, rendering it blind. He recognized the bird from FWS posters that had been distributed to inform rural residents about the listing of the species. Kiyuklook put the eider under his coat and carried it home where he and his family fed it rice and soup for several days. An FWS biologist happened to be visiting Savoonga and was told of Stormy's rescue effort. The eider, a young male, was flown to Anchorage and placed under veterinary care. Early in May, the bird was shipped to a zoo in Boston that has a good track record of rearing eiders.

Both rescued birds exhibited a peculiar condition: they were unable to waterproof their feathers. This condition is characteristic of captive birds not regularly exposed to sunshine and water. Inability to waterproof might be a clue to the decline in spectacled eider numbers. The Wales eider and other spectacled eiders found dead in the last year are being analyzed for contaminant residues in hopes of learning more about their condition at death.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	75	153	17	0	245	73
Reptiles	16	63	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	65	11	38	0	114	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	14	0	3	0	17	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	403	1	85	2	491	184
TOTAL	722	494	198	38	1,452 *	483 **

Total U.S. Endangered 722 (319 animals, 403 plants)
Total U.S. Threatened 198 (113 animals, 85 plants)
Total U.S. Listed 920 (432 animals, 488 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 399 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 CITIES Party Nations: 124

October 1, 1994

September/October 1994 Vol. XIX No. 5

ENDANGERED SPECIES

Technical Bulletin

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

994 Vol. XIX No. 6

ENDANGERED SPECIES

Technical Bulletin

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

Wolf Reintroduction Approved for Yellowstone and Central Idaho

photo by John and Karen Hollingsworth

Recovery of the gray wolf *(Canis lupus)* in the northern Rocky Mountains moved a step closer November 22, 1994, when the Fish and Wildlife Service (FWS) approved a plan to establish experimental populations of this Endangered animal in Yellowstone National Park and central Idaho.

Separate rules published in the *Federal Register* outlined how the FWS will conduct reintroductions and the manner in which wolves will be managed once released. The rules, one addressing reintroduction in Yellowstone National Park and the other in central Idaho, describe reintroduction methods and designate wolves in each area as "non-essential, experimental" populations under Section 10(j) of the Endangered Species Act. This provision of the Act allows Federal and State resource agencies and private citizens greater flexibility in managing reintroduced animals.

Specifically, such a designation will allow wolves to be killed, under certain conditions, if they are preying upon livestock. Although unlikely, if wild populations of deer, elk, and other large game are affected severely by wolf predation, wolves could be moved under an approved State management plan.

Wolves within the boundaries of two areas — one in and around Yellowstone National Park and the other in and around the central Idaho wilderness areas — are designated as non-essential experimental. Neither of these areas currently supports breeding wolves. The experimental population area for the Yellowstone region includes the entire State of Wyoming, a portion of southeastern Idaho east of Interstate 15, and a portion of Montana east of

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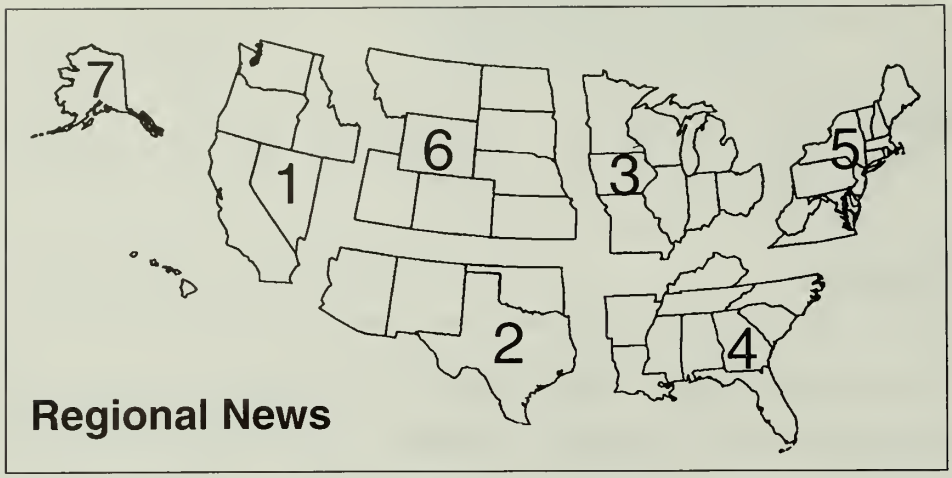

Regional News

Regional endangered species contacts have reported the following news:

Region 1 —As a result of trapping efforts funded by the FWS Boise, Idaho, Field Office, the Selkirk Ecosystem of the grizzly bear *(Ursus arctos)* recovery area now has three radio-collared grizzlies. Prior to this effort, no [illegible]ared grizzly bears existed in this ecosystem, the last one having been shot in November 1993. Radio-collared bears are extremely beneficial to population monitoring activities. The ongoing trapping effort is a joint venture involving the Boise Field Office (Region 1), Grizzly Bear Recovery Coordinator's office (Region 6), and Idaho Department of Fish and Game.

*****

Representatives of the FWS Northern Idaho Field Office have completed a partial survey of gates that were installed to control vehicular access to Bear Management Units (BMU) in the Selkirk Ecosystem, and four BMU's within the Cabinet-Yaak Ecosystem, within the Idaho Panhandle National Forest. Survey results indicate that most seasonal barriers on designated "restricted roads" are not effective, and can be bypassed easily by most all-terrain vehicles and off-road motorcycles. Under current conditions, the FWS believes that the roads may need to be reclassified as "open motorized trails," as defined by the latest road management guidelines from by the Interagency Grizzly Bear Committee. The FWS is proposing to meet soon with the Interagency Grizzly Bear Committee and the Forest Service to discuss the ineffective barriers and the need to readjust security within the BMU's.

*****

Robert Smith, Supervisor of the FWS Pacific Islands Field Office, addressed an international group of journalists (including representatives from the *Los Angeles Times, Philadelphia Inquirer, USA Today*, and five Japanese newspapers) at the East-West Center in Honolulu on August 17. The speech, entitled "Implications of Habitat Restoration Efforts for Private Landowners," focused on the use of partnerships to promote native species conservation in Hawaii and the need for adequate legal tools, including an important change to the State of Hawaii's endangered species law.

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(Continued on Page 16)

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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.

Rediscovery of the Palos Verdes Blue Butterfly

by Marjorie Nelson

photo by B. "Moose" Peterson/WRP

Adult male Palos Verde blue butterflies have vivid, silvery-blue wings. Females have more subtle coloring; their brown-grey wings are tinged with blue iridescence. Both sexes are a buff-grey color on the underside, have black spots ringed with white on their wings, and are covered with blue hairs.

On March 10, 1994, Fish and Wildlife Service (FWS) biologist Dr. Rudi Mattoni rediscovered the Palos Verdes blue butterfly *(Glaucopsyche lygdamus palosverdesensis)* on the grounds of a Department of Defense facility in San Pedro, California, while conducting a survey for ground-dwelling insects. This relatively showy subspecies was last observed in 1983, and was presumed by many to be extinct as a result of habitat loss (Mattoni 1993). It is endemic to the Palos Verdes Peninsula in Los Angeles County, California, and is associated with coastal sage scrub, a declining and greatly fragmented plant community in the region.

When the Palos Verdes blue was listed in 1980 as Endangered, seven colonies remained, although only one was considered large enough to be self-sustaining (USFWS 1984). Following the butterfly's rediscovery this year, FWS entomologists Chris Nagano and Marjorie Nelson made several additional butterfly sightings outside the Defense facility. The population is estimated to number 200 butterflies.

The Palos Verdes blue butterfly was thought to use rattlepod *(Astragalus trichopodus* var. *lonchus)* exclusively as the larval host plant during reproduction. Females have since been found to deposit their eggs on the flowers and fruits of deerweed *(Lotus scoparius)* as well. Caterpillars (larvae) hatch from eggs in 7 to 10 days and begin feeding on the host plant. Near the end of their larval stage, Palos Verdes blue caterpillars may be tended by ants. The larvae of other *G. lygdamus* subspecies secrete a sugary substance that is eaten by the ants. In return, the ants may protect the caterpillars from predators and parasitoids. Adults emerge during February and March and live for an average of only 4 days (Mattoni 1994).

The Palos Verdes blue population rediscovered by Dr. Mattoni was located in an area proposed for a pipeline project. The coastal California gnatcatcher *(Polioptila californica californica)*, a Threatened bird, also occurs in this region. The Department of Defense currently is working with FWS biologists to develop strategies to conserve both the Palos Verdes blue butterfly and the coastal California gnatcatcher. In addition, Chevron has provided funding for Dr. Mattoni to sample vegetation in the pipeline area in order to determine its suitability for recolonization by these unique species.

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Mattoni, R. H. T. 1994. Current status of the Palos Verdes blue butterfly at the U. S. Navy fuel storage reserve, San Pedro, California. Agresearch Inc. report prepared for Chevron Oil.

Mattoni, R. H. T. 1993. The Palos Verdes blue, *Glaucopsyche lygdamus palosverdesensis* Perkins and Emmel. *Occasional Paper of the IUCN Species Survival Commission.* No. 8.

United States Fish and Wildlife Service (USFWS). 1984. The Palos Verdes Blue Recovery Plan. Prepared by Dr. Richard A. Arnold, Department of Entomology, University of California.

Marjorie Nelson is a biologist in the FWS Carlsbad, California, Field Office.

Partners in Flight: Conserving a Shared Resource

by Daniel R. Petit

Nearly 700 bird species regularly breed on the North American continent north of Mexico. Although relatively few bird species have become extinct since the arrival of European settlers, the populations of many taxa have fallen. This decline in the populations of many once-common land birds initially was sensed by many ornithologists in the late 1960's, and many of those disheartening trends have since been confirmed. Several groups of species showed striking losses in the 1980's. Declines were especially pronounced in Neotropical migrants — birds that breed in North America but spend the northern winter at tropical or subtropical latitudes.

Most avian ecologists agree that the population declines are the result of increasing habitat alteration and land use changes during the past few decades. Many species that nest in large tracts of eastern North American forests or open grasslands of the Midwest and Great Plains are affected by habitat fragmentation, vegetational succession, conversion to cropland, and wetland drainage. But because not all species within a given habitat, region, or ecological guild exhibited population trends in the same direction, scientists believed that other factors also were influencing populations. Concern also was voiced about whether existing U.S. legislation could prevent further declines.

All native avian species found in the United States are protected from indiscriminate killing by the Migratory Bird Treaty Act (as amended), enacted in 1918. This powerful law, which implements agreements with Great Britain (on behalf of Canada), Mexico, Japan, and the former Soviet Union, makes it unlawful to kill, capture, harass, purchase, or otherwise "take" any migratory bird without authorization. Although the Act controls many adverse activities, it probably was not intended to stem the types of habitat-based actions most likely behind the widespread declines of Neotropical birds.

In 1988, Congress passed the "Mitchell Amendment" to the Fish and Wildlife Conservation Act of 1980. This amendment directs the Secretary of Interior to (1) monitor and assess population trends of migratory nongame birds, (2) identify the effects of human activities on those species, (3) identify migratory species of management concern, and (4) identify actions to prevent species of concern from becoming endangered. Thus, although various laws were in place to protect and monitor migratory birds, the documented alteration and loss of critical breeding habitat, even on public lands, warranted additional action to address the problems at hand.

photo by Daniel R. Petit

The prothonotary warbler* (Protonotaria citrea) *nests in mature bottomland hardwood forests, a habitat type that has been disappearing at a rapid rate. During the past 25 years, as habitat has been lost, prothonotary warbler populations have declined 1.5 percent annually. The Partners in Flight program is carrying out plans to conserve bottomland hardwood forests for this and a host of other bird species.

Partners in Flight

Recognizing the need to bring more attention to the 250 or so migratory nongame species, the National Fish and Wildlife Foundation (Foundation) assembled about 150 scientists, educators, and resource managers at a workshop in 1990. The result was creation of the Neotropical Migratory Bird Conservation Program, popularly known as "Partners in Flight" or *"Aves de las Americas."*

The goal of Partners in Flight is to conserve, enhance, or restore declining populations of Neotropical land birds before they need Endangered Species Act protection. To help achieve such a challenging goal, a network of technical, geographical, and organizational committees has been established. After 4 years, an effective organization supported by 15 Federal agencies, more than 60 State and provincial natural resource agencies, approximately 30 nongovernmental

(Continued on next page)

photo by Daniel R. Petit

Conversion of native habitat is the most serious problem faced by Neotropical migratory birds in both breeding and wintering areas. Large tracts of tropical forest are being replaced by pastures and agricultural land, such as this citrus grove in Belize. Through its international network, Partners in Flight cooperates with local Latin American groups to better conserve and manage our shared wildlife resources.

Partners in Flight

(Continued from previous page)

organizations (NGOs), and various private-sector corporations is in place.

Conserving Migratory Birds Through Partnerships

The Partners in Flight effort does not focus primarily on Threatened and Endangered species, or on listing candidates, but attempts to prevent populations from reaching the point at which it becomes necessary to give them special protected status. Partnerships among Federal agencies, States agencies, and NGOs have become widespread within conservation programs during the past 10 years, and Partners in Flight has nurtured numerous ventures of this sort. The incentive for public-corporate partnerships, a more unusual type of alliance, lies in the shared desires of partners to preserve our natural heritage while providing economic opportunity and a quality standard of living.

Partners in Flight has benefitted through the participation of private corporations, particularly the forest products industry. Currently, 14 such companies have assisted with research, management, and population monitoring activities. In Maine, for example, Scott Paper Company, Champion International, Great Northern Paper Company, and the National Council for Air and Stream Improvement have supplied funding, logistical support, professional personnel, and access to databases for a research project organized by Manomet Observatory. This massive undertaking is designed to evaluate the effects of timber harvesting practices on the distribution and reproductive ecology of terrestrial land birds. The 3-year project, initiated in 1992, will provide critical data on the types of forest habitats used by Neotropical migrants in the Northeast. It also will identify the types of local and landscape-level information needed by industry to more effectively sustain timber yields and wildlife populations. Working independently, neither Manomet scientists nor the timber companies could have developed such a balanced approach.

In another notable initiative, Phillips Petroleum and Amoco Production Company have teamed up with NGOs (Houston Audubon Society, The Nature Conservancy), the Fish and Wildlife Service, State agencies, businesses (e.g., Fermata, Inc.), the Foundation, other wildlife conservation programs, and citizen volunteers to conserve a valuable migration stopover area along the Gulf coast of east Texas and western Louisiana. The project is aimed at restoring and protecting patches of woodland within the Chenier Plain, a narrow coastal strip that is the first stop for millions of birds after flying nonstop 600 miles (965 km) over the Gulf of Mexico during spring migration. Because birds can lose up to 50 percent of their body mass during this flight, high quality wooded habitat is pivotal for completion of the migratory trek to their breeding grounds. This area also is the last feeding stop for migrants before they cross the Gulf on their southward journey in autumn. Thus far, hundreds of acres have been restored and several million dollars invested towards improving this important stopover habitat.

Conserving habitat on breeding grounds and along migration routes is not enough; wintering habitat also must be conserved. Toward that end, Partners in Flight established three coordinators in Latin America and the Caribbean in 1993. Currently, several dozen research and outreach programs directed by Partners in Flight have been completed or are under way in wintering areas. Education and outreach projects range in scope from development of elementary school material on migratory birds in Mexico to internships with U.S. natural resource agencies and the promotion of wildlife curricula in Latin American universities. Research and conservation projects are being conducted from the Amazon Basin north to the U.S. border. A common theme among these programs is the need to integrate protection of native biodiversity with sustainable economic growth.

Partners in Flight, as the name implies, is a partnership — it has no employees or address. The aim is to provide sound management plans to public and private land stewards, and to help identify new ways for partners to combine their resources for the restora-

(Continued on Page 6)

Working Together for the Great Lakes Piping Plover

by Kelly Millenbah

An extensive partnership has been formed to restore the Great Lakes population of the piping plover *(Charadrius melodus)*, one of our nation's rarest shorebirds. The cooperators include the Fish and Wildlife Service (FWS), Michigan Department of Natural Resources, University of Minnesota, North Central Michigan College, Lake Superior State University, and the National Park Service.

In recent decades, this stocky shorebird has disappeared from much of its historical range in the Great Lakes region and is now limited to the shores of Lakes Michigan and Superior in northern Michigan. In 1994, monitoring and protection efforts identified only 19 piping plover breeding pairs in the Great Lakes region (a slight increase from 18 pairs in 1993).

Through State-administered funds issued under Section 6 of the Endangered Species Act, the FWS East Lansing, Michigan, Field Office initiated two cooperative agreements this year to coordinate protection of the piping plover. The University of Minnesota, through the Minnesota Cooperative Fish and Wildlife Research Unit, was contracted to use Geographical Information Systems and a Global Positioning System for analysis of principal plover nesting areas. The purpose of this work was to develop concise visual displays of plover nesting history, habitat use, and habitat availability in the Great Lakes region. Also included in this agreement was identification and evaluation of primary causes of disturbance to piping plover reproductive success. Individual nests were monitored using remote video cameras to determine levels and sources of disturbance.

Section 6 funds also were used to build predator exclosures, post plover nesting areas, and monitor nest sites at least once per week. University of Minnesota researchers led monitoring and protection efforts at sites in Michigan's lower peninsula, with a seasonal Michigan State employee heading up efforts at Wilderness State Park, Emmet County, Michigan.

photo by Mark Pryor

Piping plovers* (Charadrius melodus) *are distinguished by their pale plumage, black neck ring, large eyes, and bright orange legs.

In addition, a professor and 10 undergraduate students from North Central Michigan College braved black flies, mosquitoes, and severe thunderstorms to observe a plover nest continuously for 18 days after the chicks hatched in Wilderness State Park. Their around-the-clock observations helped identify potential predators and protected the young birds during a critical period of chick development.

Other monitoring and protection efforts were carried out in cooperation with the National Park Service and Lake Superior State University. In 1994, 4 plover breeding pairs were identified at Sleeping Bear Dunes National Lakeshore on North Manitou Island. National Park Service rangers kept close tabs on the status of the breeding plovers and their chicks. Rangers also closed beaches where plovers nested and used signs to explain the Lakeshore's role in their protection.

In Michigan's Upper Peninsula, monitoring and protection efforts were conducted by a researcher from Lake Superior State University.

These partners, with the support of the FWS and Michigan Department of Natural Resources, are pursuing a goal beyond the reach of any single organization or agency: recovery of the Great Lakes piping plover. Continued support will be necessary to reach that goal.

Kelly Millenbah is a wildlife biologist with the FWS East Lansing (Michigan) Field Office.

Partners in Flight

(Continued from page 5)

tion and conservation of Neotropical migratory birds.

The Partners in Flight network continues to grow. For more information, write Peter Stangel, National Fish and Wildlife Foundation, 1120 Connecticut Avenue NW, Suite 900, Washington, D.C. 20036, or Dan Petit, USFWS, Office of Migratory Bird Management, 4401 North Fairfax Drive, Room 634, Arlington, Virginia 22203.

Dan Petit, the Fish and Wildlife Service's Neotropical Migratory Bird Coordinator, is a wildlife biologist in the Office of Migratory Bird Management.

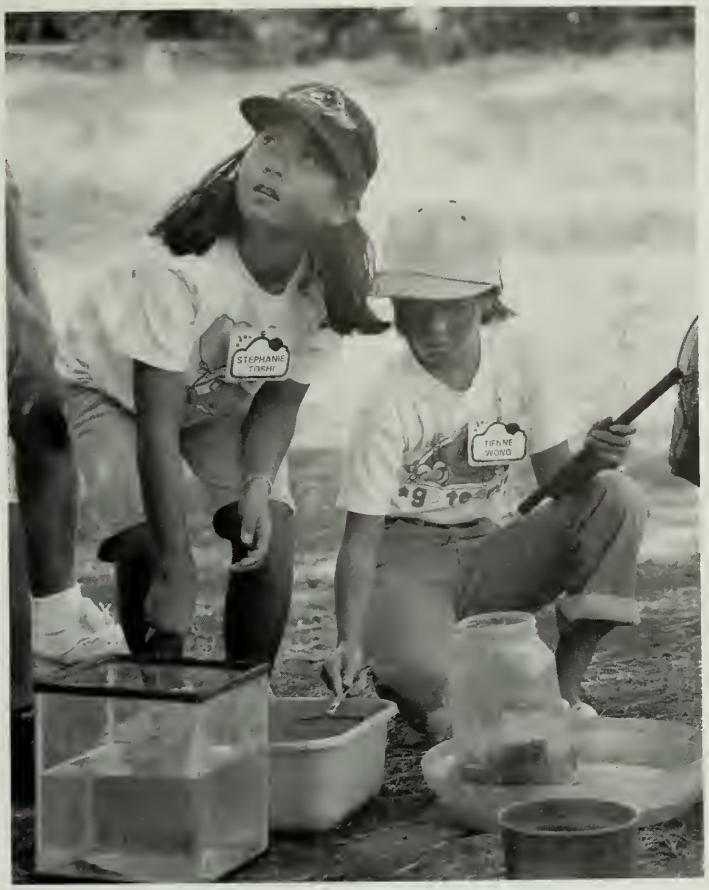
Cooperative Projects Aid Hawaiian Wildlife

The Kilauea Project

The Fish and Wildlife Service (FWS) recently entered into a cooperative agreement with Federal, State, and private agencies providing for cooperative management of thousands of acres of native forest on the island of Hawai'i near Kilauea volcano. This area provides habitat for many native Endangered Hawaiian species, including four forest birds, the Hawaiian hoary bat, and several plants. Other cooperators in the agreement include the Kamehameha Schools Bishop Estate (the largest private landowner in the State), Hawaii Department of Public Safety, Hawaii Division of Forestry and Wildlife, and National Park Service (Hawaii Volcanoes National Park).

One of the first management goals will be to eliminate feral pigs within the 4,200 acres of forest to protect native plants and wildlife habitat. (See "Killer Pigs, Vines, and Fungi" in *Bulletin* Vol. XIX, No. 5.) Rooting by pigs destroys plants and creates pockets of standing water that allow mosquitoes to breed. The mosquitoes carry avian pox and avian malaria, diseases that kill native forest birds.

Ultimately, FWS hopes to use this cooperative agreement and its newly formed partnerships as a means to provide some protection for the 100 square miles of forest in the Kilauea area. Informal discussions have been going on for several years about how to manage the natural resources of this area given its fragmented ownership. The partners hope this agreement is the start of a cooperative relationship between landowners in the area and natural resource agencies to find innovative ways of increasing environmental protection for Hawaii's native species.



photos courtesy of Barbara Maxfield, FWS Pacific Islands Field Office

Students at the Hawaii Nature Center learn about invertebrates as part of a new wetlands education program at Honouliuli.

Honouliuli Environmental Education Project

In 1993, the Hawaii Nature Center and the FWS initiated a new wetlands education program for third grade students on the island of O'ahu. It took place at the Honouliuli Unit of the Pearl Harbor National Wildlife Refuge. Normally closed to the public to protect endangered Hawaiian waterbirds and migratory birds, the refuge was opened on a limited and closely-monitored basis for an experimental program designed by the Hawaii Nature Center. After biologists found no impact on the birds, at least during the nonnesting season, the FWS agreed to expand the program during the 1994-95 school year.

Each day from September through December, Hawaii Nature Center environmental educators will guide about 60 students in small groups through the refuge. Teachers are required to attend pre-visit planning conferences to prepare their students for the visit. The program has been enthusiastically accepted by local teachers — so much so that all of the available dates were booked during the first three hours the Hawaii Nature Center accepted reservations.

Program development was supported not only by the FWS, but also by several private sponsors: the James and Abigail Campbell Foundation, the Estate of James Campbell, Chevron USA, the Harold K. L. Castle Foundation, and the Atherton Family Foundation. Monitoring of impacts on the refuge and its birds will continue this year, but the long-term benefits of educating Hawaii's youth are expected to far outweigh any impacts on the refuge or its resources.

Chevron USA Cooperative Agreement

The middle of an oil refinery doesn't sound like the best place for endangered Hawaiian waterbirds to build their nests, but to a number of ae'o or Hawaiian stilt *(Himantopus mexicanus knudseni)*, it's an attractive home. Indeed, the Chevron refinery may have produced more young stilt than any other comparably sized wetland area on O'ahu during the past three years.

In April 1992, officials from Chevron USA's O'ahu refinery called the FWS to ask how to discourage Hawaiian stilt from using their containment ponds. The largest pond, known as Roland Pond, includes about 6 acres of open water and mudflat habitat. It contains rainwater runoff and treated effluent rich in natural microbes and algae that support the invertebrate populations upon which the birds feed. The site

(Continued on Page 8)

Banding Together for the Florida Grasshopper Sparrow

by Michael F. Delany

State and Federal agencies and conservation organizations have banded together, literally and figuratively, in a partnership to recover the Florida grasshopper sparrow *(Ammodramus savannarum floridanus)*. Information gathered through banding studies and surveys of singing birds is providing information land managers can use to prevent extinction of this rare bird.

The Florida grasshopper sparrow, discovered in 1901, is endemic to the State's south-central prairie region. During the breeding season, it is isolated from other grasshopper sparrow subspecies by more than 310 miles (500 kilometers). Early reports imply that the Florida subspecies had a relatively large, widespread population within this region. The conversion of dry prairie to improved pasture for cattle grazing may have eliminated the sparrow from some of its former range. In 1986, the Florida grasshopper sparrow was listed as Endangered because of its restricted distribution, loss of habitat, and declining numbers.

According to the Florida Grasshopper Sparrow Recovery Plan, the sparrow can

(Continued on next page)

Hawaiian Co-op Projects

(Continued from page 7)

also has little surrounding vegetation in which predators can hide. Because the stilt had already begun nesting at the pond, Chevron officials agreed to protect the nesting area for the season and allow the FWS to monitor the birds.

In 1993, Chevron USA entered into a cooperative agreement with the FWS to protect stilt and migratory shorebirds at the refinery, and to provide suitable feeding and nesting habitat for the stilt at Roland Pond. Chevron maintains specified water levels in the pond during the stilt's breeding season (March through August) to ensure adequate foraging habitat for adults and chicks. The FWS is allowed access to monitor the birds throughout the nesting season. In 1992, 24 Hawaiian stilt successfully fledged from Roland Pond. In 1993, the number of fledged birds increased to 36, and in 1994, 51 birds were raised at the site.

Hawaiian (black-necked) stilt at Chevron's Oahu facility. These distinctive black and white birds use their long pink legs and straight black bills to wade and forage in ponds, on mudflats, and in wet grassy areas of the Hawaiian islands.

ʻAlala Cooperative Effort

When the known population of a species in the wild numbers only 12 birds, it takes an intensive effort by many partners to prevent its extinction. Fortunately for the ʻalala or Hawaiian crow *(Corvus hawaiiensis)*, that effort is under way. The FWS, Hawaii Department of Land and Natural Resources, National Biological Survey, The Peregrine Fund, National Audubon Society, Hawaii Audubon Society, and the private landowners at Kai Malino, Kealia, and McCandless Ranches have joined together to save this critically endangered species. The recovery efforts began in 1993, based on recommendations from the National Academy of Sciences and the ʻAlala Recovery Team. For details, see the ʻalala feature in *Bulletin* Vol. XVIII, No. 3.

The Peregrine Fund has undertaken the rearing and hacking responsibilities under a cooperative agreement with the FWS, and will be constructing and operating a captive propagation facility on the Big Island next year, in part for the ʻalala. In a parallel effort, the State of Hawaii operates the Olinda Endangered Species Propagation Facility on Maui, where 14 ʻalala now reside. Some of the chicks from the wild and from Olinda are exchanged to increase the genetic diversity of the captive breeding flock. The remaining chicks are released back to the wild from a hacking facility built by The Peregrine Fund on State-owned land within the privately owned ranches. Since all of the species' nesting territories, and most of the birds, are on private land, the cooperation of landowners is a key factor in the recovery effort.

With the assistance of all of the partners, 12 young ʻalala have been released to the wild during the past 2 years, and the captive breeding flock at Olinda has been expanded by 6 birds. FWS biologists closely monitor the wild flock throughout the year.

In addition, National Biological Survey biologists are conducting research on avian pox and avian malaria, two mosquito-borne diseases that may have played a role in the decline of the ʻalala.

The above examples are courtesy of Robert Smith, Supervisor of the FWS Pacific Islands Field Office in Honolulu, Hawaii.

photo by Michael Delany

Florida grasshopper sparrow

Grasshopper Sparrow

(Continued from previous page)

be reclassified to the less critical category of Threatened if 50-100 breeding pairs become established at each of 10 secure, discrete sites throughout its former range, and can be delisted if established at 25 such sites[1]. Results from singing male surveys conducted by the Florida Game and Fresh Water Fish Commission (Commission), U.S. Air Force, volunteers, and a private consultant (Alvarez, Lehman and Associates, Inc.), however, do not indicate that a change in the bird's classification is warranted at this time. Of the nine sparrow locations known at the time of listing, the bird remains at only three. Abandoned locations on private lands have been plowed and planted with non-native grasses to improve cattle grazing or for use in sod production.

Although some historical populations have disappeared, the sparrow has been found at four previously unreported locations since it was listed, resulting in a total of seven currently known colonies. Fortunately, the largest known populations are on public lands — the Commission's Three Lakes Wildlife Management Area (Osceola County) and the Air Force's Avon Park Range (Highlands and Polk counties) — and have remained stable. A recent survey of singing birds also detected 14 males on the National Audubon Society's Kissimmee Prairie Sanctuary in Okeechobee County. Assuming an equal sex ratio, the 150 males counted during recent surveys represent a minimum total population of 300 adults. Other colonies may exist on some private ranches where access to researchers is denied.

Habitat requirements include large, open grasslands where saw palmetto *(Serenoa repens)*, wire grass *(Aristida stricta)*, and dwarf oak *(Quercus minima)* provide nesting sites for this sparrow. Frequent prescribed burns by Commission, Air Force, National Audubon Society, and Nature Conservancy land managers keep the vegetation in a low, early successional stage usually associated with greater densities of Florida grasshopper sparrows. Light grazing by cattle at some locations appears to be compatible with the ecological needs of the sparrow. The occurrence of the Florida grasshopper sparrow in some managed pastures and agricultural fields reverting to prairie shows that the bird may be responsive to habitat restoration. Because the cooperation of ranchers is essential to the recovery of this sparrow, the U.S. Department of Agriculture's Soil Conservation Service considers the bird during range management consultations with landowners.

Additional management is required on the Air Force's Avon Park Range. The 166 square mile (430 square kilometer) military installation serves as a training range for fighter aircraft and contains most of the known Florida grasshopper sparrows. Further military efforts to accommodate the sparrow include removal of planted slash pines *(Pinus elliottii)* from occupied prairies and planning Army National Guard maneuvers in ways that avoid jeopardizing the bird. The "impact" of explosions on grasshopper sparrows near targets also is being monitored.

Personnel from the Commission, Air Force, National Audubon Society, and Archbold Biological Station conducted a banding study of this little-known bird from 1989-1992. Seventy-three Florida grasshopper sparrows on the Avon Park Range were captured with mist nets and color-banded for the study. Resightings and recaptures of marked individuals provided some much needed information. Territory size during the breeding season averaged 4.37 acres (1.77 hectares), and population density was 0.02 territory/acre (0.05 territory/ha). Thus, the recovery plan objective of a minimum viable colony of 50 breeding pairs would require over 2,470 acres (1,000 ha) of contiguous habitat.

The relatively high annual survival rate (0.59) and mean longevity (2.9 years) of Florida grasshopper sparrows, together with a high reproductive potential (2-3 broods per year are reported), may facilitate the recovery of populations remaining in good breeding habitat. One individual banded as an adult on April 18, 1989, and resighted on June 28, 1992, exceeded the longevity record for grasshopper sparrows by at least one year[2]. Recaptures during the winter support the assumption that the Florida subspecies is nonmigratory. Prior evidence of a resident population was limited to 2 specimens collected during January 1937[3].

Recovery of the Florida grasshopper sparrow will be possible only if the bird can increase in numbers and range. Although most known populations of this subspecies are on protected lands, most of the available prairie habitat for future populations is on private lands that are vulnerable to conversion. Land use trends indicate continued habitat loss for the sparrow. Data gathered during recent studies, however, will be used to develop strategies for recovery and will enable property owners to make informed resource management choices.

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[1]USFWS. 1988. Recovery Plan for Florida Grasshopper Sparrow. U. S. Fish and Wildl. Serv., Atlanta, Ga. 22 pp.

[2]Klimkiewicz, M. K., and A. G. Futcher. 1987. Longevity records of North American birds: Coerebinae through Estrildidae. J. Field Ornithol. 58:318-333.

[3]U. S. Natl. Mus., Nos. 341353 and 341455.

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Listing Proposals — August/September 1994

Fifteen species — 11 animals and 4 plants — were proposed by the Fish and Wildlife Service (FWS) during August and September 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Seven Southeastern Mussels

The Gulf Slope rivers draining the Appalachicolan Region of southeast Alabama, southwest Georgia, and northern Florida are known for their high levels of species diversity and endemism. They harbor nearly 30 species of endemic freshwater mussels, at least a dozen fishes, over 20 aquatic snails, and nearly two dozen species of crayfish.

Seven of these mussels were proposed on August 3 for listing under the Act. The classification of Endangered was recommended for the five most vulnerable species:

- **fat three-ridge** ***(Amblema neislerii)*** — an inflated mussel with a heavy, dark shell featuring prominent ridges;
- **shiny-rayed pocketbook** ***(Lampsilis subangulata)*** — characterized by a yellowish brown shell with fairly wide, bright emerald green rays;
- **Gulf moccasinshell** ***(Medionidus penicillatus)*** — a small species with a yellowish to greenish-brown, slightly-ridged shell highlighted by fine, interrupted rays;
- **Ochlockonee moccasinshell** ***(Medionidus simpsonianus)*** — another small, slightly-ridged mussel marked with green rays formed by a series of connecting chevrons or undulating lines; and
- **oval pigtoe** ***(Pleurobema pyriforme)*** — a small to medium sized mussel with a shiny, tan to dark brown shell.

Because the other two species in the listing proposal are not in as great a degree of danger, they were proposed for classification as Threatened:

- **Chipola slabshell** ***(Elliptio chipolaensis)*** — a medium sized mussel with a smooth shell that is chestnut in color, and
- **purple bankclimber** ***(Elliptoideus sloatianus)*** — a large, heavily-ridged species about 8 inches (20 centimeters) in length with a dark purple nacre (inner shell lining).

All seven mussels generally occur in clean, free-flowing streams. Their precarious status is the result of widespread habitat modification or destruction. Many stream reaches no longer sustain the mollusks because of such factors as impoundments, channel dredging, agricultural runoff, industrial and municipal waste discharges, and siltation from certain silvicultural practices (clear-cutting and destruction of streamside vegetation).

Two California Butterflies

Two butterfly subspecies in southern California were proposed August 4 for listing as Endangered:

- **Laguna Mountains skipper** ***(Pyrgus ruralis lagunae)*** — a small, mostly white butterfly inhabiting wet, montane meadows within a very restricted range in San Diego County; and
- **quino checkerspot** ***(Euphydryas editha quino)*** — a small butterfly checkered with dark brown, reddish, and yellow spots. This subspecies is endemic to sunny openings on clay soils within chaparral and coastal sage shrublands of southwestern California and northwestern Baja California, Mexico. Historically, it also was found in open grasslands.

Both butterflies have declined significantly in numbers and range due to habitat damage resulting from urban, agricultural, and recreational development. The primary factors in the decline of the Laguna Mountains skipper, however, were overgrazing, vegetative changes due to fire suppression, and trampling by cattle of its larval food plant, *Horkelia clevelandi.* Grazing and subsequent replacement of native vegetation by non-native plants also have damaged stands of *Plantago erecta*, the host plant for quino checkerspot larvae. The ranges of both butterfly subspecies are determined largely by the presence of these food plants, although other physiological or ecological constraints may further restrict the butterflies.

Overcollecting and deliberate destruction of habitat are additional threats. Butterfly collectors who specialize in rare species have caused the loss of some quino checkerspot colonies. Additionally, the habitat of the largest and most dense quino checkerspot population in Riverside County was destroyed in the 1980's for the purpose of eliminating the butterflies.

Arkansas River Shiner *(Notropis girardi)*

As its "common" name indicates, this small, heavy-bodied minnow is endemic to the Arkansas River and its tributaries in Arkansas, Texas, Oklahoma, Kansas, and New Mexico. But the Arkansas River shiner is no longer common; this historically widespread and abundant fish has been eliminated from over 80 percent of its historical range. Remnant populations are restricted primarily to a portion of the South Canadian River

(Continued on next page)

photo © R.L. Mayden

Arkansas River shiner

Listing Proposals

(Continued from previous page)

(an Arkansas River tributary) in Oklahoma, Texas, and New Mexico.

The Arkansas River shiner is adapted to life in the main channels of wide, shallow, sandy-bottomed rivers and streams. Most of its historical habitat has been channelized, inundated by impoundments, or desiccated by water diversions and excessive groundwater pumping. Competition from an introduced fish, the Red River shiner *(Notropis bairdii)*, also may have contributed to the decline of the Arkansas River shiner.

The FWS proposed August 3 to list the Arkansas River shiner as Endangered. This proposal, however, does not cover a non-native population that has become established in the Pecos River in New Mexico, presumably originating from the release of bait fish collected from the species' native range. Protection of this artificial population would conflict with efforts to manage native fish populations in the Pecos River.

San Diego Fairy Shrimp *(Branchinecta sandiegoensis)*

A small and delicate freshwater crustacean, the San Diego fairy shrimp occurs at 11 locations in San Diego County, California, and 2 in northwestern Baja California. Nine of these populations are declining because of habitat degradation.

The vernal pools that support the San Diego fairy shrimp and other endemic animals and plants form in regions with a Mediterranean climate where 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 animals and plants are adapted specifically to this environment and cannot survive if it is altered or lost. Fairy shrimp adaptations include eggs that can survive heat, cold, and dry conditions until the pools fill again in the fall.

Vernal pools are considered fragile, easily disturbed ecosystems. One study found that, in San Diego County, more than 97 percent of historical vernal pool habitat had been lost by 1986. Although it is uncertain how many of these pools were inhabited by the San Diego fairy shrimp, several sites known to have supported the species have been degraded or destroyed. Most of the remaining habitat is vulnerable to damage by urban and agricultural development, mowing and livestock grazing, streambed channelization, off-road vehicle use, trash dumping, and invasions of weedy, non-native plants. Because of these continuing threats, the FWS proposed August 4 to list the San Diego fairy shrimp as Endangered.

Two California Plants

Endangered Species Act protection was proposed August 4 for two plant subspecies native to the Peninsula Ranges of southwestern California:

- **Cuyamaca Lake downingia** *(Downingia concolor* var. *brevior)* — a low-growing annual herb in the bellflower family (Campanulaceae) with blue and white flowers. Its seeds are dispersed by flooding and require brief inundation to germinate. Because the entire population exists solely in the Cuyamaca Valley area, this plant was proposed for listing as Endangered.
- **Parish's meadowfoam** *(Limnanthes gracilis* ssp. *parishii)* — an annual in the family Limnanthaceae with white or cream-colored, bowl-shaped flowers. This plant also requires saturated soils or inundation to promote germination. Fewer than 20 populations are known. Because the meadowfoam is vulnerable but not in immediate danger of extinction, it was proposed for listing as Threatened.

Both plants grow only in moist soils, near springs or seeps, or in vernal pools — wetlands that are disappearing rapidly in southern California. Factors implicated in the decline of the San Diego fairy shrimp threaten the Cuyamaca Lake downingia and Parish's meadowfoam include hydrological alterations, grazing, recreational activities, and invasions of weedy species.

Spring Creek Bladderpod *(Lesquerella perforata)*

A rare plant in the mustard family (Brassicaceae), the Spring Creek bladderpod is restricted to central Tennessee, where it grows along a limited number of streams. Habitat alteration has eliminated this species from several historical locations and threatens the remaining sites. Only four populations remain, all in Wilson County. On August 23, the FWS proposed to list this species as Endangered.

The Spring Creek bladderpod is a winter annual that germinates in the early fall, over-winters as a small rosette of leaves, and produces white to lavender flowers the following spring. Soon after the flowers wither, the fruits mature and the plant dies. The seeds fall to the ground and lie dormant until the fall, when the cycle begins again. This species typically grows on floodplains and requires annual disturbance to complete its life cycle. Historically, the needed disturbance was provided by periodic flooding that removed competing perennial grasses and woody plants.

As a result of flood control measures, woody vegetation has encroached on some Spring Creek bladderpod sites. However, the cultivation of annual crops such as corn is an excellent means of artificially maintaining the habitat, provided that there is no fall plowing and that herbicide use is limited. The direct destruction of habitat for commercial, residential, or industrial development is the most significant threat to the bladderpod at this time.

Eggert's Sunflower *(Helianthus eggertii)*

Another rare plant from Tennessee, as well as Kentucky and Alabama, is Eggert's sunflower. This perennial in the aster family (Asteraceae) typically grows in open fields and along woodland borders where it receives full sun or only partial shade.

Some of the species' former sites have been lost to development or converted for agricultural uses. Vegetational suc-

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Final Listing Rules — September/October 1994

Final rules adding 24 species — 16 plants and 8 animals — to the U.S. List of Endangered and Threatened Wildlife and Plants were published by the Fish and Wildlife Service in September and October 1994. These plants and animals now receive Endangered Species Act protection, and plans will be developed for their recovery. A list of the newly added taxa, with their legal classifications and *Federal Register* publication dates, follows:

PLANTS

Five California Plants

Five plant taxa endemic to carbonate deposits in the San Bernardino Mountains of southern California were listed August 24. One was listed as Threatened:

• **Parish's daisy** *(Erigeron parishii)* — a small perennial herb in the aster family (Asteraceae).

Because the other four are in more immediate danger of extinction, they were listed as Endangered:

• **Cushenbury buckwheat** *(Eriogonum ovalifolium* var. *vineum)* — a low, densely-matted perennial in the buckwheat family (Polygonaceae);

• **Cushenbury milk-vetch** *(Astragalus albens)* — a small, silvery-white perennial herb in the pea family (Fabaceae);

• **San Bernardino Mountains bladderpod** *(Lesquerella kingii* var. *bernardina)* — a silvery, short-lived perennial in the mustard family (Brassicaceae); and

• **Cushenbury oxytheca** *(Oxytheca parishii* var. *goodmaniana)* — a wiry annual in the buckwheat family.

Four Hawaiian Ferns

Four species of ferns endemic to the Hawaiian Islands were listed September 26 as Endangered:

• *Asplenium fragile* var. *insulare* — a short-stemmed fern in the spleenwort family (Aspleniaceae);

• *Ctenitis squamigera* — a densely scaled fern in the spleenwort family, known in Hawaiian as pauoa;

• *Diplazium molokaiense* — a short, prostrate fern, also in the spleenwort family; and

• *Pteris lidgatei* — an herb in the maidenhair family (Adiantaceae).

Tetramolopium capillare

This Hawaiian plant, a sprawling shrub in the aster family, was listed separately on September 30 as Endangered. It is known in the Hawaiian language as pamakani.

Three Puerto Rican Plants

Three plant species native to the island of Puerto Rico were listed September 9 as Endangered:

• *Mitracarpus maxwelliae* — a low, densely-branching shrub in the family Rubiaceae;

• *Mitracarpus polycladus* — a related shrub also found on the island of Saba in the Lesser Antilles; and

• *Eugenia woodburyana* — a small evergreen tree in the myrtle family (Myrtaceae).

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Listing Proposals

(Continued from page 11)

cession, however, may be the most significant threat. Because of its intolerance of full shade, Eggert's sunflower depends on periodic disturbance to maintain the open nature of its habitat. Historically, disturbance was provided by wildfires, which eliminated competing vegetation. Due to fire suppression, the sunflower now is found most often in habitats that only mimic its ecological requirements. These sites typically are disturbed habitats such as roadside rights-of-way, ditches, and roadcuts. But unless periodic mowing, burning, or vegetation thinning is employed to control the growth of woody plants, Eggert's sunflower cannot survive indefinitely even in such locations.

Photo by R. L. Jones

Eggert's sunflower grows to about 8 feet (2.5 meters) in height and bears large yellow flowers.

At present, Eggert's sunflower is known to exist at only 24 locations within 13 counties in Tennessee, Kentucky, and Alabama. Fifty-eight percent of these populations are threatened by habitat modification or destruction. Accordingly, on September 9, the FWS proposed listing this species as Threatened.

Final Listing Rules

(Continued from previous page)

Two Texas Plants

Two plants from southern Texas were listed August 24 for listing as Endangered:

- *Texas ayenia (Ayenia limitaris)* — a subshrub in the cacao family (Sterculiaceae), and
- south Texas ambrosia *(Ambrosia cheiranthifolia)* — an herbaceous perennial in the aster family (Asteraceae).

Western Lily *(Lilium occidentale)*

This perennial in the family Liliaceae produces attractive red flowers. One of the three rarest lilies in the United States, it has an extremely restricted distribution near the Pacific Coast in southern Oregon and northern California.

ANIMALS

Four Freshwater Shrimp

Four species of freshwater shrimp native to California's Central Valley were listed September 19. The three most imperiled species were classified as Endangered:

- Conservancy fairy shrimp *(Branchinecta conservatio)*,
- longhorn fairy shrimp *(Branchinecta longiantenna)*, and
- vernal pool tadpole shrimp *(Lepidurus packardi)*.

Although vulnerable, the fourth species is not in as much immediate danger, and therefore was listed as Threatened:

- vernal pool fairy shrimp *(Branchinecta lynchi)*.

All four species are small crustaceans that inhabit vernal pools, an unusual type of ephemeral wetland. Fairy shrimp have delicate, elongate bodies, stalked compound eyes, no carapace, and 11 pairs of swimming legs. Tadpole shrimp have dorsal compound eyes and a shield-like carapace covering most of the body.

Two Puerto Rican Hawks

Two subspecies of hawks restricted to forested mountains on the island of Puerto Rico were listed September 9 as Endangered:

- Puerto Rican broad-winged hawk *(Buteo platypterus brunnescens)* — small, dark brown hawk with a black-and-white banded tail and rufous breast.
- Puerto Rican sharp-shinned hawk *(Accipiter striatus venator)* — a small, dark gray hawk with heavily-barred rufous underparts.

White Sturgeon *(Acipenser transmontanus)*

The Kootenai River population of the white sturgeon was listed September 6 as Endangered. This action applies to white sturgeon within a distinct 168 mile (270-kilometer) stretch of the Kootenai River in Idaho, Montana, and British Columbia, Canada. Since 1974, soon after Libby Dam in Montana began operation, few if any juvenile white sturgeon have been added to this population.

Pacific Pocket Mouse *(Perognathus longimembris pacificus)*

One of the smallest rodents in the world, the Pacific pocket mouse reaches only up to 5.2 inches (131 millimeters) from nose to tip of tail. The only population known to remain inhabits less than 4 acres (1.6 hectares) on the Dana Point Headlands in Orange County, California. Because of threats posed by development and free-roaming cats, this subspecies was listed September 29 as Endangered.

1995 Refuge Calendar Available

The 1995 *Our National Wildlife Refuges* calendar by natural history photographers John and Karen Hollingsworth is now available.

Highlighting the diversity of wildlife and habitats within the National Wildlife Refuge System, the calendar includes a list of refuge events nationwide, such as festivals, fishing derbies, and prime times to see certain migratory species.

As before, for every calendar purchased, 50 cents will be donated to the National Fish and Wildlife Foundation, which will match these donations fully. The funds will be used for habitat restoration and environmental education projects on refuges.

To order the calendar, send $15 (shipping and handling included) to: Reflections of Nature, P.O. Box 235, Bellvue, Colorado, 80512-0235, or call 1-800-493-2713 (VISA and Mastercard accepted).

The Hollingsworths also recently published a book entitled *Seasons of the Wild - A Journey through Our National Wildlife Refuges with John & Karen Hollingsworth.* With more than 70 photographs, the book features 47 national wildlife refuges. A portion of the proceeds from sales of the book also will go to the Foundation. The book can be ordered from Reflections of Nature for $19.95.

Recovery Updates

The recovery of imperiled plants and animals to a secure status in the wild is the ultimate goal of the Fish and Wildlife Service's endangered species program. Because of the growing interest in species recovery, we recently created a new Recovery Updates section. The recovery news is arranged by region, and we encourage all offices to bring their success stories to light.

Region 1

• **San Joaquin Valley Multi-Species Recovery Planning** —Staff from the Fish and Wildlife Service (FWS) Sacramento, California, Field Office met with the San Joaquin Valley Endangered Species Recovery Planning Program staff to discuss the status of an effort to create a multi-species recovery plan for the valley. Information has been collected from numerous data sources in the field and preliminary population viability analyses (PVA) have been done for a number of species. PVA results should aid in the development of models for analyzing the effects of different preserve designs on species recovery.

• **'Alala** *(Corvus hawaiiensis)* — Following a successful season of manipulating wild 'alala (Hawaiian crow) nests, five chicks of this severely endangered species were hatched and reared at a temporary incubation facility on the island of Hawai'i (the "Big Island"). Record success at the captive breeding facility on Maui also produced four 'alala chicks this year, which were swapped recently with two from the Big Island. The seven chicks now on the Big Island have been transferred to the field aviary adjacent to the wild 'alala territories and are scheduled for release shortly.

Four of the chicks that hatched last year are progressing well and have been observed foraging for fruit on trees growing within the aviary; however, the fifth bird has disappeared and is feared dead.

• **Pahranagat Valley Species Recovery Plan** — The FWS Reno, Nevada, Field Office issued a draft recovery plan for aquatic and riparian species of Pahranagat Valley to the Portland Regional Office on August 15. This plan incorporates an ecosystem approach to recovery by addressing the recovery needs of three Endangered fish species and nine listing candidates. Reno staff also met with private landowners in the Pahranagat Valley to discuss cooperative ways to restore riparian habitat and enhance aquatic habitat.

Region 2

• **Kemp's ridley sea turtle** *(Lepidochelys kempii)*—The FWS National Sea Turtle Coordinator's Office in the Albuquerque Regional Office, in cooperation with the Gladys Porter Zoo in Brownsville, Texas, works with the Instituto National de Pesca, Secretaria de Pesca, Mexico, to save one of the most imperiled animals in the world: the Kemp's ridley sea turtle. For 17 years, Mexico, the FWS, and the zoo jointly have protected nesting female turtles, their eggs and hatchlings, and crucial nesting habitat. This project often has been identified as one of the best examples of international cooperation for the conservation and recovery of an endangered species.

The Kemp's ridley normally nests at only one spot on earth: Playa Rancho Nuevo on northern Mexico's Gulf Coast. By November 1, 1994, the eggs from 1,568 nests had been collected for incubation in protected corrals. This is the best year on record for the recovery project. In 1994, we encountered more than twice the number of nests seen in 1985 (the year with the fewest nests), and project biologists released about 120,000 viable hatchlings into the Gulf. In each of the last few years, 50,000 to 80,000 hatchlings were released annually into the wild. Typically, however, only a small percentage of hatchlings survive into adulthood.

The increase in the number of Kemp's ridley nests is due to the protection given the nesting area each year. Biologists also are optimistic that the acceptance and use of turtle excluder devices (TEDs) in the U.S. and Mexican shrimp fleets will greatly enhance the recruitment of turtles into the adult breeding population. If all shrimp boats use TEDs in their nets *and* fish with them properly, the number of turtles that escape shrimping trawls and return to the breeding beach may increase exponentially.

Despite the optimism about the increases, the Kemp's ridley is by no means in the clear. Recent successes are overshadowed by the fact that, less than 50 years ago, 40,000 nesting females

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FWS photo

Kemp's ridley sea turtle

Recovery Updates

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were seen at the nesting beach in a 4-hour period. Recent heavy mortalities on Texas beaches during the shrimping season have been discouraging. Protection of the sole nesting area and support for active enforcement of the National Marine Fisheries Service TED regulations are essential if recovery is to be achieved.

• **Mexican wolf** ***(Canis lupus baileyi)*** —Twenty-one Mexican wolf pups were born during the 1994 breeding season. Fifteen survived as of August 1, 1994, bringing the current population of *lobos* to 90.

The entire known population of Mexican wolves exists in captive breeding facilities at 15 sites in the U.S. and 5 in Mexico. The American Zoo and Aquarium Association recently included the Mexican wolf in its "Species Survival Plan" (SSP) program, which seeks to preserve the world's rarest species through carefully managed captive breeding. Dave Parsons, the FWS Mexican Wolf Recovery Coordinator, met in July with representatives from cooperating captive management facilities to discuss the SSP, and to plan for next year's wolf breeding program.

The FWS is drafting a proposal to reintroduce Mexican wolves to two sites: the White Sands Missile Range in south-central New Mexico and the Blue Range Area in the Apache-Sitgreaves National Forest of southeastern Arizona. A Draft Environment Impact Statement (EIS) is being prepared, and is targeted for release to the public in February 1995. Wendy Brown, a wildlife biologist hired in May 1994 to work full time on Mexican wolf recovery, will coordinate an extensive outreach effort throughout the EIS process. She also is developing surveys to determine if any wild Mexican wolves remain along the U.S./Mexico border. A similar survey effort, led by Dr. Julio Carrerais, is under way in Mexico.

The FWS also plans to build a Mexican wolf captive management facility at the Sevilleta National Wildlife Refuge in New Mexico. It will be used for holding and breeding Mexican wolves and, if the reintroduction proposal is approved, for initial acclimation of captive-bred animals for release into the wild.

Region 3

• **Kirtland's warbler** ***(Dendroica kirtlandii)*** —Recovery efforts in Michigan for this Endangered bird are showing impressive results. In early June, census takers counted a record 633 singing males, up from 485 in 1993 and a low of 167 recorded in 1987.

Cooperative habitat management efforts by the FWS, U.S. Forest Service, and Michigan Department of Natural Resources are providing nesting sites for the bird. Additionally, the FWS East Lansing, Michigan, Field Office has been coordinating the control of brown-headed cowbirds *(Molothrus ater),* which parasitize the nests of warblers and other birds. More than 3,100 cowbirds were removed from warbler breeding areas in 1994.

Recovery team members and others concerned about the warbler are scheduled to meet again in February 1995 to discuss next year's habitat management plans on State and Federal lands. The survival of the Kirtland's warbler will depend on continued cowbird control as well as intensive habitat management.

• **purple cat's paw pearly mussel** ***(Epioblasma obliquata obliquata)*** — Under contract to the Ohio Division of Wildlife, Dr. Micheal Hoggarth recently discovered a new population of this Endangered mollusk in Killbuck Creek of Coshocton County, Ohio. The wide age diversity he found indicates that the population is reproducing. This represents the "malacological find the century" in Ohio because the Killbuck Creek population may be the largest, and only reproducing, purple cat's paw population remaining anywhere. The FWS Reynoldsburg, Ohio, Field Office is moving quickly with the State to determine the population's size and range, and to secure its protection.

Region 5

New populations of several rare New England plants and animals have been discovered recently, making 1994 a banner year for endangered species in the region.

• **northeastern beach tiger beetle** ***(Cicindela dorsalis dorsalis)*** — In Massachusetts, a mainland site for this Threatened insect has been rediscovered near Westport, one of the State's five known historical locations. Until this summer, the only population known to remain in New England occurred on the island of Martha's Vineyard.

Once described as occurring in "great swarms" along beaches from Massachusetts to New Jersey, the northeastern beach tiger beetle has been extirpated from New Jersey, New York, Connecticut, and Rhode Island. It remains relatively well established only in the Chesapeake Bay area. The species needs a beach ecosystem that is highly dynamic, subject to natural erosion and accretion processes, and undisturbed by heavy human use. As a result of intense coastal development, shoreline stabilization, and recreational uses, this type of beach habitat has been reduced seriously along much of the Atlantic and Gulf coasts, particularly in the northeast.

Northeastern beach tiger beetles are predatory at both their adult and larval stages. Adults are active on warm, sunny days aiong the water's edge, where they use their long, sickle-like mandibles to capture such prey as amphipods and flies and to scavenge on crab and fish carcasses. On the other hand, larvae are "sit-and-wait" predators, digging burrows in the sand and waiting at the burrow mouth to capture passing amphipods.

• **dwarf wedge mussel** ***(Alasmidonta heterodon)*** — A new population was discovered by a graduate student during an inventory of freshwater mussels in southern New Hampshire. It appears to be one of the better populations for this Endangered mollusk, although it is limited to a short stretch of river.

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Recovery Updates

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• sandplain gerardia *(Agalinis acuta)* — Prospects for this Endangered plant brightened when a new population was discovered in Massachusetts by a student intern working for The Nature Conservancy. Previously known from 49 sites in the northeast, only 11 populations are known today. The two other known Massachusetts sites are in small cemeteries at Cape Cod dating back to the 1700's, where mowing has maintained the grasslands supporting the gerardia.

An annual herb growing up to about 12 inches (30 centimeters) tall, the sandplain gerardia produces individual purple or pink flowers that last a single day. This species typically grows in dry, sandy, nutrient-poor soils of sparsely vegetated sandplain environments and serpentine barrens. Such harsh conditions may eliminate potentially competitive species. The most significant threat to the sandplain gerardia is degradation or loss of habitat.

• northeastern bulrush *(Scirpus ancistrochaetus)* — State, Federal, and contract biologists have discovered four additional populations, two in New Hampshire and two in Vermont. A member of the sedge family, this wetland species typically is found in ponds, wet depressions, or shallow sinkholes within small wetland complexes characterized by seasonally variable water levels. Threats to its survival include habitat loss and degradation caused by wetland draining, dredging, and filling for residential and agricultural development. Very little is known about the life history and reproductive biology of the northeastern bulrush.

• Michaux' sumac *(Rhus michauxii)* — Until recently, surviving populations of Michaux' sumac were known only from North Carolina and one site in Georgia. Not even historical records existed for this plant in Virginia. But a recent discovery at Fort Pickett, an Army base in Virginia, located what is now the species' largest known population, containing over 21,000 plants.

Very few of the previously known populations produce fruit. In contrast, the Fort Pickett population is prolific. The Army is taking advantage of the situation by promoting the recovery of Michaux' sumac with vigor. Recovery activities planned or under way include additional surveys, habitat protection, and genetic studies to determine if hybridization occurs between *R. michauxii* and the common smooth sumac *(Rhus glabra)*. A Global Positioning System is being used to record species locations into a Geographic Information System. Graduate studies are planned to determine levels of seed germination and viability, and the feasibility of propagating and transplanting Michaux' sumac to establish or augment populations. The Army also plans to set up and monitor prescribed burning plots to determine the best habitat management strategy for this species.

Regional News

(Continued from page 2)

FWS Reno, Nevada, Field Office staff recently accompanied representatives from the Nevada Natural Heritage Program, Nevada State Museum, and developers of the Shaheen Business Park to the only known habitat of the Carson wandering skipper *(Pseudocopaeodes eunus* ssp.*)* in Carson City, Nevada. The butterfly's habitat is a wetland located adjacent to land being developed for the business park. The developers have expressed a willingness to purchase the entire habitat (they now own about half) and donate it to The Nature Conservancy. This action, which is intended to serve as mitigation for a proposed wetland fill, should also serve to protect the wandering skipper at the site.

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Staff from the FWS Ventura, California, Field Office and the National Biological Survey recently conducted a survey of southern sea otters *(Enhydra lutris nereis)* on San Nicolas Island, where the FWS has attempted to establish a population of this Threatened marine mammal. Eight mature sea otters and two pups were found. Unusually dense kelp beds and fair to poor viewing conditions were noted throughout the survey period. Sea otter populations at San Nicolas Island have been relatively stable for the past 4 years.

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Region 3 — The Karner blue butterfly *(Lycaeides melissa samuelis)* and its host plant, wild lupine *(Lupinus perennis)*, occur at about 130 locations in Wisconsin. Together, these site comprise the butterfly's largest known remaining concentration. Much of the habitat, however, is on public or private land managed for timber production. Because some forestry activities, such as pesticide applications and tree planting, may have adverse effects on the butterfly, the Wisconsin Department of Natural Resources has entered into a statewide habitat conservation planning process with representatives of the forest industry. The State hopes to expand the partnership to other private and public landowners. The Habitat Conservation Plan will be a key component in a permit application for "incidental take" of the Karner blue butterfly.

*****

Region 4 — The FWS recently initiated a civil penalty proceeding against a Melbourne, Florida, condominium association for violations of the Endangered Species Act resulting from use of beach lighting that allegedly caused sea turtle disorientation and deaths.

Most sea turtle species hatch at night. When they emerge from their nests in the sand, the hatchlings instinctively head for the lightest horizon. Normally, the lightest point would be the reflection of moonlight on the ocean, which would guide the hatch-

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FWS photo

loggerhead sea turtle hatchling

Regional News

(Continued from previous page)

lings to the water. Artificial lighting along nesting beaches can disorient the hatchlings, leading them to crawl away from the ocean and into danger. They then become vulnerable to cars, predators, and desiccation.

The condominium association was served a Notice of Violation for high sea turtle mortality on three separate nights caused by the facility's outdoor lighting near a nesting beach. The notice proposed a civil penalty of $15,000 each for three alleged Endangered Species Act violations. Prior to this action, the association had received several warnings that it was violating Brevard County's lighting ordinance and that the lighting was likely to result in the death of protected sea turtles. The association failed to heed the recommendations to correct its lighting problem.

Since receiving the Notice of Violation, the association has installed shields on the problem lights, bringing them into compliance with the Brevard County lighting ordinance. It also is encouraging residents to turn off any exterior lighting on their beachside balconies and to close blinds and draperies in oceanfront rooms at night from May 1 to October 31 of each year.

For information about the impacts of lighting on sea turtles, contact the Sea Turtle Recovery Coordinator, U.S. Fish and Wildlife Service, 6620 Southpoint Drive, South, Suite 310, Jacksonville, Florida 32216-0912, telephone 904/232-2580.

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Region 5 — Michael Amaral, Endangered Species Specialist with the FWS New England Field Office, recently guided a team of animal damage control specialists from the U.S. Department of Agriculture (USDA) and the New Hampshire Fish and Game Department through an important Karner blue butterfly site in Concord, New Hampshire. Last June, deer and woodchucks browsed more than half of the site's lupine blossoms, reducing a critical butterfly nectar source. After the visit, USDA agreed to assume the lead in preparing an animal damage control plan for the 2-acre (0.8 hectare) site. The plan likely will call for woodchuck control and an electric fence for deer.

*****

The Ohio River Islands National Wildlife Refuge encompasses a chain of islands and surrounding aquatic habitat spread over 360 river miles (580 kilometers) in Pennsylvania, West Virginia, and Kentucky. Among the resources of management concern within the refuge are over 40 species of native freshwater mussels, including 2 Endangered species: the pink mucket pearly mussel *(Lampsilis abrupta)* and the fanshell mussel *(Cyprogenia stegaria)*.

Diving is required to effectively assess and monitor the mussel communities in the Ohio River ecosystem, where mussels inhabit waters up to 35 feet (10.7 meters) or more in depth. Hiring SCUBA diving contractors is expensive, over $600 per day per diver, and it takes considerable time to orient even

(Continued on page 18)

(Continued from page 17)

experienced divers in conducting mussel studies in riverine environments. To ensure that necessary studies can be accomplished within available funds, three refuge staff members (Mitch Ellis, Patricia Morrison, and Janet Butler) have been trained and certified as SCUBA divers. Following 2 years of planning and coordination with the National Biological Survey and U.S. Geological Survey, the new FWS Dive Team was approved by the Region 5 Regional Office as a pilot program.

In the future, refuge staff will team with members of the FWS Ecological Services Office in Elkins, West Virginia, to form a larger dive team specializing in freshwater mussel work within the Ohio River ecosystem. This in-house SCUBA diving capability will enable the team to provide diving services for other FWS stations that need underwater investigations. For details, contact Assistant Manager Mitch Ellis at Ohio River Islands NWR, P. O. Box 1811, Parkersburg, West Virginia 26102-1811, (304) 422-0752, or via CC-Mail at R5RW_OHRINWR.

*****

Region 6 — The Virgin River in southwestern Utah is home to two endangered fish species, the Virgin River Chub *(Gila robusta semidnuda)* and the woundfin *(Plagopterus argentissimus)*. A third fish species inhabitating this river is the Virgin spinedace *(Lepidomeda mollispinis mollispinis)*, which was proposed for listing in May 1994. Reduced flows caused by water development projects have had serious impacts on all three species. One water project that may have had significant adverse impacts is the Quail Creek Dam. FWS officials have indicated that the minimum flow rate established in the biological opinion for the dam is not being met by the Washington County Water Conservancy District, and that the available water may not be sufficient for maintenance or recovery of the Virgin River chub. Accordingly, FWS has requested that the Bureau of Land Management reinitiate Section 7 consultation on operation of the dam.

*****

Region 7 — For years, FWS officials in Alaska have been concerned about the rate of logging in southeast Alaska's Tongass National Forest and its effects on wildlife resources, including the Alexander Archipelago wolf *(Canis lupus ligoni)*, Queen Charlotte goshawk *(Accipiter gentilis laingi)*, and marbled murrelet *(Brachyramphus marmoratus)*. The Tongass, at nearly 17 million acres (6.9 million hectares), is our largest National Forest. It is a mosaic of glaciers, mountains, fjords, and islands within one of the largest remaining temperate rainforests on earth.

Large-scale logging began on the Tongass during the mid-1950's to support two pulp mills in Ketchikan and Sitka. The mills were established under 50-year contracts to create a relatively stable, year-round economy in a remote region that was dependent on seasonal industries such as fishing and tourism. The Sitka mill closed this year because of financial difficulties; consequently, its contract was terminated by the U.S. Forest Service. The Ketchikan Pulp Company contract remains effective until 2004.

The primary method of timber harvest in southeast Alaska has been clearcut logging. This method converts uneven-aged mature forest into even-aged timber stands so dense that, after about 30 years, little understory vegetation — critical to many wildlife species — can persist. Old-growth forest conditions require 200 years to return. However, the current planned rotation for timber harvest in the Tongass is 90-125 years. Thus, under this schedule, vast areas of the forest will never return to old- growth conditions.

In response to increased concerns for the Tongass and its diverse resources, the FWS, Forest Service, and Alaska Department of Fish and Game are working to establish a cooperative interagency protocol for the forest. The aim is to minimize or avoid the need to list Tongass species under the Endangered Species Act. Considering the widely divergent views on how the forest should be managed, this is an ambitious goal. The agencies agree that change is needed and that implementing changes will be difficult.

*****

The Eskimo curlew *(Numenius borealis)* is the most endangered long distance migrant in the world. This bird nests in northwestern Canada and perhaps northern Alaska, and flies as far south as the region of Patagonia in South America. Through Conservation International, the FWS has funded two studies of the Eskimo curlew in its Central and South American migration and wintering sites.

The objective of the first project was to locate Eskimo curlews by intensive searches of historically occupied wintering habitats. Forty ornithologists searched Argentina and Uruguay during the winter of 1992-1993. They found concentrations of associated grassland shorebirds, but no Eskimo curlews.

The second project involved a search of Spanish and Portuguese literature in South America, museum skins, and other informational sources. It appears that the birds historically spent the middle of the nonbreeding season (November and December) in the southern pampas or in Patagonia, returning to the northern pampas of Argentina in January-February. Extensive areas of grassland habitat remain in Argentina today, and shorebirds associated with the curlew are still common.

Wolf Reintroduction Approved

(Continued from page 1)

Interstate 15 and south of the Missouri River. The central Idaho experimental population area includes portions of Idaho south of Interstate 90 and west of Interstate 15. It also includes a corner of Montana south of Interstate 90 from the Idaho border eastward to Missoula, and west of Highway 93 as it runs south from Missoula.

The current FWS wolf management program in the northern Rocky Mountains allows the agency to move or kill the occasional wolf that preys on livestock, and that program will continue. In addition, the rules will allow private property owners and livestock owners with grazing leases on public land to "harass" wolves without injuring them to discourage conflicts with domestic animals, but will also require those owners to report such incidents within 7 days. On private property within the experimental areas, landowners can kill wolves in the act of wounding or killing livestock, but are required to report the incident within 24 hours, and physical evidence of the attack will be required. Killing wolves on public land by private citizens will require a permit and will be an option only after attempts to relocate problem wolves have ended.

The FWS will establish wolf populations by reintroducing wild gray wolves from Alberta and British Columbia, Canada, where they are not endangered. Over the next 3 to 5 years, about 30 wolves annually (15 for each site) would be captured in Canada in November and December, with approval of the Canadian Wildlife Service, and released in Yellowstone National Park and on U.S. Forest Service lands in central Idaho.

Two different release methods are planned. In Yellowstone, three family groups (adults and their offspring) will be placed in separate 1-acre enclosures to allow them to acclimate to the area within the park. After about 4 to 6 weeks, they will be radio-collared and released. Biologists will track their movements and provide supplemental feeding if necessary. This release technique is designed to encourage released animals to remain in or near the park.

photo by John and Karen Hollingsworth

The releases in central Idaho will consist of about 15 adult wolves from various packs. They will be fitted with radio collars and freed as soon as possible after arriving at the release site. This technique, which does not include an acclimation period, is planned for central Idaho because the remote release site's rough terrain makes access difficult for program biologists. In addition, biologists believe the region's steep topography will help keep wolves within the release area. After becoming oriented to the area, the released wolves are expected to behave as naturally occurring wolves. They are expected to disperse, find mates, and form packs, primarily within the 12 million acres of national forest land in central Idaho.

The final rules reflect the recommendation outlined in a final environmental impact statement (EIS) on wolf reintroduction in Yellowstone and central Idaho completed earlier this year by the FWS. The EIS explored options for wolf reintroduction in order to promote the recovery of the gray wolf in the northern Rocky Mountains.

Gray wolves were common in the northern Rocky Mountains prior to 1870. As human settlement intensified, however, prey species such as deer, elk, and bison declined. With the wolves' natural prey depleted, settlers and government trappers feared that hungry wolves would turn to livestock. Successful campaigns to exterminate wolves in the Rocky Mountain area soon followed.

Populations of natural prey animals have since rebounded. While it is generally agreed that wolves could have eventually repopulated the Yellowstone and central Idaho ecosystems on their own, the process could have taken decades to occur. If wolves reestablished themselves naturally, they would have received the full protection of the Endangered Species Act, with significantly less management flexibility than allowed by the experimental population approach. Under the reintroduction plan, wolf populations are expected to recover by 2002.

Complete details of the rules are found in the November 22, 1994 *Federal Register.*

Almost 500 comments were received on the August 16, 1994, proposed rules, and public hearings were held in Cheyenne, Wyoming; Helena, Montana; Boise, Idaho; Salt Lake City, Utah; Seattle, Washington; and Washington, DC.

For more information, contact the U.S. Fish and Wildlife Service, P.O. Box 8017, Helena, Montana 59601; 406/449-5202.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	39
Birds	75	153	16	0	244	73
Reptiles	16	63	19	14	112	31
Amphibians	6	8	5	0	19	10
Fishes	65	11	38	0	114	66
Snails	14	1	7	0	22	29
Clams	50	2	6	0	58	42
Crustaceans	14	0	3	0	17	4
Insects	19	4	9	0	32	17
Arachnids	4	0	0	0	4	0
Plants	402	1	86	2	491	208
TOTAL	721	494	198	38	1,451 *	526 **

Total U.S. Endangered	721	(319 animals, 402 plants)
Total U.S. Threatened	198	(112 animals, 86 plants)
Total U.S. Listed	919	(431 animals, 488 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 416 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 CITIES Party Nations: 124

November 10, 1994

November/December 1994 Vol. XIX No. 6

ENDANGERED SPECIES

Technical Bulletin

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

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ENDANGERED
Species
BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
JANUARY/FEBRUARY 1995

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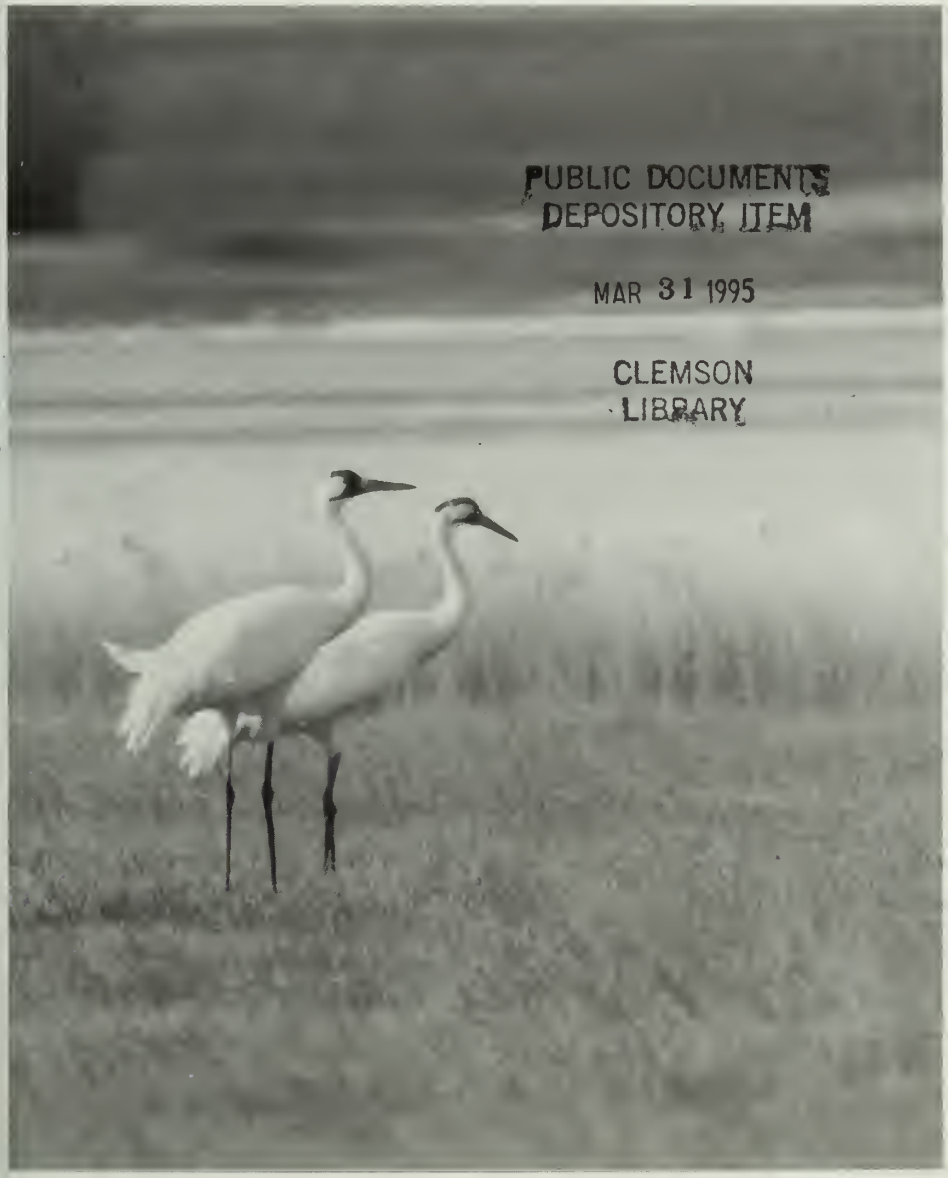

Endangered species indicate threats to the environment we all share, but reacting to the plight of individual species is no longer enough. This issue of the newly designed ***Endangered Species Bulletin*** *highlights a different approach—one that involves the health of entire ecosystems.*

The shift to an ecosystem approach reflects our growing awareness of the interrelationships among species and their habitats. As the scope of our conservation effort broadens, so must the ability of governments to form working partnerships with the private sector.

The following articles outline the Fish and Wildlife Service's ecosystem policy, the ethic upon which it is based, and examples of cooperative efforts to restore and protect our Nation's rich ecological heritage.

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ENDANGERED Species BULLETIN

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On the Cover
Ecological health is essential to the recovery of whooping cranes and other vulnerable wildlife.
photo by Tom Mangelsen, Images of Nature

Our thanks and acknowledgement with this edition to designer Christina Watkins and computer graphics specialist Amanda Summers, with appreciation also to Mary Maruca for her support.

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics relating to endangered species, and may be semi-technical or popular in nature. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, cooperative ventures, changes in a species' status, and significant new threats.

Contact the Editor before preparing a manuscript to determine the proper length, focus, and timing of proposed articles. We cannot guarantee publication.

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by Mollie Beattie, Director

A Broader View

As I write this (January 12), I am waiting for a plane to Montana where I will be present for the reintroduction of wolves to Yellowstone National Park. Returning the wolf to Yellowstone replaces a vital piece of the "biotic community" that has been missing for 60 years.

Fifty years ago, after the howl of the wolf was silenced in Yellowstone, naturalist Aldo Leopold wrote of his understanding of the role that the wolf had served:

> *I have lived to see state after state extirpate its wolves. I have watched the face of many a newly wolfless mountain, and seen the south-facing slopes wrinkly with a maze of new deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death....*

Director Mollie Beattie and Interior Secretary Bruce Babbitt (front center) help carry one of the caged wolves taken to Yellowstone National Park in preparation for the release.
photo by Jim Peaco/ National Park Service

Leopold's perspective in understanding wolves, and in writing *A Sand County Almanac*, is what we are today calling the "ecosystem approach." It is a way of thinking about natural resources not as individual commodities—wildlife, trees, water, or soil—but as interdependent pieces of a whole. Leopold was not the first to urge us to understand the interconnectedness of the ecosystem, although he may have been the most eloquent. His book was published in 1949; the ecosystem approach is not a new concept.

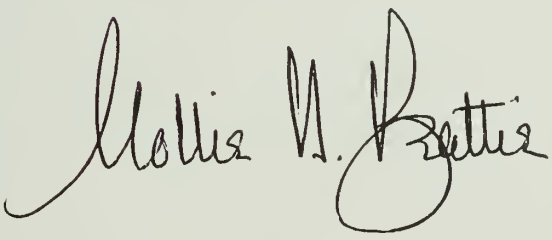
What *is* new is a broad realization that only the ecosystem approach will allow us to cure the basic ills that affect our wildlife. The problem with our wildlife is a problem with our land and water: the polluted and dying rivers and streams, the degraded wetlands, and the fragmentation and destruction of forests. It is only by thinking about wildlife in the context of the ecosystem that we can, as Leopold said, move from "land doctoring" of symptoms to the "science of land health."

For the Fish and Wildlife Service to adopt an ecosystem approach, we must regard each of our programs and each of our mandates as we now regard individual species; that is, as one element of a system that must be treated as a whole if that element is to succeed. The elements of the Service's managerial ecosystem are other programs within the Service, other agencies within the Federal government, and other land managers and policy makers outside the Federal government (especially states, tribes, and private landowners). If a mission of the national wildlife refuge system is the conservation of endangered species, refuge managers must work closely with the Service's Ecological Services staffs. If farmers hold the keys to habitat restoration on private lands, we must be close partners with the Department of Agriculture, and with farmers themselves. If we seek to restore fisheries, we must work with those who own the streambanks and with the states that control water use and fishing.

The Service must speak to the public of the importance of biodiversity and the ecosystem-based approach to managment. Some obscure, unlovable species with peculiar names may be more important for maintaining the intricate web of life than eagles, wolves, and bears.

Ironically, we must see as our guiding goal the diminishment of the importance of the Endangered Species Act and make whatever efforts we can to avert the need for listings. This means applying a multi-species, ecosystem approach to preventing the decline of species.

We know this is far more likely to preclude the need for additional listings under the Endangered Species Act than dealing with one species at a time. For example, we cannot effectively deal with the decline of freshwater mussels independent of a decline in fish populations if they live in the same ecosystem and are affected by the same contaminants and degradation of habitat. It makes more sense, both biologically and economically, to take a broader view of conservation by restoring the entire ecosystem.



Policies for Comment

Notices of Availability were published in the December 21, 1994, *Federal Register* for the following draft policies:

Endangered Species Consultation Handbook—a guide to the process under which Federal agencies are required to consult with the FWS (or the National Marine Fisheries Service, where appropriate) if their activities may affect listed species.

Habitat Conservation Planning and Incidental Take Permit Processing—clarifies and streamlines the process for obtaining incidental take permits under the Endangered Species Act (ESA) in accordance with approved habitat conservation plans.

Petition Management—internal FWS guidance for management of petitions to list, reclassify, or delist species under the ESA.

Candidate Species—guidance for identifying listing candidates, assessing and monitoring their status, and promoting their stabilization and recovery.

Recognition of Distinct Vertebrate Population Segments—draft policy to clarify the phrase "distinct population segment of any species of vertebrate fish and wildlife" for the purpose of listing, delisting, or reclassification.

Copies are available from the FWS Regional Offices (see page 2 for addresses). Comment by April 7, 1995, to: FWS, Division of Endangered Species, 4401 N. Fairfax Drive, Rm. 452, Arlington, VA 22203.

by Denise Henne

Taking an Ecosystem Approach

Opposite page
"Thinking like a mountain" is a phrase coined by naturalist Aldo Leopold to describe the belief that a healthy ecosystem is one that retains all of its parts, including predators such as bears and wolves. photo by Galen Rowell/ Mountain Light

Change is coming to the U.S. Fish and Wildlife Service (FWS). In response to better scientific understanding about how ecological systems work, the FWS has adopted an "ecosystem approach" to fish and wildlife conservation. This somewhat new approach is helping the FWS better achieve its mission to conserve and enhance fish and wildlife, and their habitats, for the continuing benefit of the American people. It is based on a growing awareness that successful natural resource management must incorporate larger, broader ecological timeframes and scales.

An ecosystem approach essentially is a philosophy that considers the entire environment within a geographic area. It involves maintaining ecological and evolutionary processes and viable populations of all native species. This is not a new concept. It was central to Aldo Leopold's eloquent discourses on conservation biology and the need for a "land ethic." Even earlier, writers such as Henry Thoreau and John Muir stressed taking a holistic view of nature.

Adopting an ecosystem-based approach to wildlife conservation means significantly changing the way the agency thinks, acts, and solves problems. The FWS is increasing its efforts to think and act in terms of systems, relationships, and processes to recognize that, in some way, all things are connected. Because plants and animals are inseparable from their environment and their relationships with each other, species will be addressed as components of the systems within which they are found. Humans, who play a pivotal role in ecosystem dynamics, will play an increasingly important role in sustaining ecosystem processes and health.

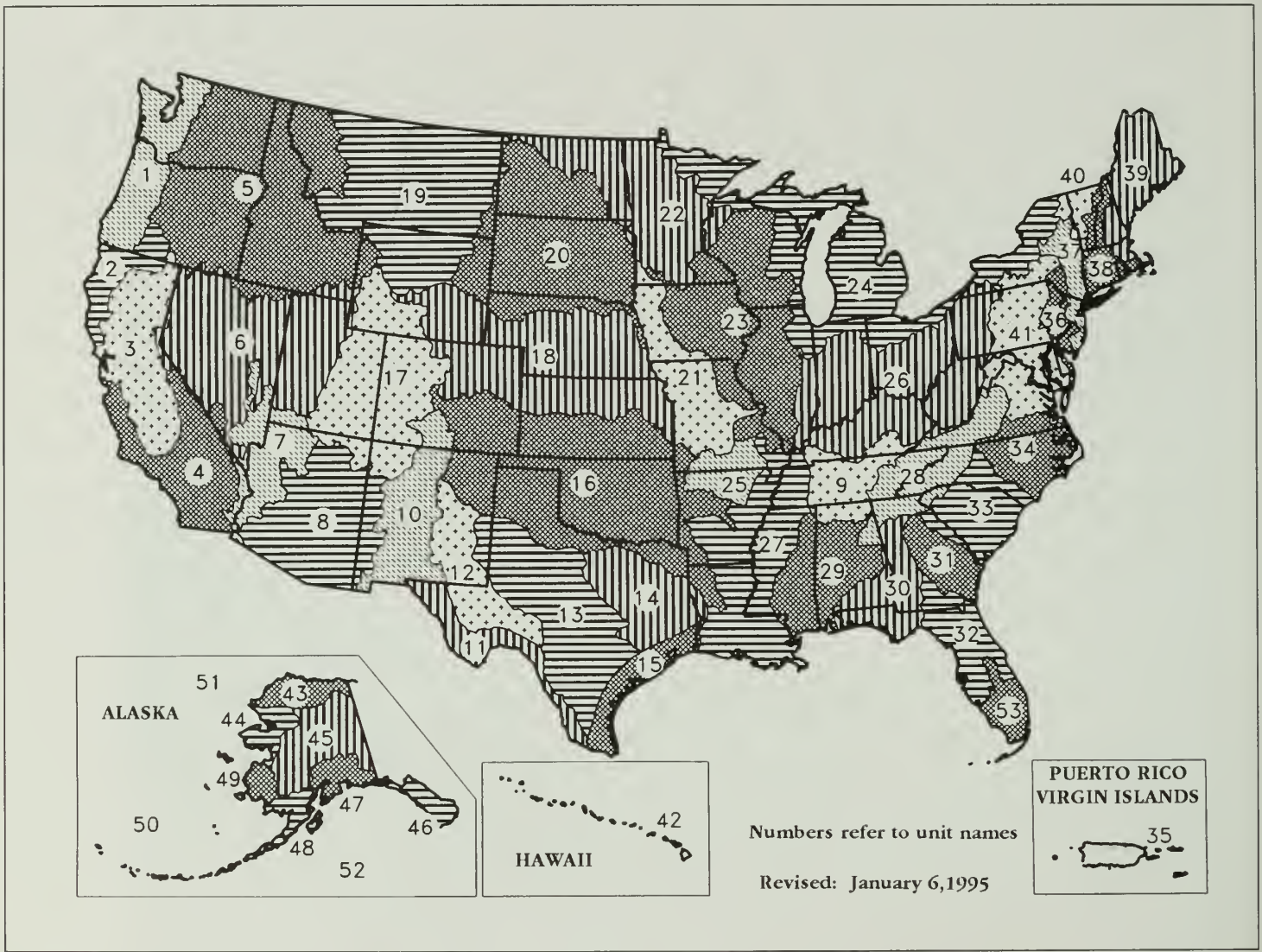
Partnerships are probably the most critical element of an ecosystem approach because, by increasing cooperation and pooling resources, they can enable the participants to accomplish more with fewer dollars. To be the most effective, however, the FWS must collaborate with all interests that share responsibility for ecosystem health. In implementing an ecosystem approach, the FWS will participate as a member of a diverse management team including other Federal agencies, the States, Native American tribes, communities, corporate and individual landowners, and organizations. The FWS role will vary from one ecosystem to the next.

Traditionally, many FWS programs and initiatives have made significant contributions to the conservation of ecosystems and biological diversity. Most obvious are actions that have led

to the acquisition and protection of habitat and the recovery of imperiled wildlife and plant populations. Less obvious, but equally significant, are actions that have helped to restore important habitats, reduce environmental degradation and contamination, monitor the health of natural systems, regulate the harvest of migratory birds, and provide technical assistance to private landowners. Through an ecosystem approach, the FWS is expanding its outlook by addressing the needs of larger, natural systems rather than concentrating on individual species or small parcels of habitat.

In every ecosystem-based project, one of the first steps is to define the geographic area to be addressed. Because no single mapping system meets all needs, the FWS considered several options in selecting a framework to delineate ecosystems or areas of the landscape. The FWS chose watersheds, as identified by the U.S. Geological Survey's Hydrologic Unit Map, as the basic units for organizing agency programs and implementing ecosystem-based projects.

Watersheds were chosen for several reasons: (1) They are discrete physical units that provide widely-recognized and well-defined physical boundaries; (2) They are the best known focus for aquatic, coastal, and estuarine habitats (approximately 45 percent of the Nation's Threatened and Endangered species depend on these habitats); (3) They are consistent with the philosophy underlying the ecosystem approach in that any activity within a watershed potentially has an impact on the entire watershed; and (4) They are hierarchical by nature (watersheds are



Map represents the FWS watershed-based ecosystem units. These units are identified by grouping or, in some cases, segmenting watershed units. Vegetative cover types, physiography, and optimum size were considered in the grouping of watersheds. Within each ecosystem unit, focus areas or "hot spots" are identified to localize attention and activity, based on the importance of the resources present.

made up of smaller river systems) and therefore offer flexibility of scale, which is necessary in implementing a realistic and effective ecosystem approach.

It is important to note that the delineation of watersheds does not mean that every resource issue will be confined to a watershed analysis. All problems and issues will be analyzed over as broad a geographic area as is dictated by good science. The map will remain flexible to reflect continuing discussions and collective decisions of all involved parties about individual watersheds or ecosystems.

Ecosystem teams for each of the watershed-based units identified on the map have been formed. The teams include personnel from all FWS programs and are the vehicle by which ecosystem approach activities will be accomplished. Members already are setting goals and objectives, deciding on action strategies, establishing priorities, identifying budget needs, and implementing collaborative projects within the agency and with partners.

In the FWS Washington Office, a cross-program team of managers has been established to assist with national implementation and coordination of the ecosystem approach. Policies are established by the FWS Directorate, while Regional Offices provide guidance and oversight for the ecosystem teams, and consolidate goals, priorities, and budgets at the regional level.

To ensure that FWS employees, non-biologists as well as biologists, have a common understanding of the ecosystem approach, the agency is providing training courses and seminars. These training opportunities are being made available to all FWS employees and interested individuals from outside the agency. Courses on topics such as team building, team effectiveness, transition management, outreach and education, developing effective partnerships, conducting effective meetings, and managing change are being offered through the FWS National Education and Training Center. For information on these courses, contact the Center's registrar at Route 3, Box 49, Kearneysville, West Virginia 25430; telephone 304/725-8461.

In addition to training, the FWS is increasing the diversity of its workforce, both professionally and culturally. A variety of expertise from ecologists, hydrologists, geologists, landscape architects, and social scientists is needed to fully implement an ecosystem approach. Broadening the cultural diversity of FWS employees will increase the agency's ability to better understand its various constituencies, which have expanded from people interested predominantly in hunting, fishing and nature-watching to include urban dwellers that may not have close contact with wildlife. Looking to other Federal and State agencies and the private sector to obtain expertise not readily available within the FWS is another way to more effectively meet the diverse needs of ecosystem-based management.

The FWS ecosystem approach to fish and wildlife conservation will continue to evolve over time. There is much to learn from exploring new methods, evaluating agency activities, and working with partners. Although change does not come easily or quickly, by working diligently with others, the FWS hopes to provide future generations of natural resource managers with more effective tools to protect our biological heritage.

Our society places great value on wildlife and the ecosystems upon which all species, including humans, depend. To restore and protect ecosystems, we now realize that we need to nurture the land, not exploit it relentlessly. Helping people understand the connection between human prosperity and healthy, functioning ecosystems is no small challenge, but one in which the FWS is proud to play a role.

Denise Henne is a program specialist in the FWS Division of Habitat Conservation in Washington, D.C.

WATERSHED BASED ECOSYSTEM UNITS

1. ***North Pacific Coast***
2. ***Klamath/Ctl. Pacific Coast***
3. ***Central Valley of California/ San Francisco Bay***
4. ***South Pacific Coast***
5. ***Columbia River Basin***
6. ***Interior Basins***
7. ***Lower Colorado River***
8. ***Gila/Salt/Verde River***
9. ***Southern Appalachia***
10. ***Middle and Upper Rio Grande***
11. ***Lower Rio Grande***
12. ***Pecos River***
13. ***Edwards Plateau***
14. ***East Texas***
15. ***Texas Gulf Coast***
16. ***Arkansas/Red Rivers***
17. ***Upper Colorado River***
18. ***Platte/Kansas Rivers***
19. ***Upper Missouri/Yellowstone Rivers***
20. ***Main Stem Missouri River***
21. ***Lower Missouri River***
22. ***Mississippi Headwaters/ Tallgrass Prairie***
23. ***Upper Mississippi River/ Tallgrass Prairie***
24. ***Great Lakes***
25. ***Ozark Watersheds***
26. ***Ohio River Valley***
27. ***Lower Mississippi River***
28. ***Tennessee/Cumberland River***
29. ***Central Gulf Watersheds***
30. ***Florida Panhandle Watersheds***
31. ***Altamaha/Suwanee Rivers***
32. ***Peninsular Florida***
33. ***Savannah/Santee/Pee Dee Rivers***
34. ***Roanoke/Tar/Neuse/Cape Fear Rivers***
35. ***Caribbean***
36. ***Delaware River/Delmarva Coastal Area***
37. ***Hudson River/New York Bight***
38. ***Connecticut River/Long Island Sound***
39. ***Gulf of Maine Rivers***
40. ***Lake Champlain***
41. ***Chesapeake Bay/ Susquehanna River***
42. ***Pacific Islands***
43. ***Arctic Alaska***
44. ***Northwest Alaska***
45. ***Interior Alaska***
46. ***Southeast Alaska***
47. ***South Central Alaska***
48. ***Bristol Bay/Kodiak***
49. ***Yukon–Kuskokwim Delta***
50. ***Bering Sea/Aleutian Islands***
51. ***Beaufort/Chukchi Seas***
52. ***North Pacific/Gulf of Alaska***
53. ***South Florida***

by Jim Clark

Rediscovering the Land Ethic

Protecting our natural heritage into the next century requires us to stop looking through the rear-view mirror. We know where we have been. We now must look ahead, expand our knowledge, improve our expertise, and anticipate the strategies needed to sustain our ecological resources for future generations.

Aldo Leopold photo by Robert McCabe, courtesy of University of Wisconsin at Madison—Archives (#x25 1307)

The evolution of a modern Land Ethic advanced in 1933 when pioneering conservationist Aldo Leopold published *Game Management*, the first attempt to mesh ecological theory with "on the ground" conservation strategies. Although his book emphasized game species, Leopold stressed the importance of protecting a diversity of native plants and animals. He was already moving beyond the traditional concepts of game management to a more holistic view of conservation, a concept not fully embraced by others in the natural resource field at that time.

Two years later, Leopold journeyed to Europe to study Germany's forest management program. While touring the German forests, he quickly saw that the ecological concepts he advocated were missing there. Germany had instituted, over a course of centuries, an intensive forest management program geared to maximum output of trees and deer. The desired results were achieved, but they were accomplished at a very high cost to other ecological resources that depended on a diverse and dynamic forest ecosystem.

Leopold saw very little natural diversity occurring within the intensively managed plantations. He noticed the absence of plant diversity in the understory and a shortage of mammalian predators, raptors, cavity-nesting birds, and other typical forest species within these manicured stands. Leopold wrote that the German forests were "deprived of a certain exuberance which arises from a rich variety of plants fighting with each other for a place in the sun."

Apparent to Leopold was the eventual failure of such an artificial and highly manipulated system. He feared the same could happen to the forests in America, and upon returning to Wisconsin, he expressed his concern: "We yearn for more deer and pines, and we shall probably get them. But do we realize that to get them, as the Germans have, at the expense of their wild environment and their wild enemies, is to get very little indeed?"

From the start of his career in 1909 to his death in 1948, Leopold continually evolved his thinking and awareness of ecology. Although in his early years he advocated controlling predators as "vermin," he later came to believe that the key to the health of all natural communities depends on maintaining natural diversity and system dynamics. The evolution of Leopold's thinking over many years culminated in his vision of "thinking like a mountain," otherwise known as the Land Ethic.

This view may have been ahead of its time; for years, it was not widely incorporated into resource management. But we now are revisiting Leopold's basic theory of ecological conservation. We know that every component of the system, large or small, plays a role in preserving the integrity of an ecosystem. Like Leopold did in his short career, we have started expanding our focus of the natural world from single species management to strategies to protect the full array of native plants and animals. Most recently, the importance of system dynamics in maintaining ecosystems is being recognized as well. In essence, we are rediscovering Leopold's Land Ethic.

Developing strategies to protect our ecological resources begins with the basic premises of that ethic. Although some adaptation to today's world may be required, it remains as viable and important as it was 50 years ago. It involves:

- *recognizing the dynamic nature of an ecosystem.* When developing and implementing management actions, we must incorporate considerations for ecosystem resiliency, and develop strategies that can accommodate unexpected events or natural disturbance regimes. Forget about trying to simplify complex ecosystems.

This does not negate the need for management, but it calls for us to heed Leopold's advice that the land "should be modified as gently and as little as possible." Although he once held the traditional game management views of his time, Leopold later advocated restoring and protecting native communities, instead of creating or enhancing artificial habitats for a few high-interest species.

- *constantly monitoring both the resources and management actions so that any needed adjustments can be made.* This approach involves continual experimentation with management strategies and approaches, with the understanding that decisions may at times have to be made with less than perfect knowledge. Management approaches and techniques must remain adaptable to change, both natural and societal.

- *striving to maintain existing native plant and animal populations, and restoring those that have suffered drastic declines due to human interference.* We need to accept the fact that we induce failure when we try to control natural variation of a system. Adapt management practices to a system, not the other way around. To the extent practical, allow natural processes to operate unimpeded.

- *setting clear goals and objectives, including targets that can be measured to monitor ecosystem condition (what Leopold referred to as "land health").*

- *incorporating aesthetic concerns and amenity values into our management approaches.* Both elements are important to preserving the natural integrity and appearance of an area.

- *involving the public as an informed, active participant in the process.* This means we must develop approaches that meet the needs and interests of the various groups within our culturally diverse society. Generic public outreach and environmental education programs are no longer effective in today's world.

- *developing partnerships.* Successful partnerships are essential, but challenging. They require adaptability, risk-taking, innovation, a shared vision, active participation, and commitment by all parties involved.

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While hunting in Mexico's Sierra Madre, Leopold observed a working ecosystem with all the native flora and fauna components, where natural processes were permitted to run their course unimpaired. He observed that in spite of a healthy population of mountain lions and wolves, the deer population was in much better condition than what he observed in Germany and even in the U.S., where predators, large and small, were targets for annihilation. The health of the Sierra Madre ecosystem rested not only on having the natural distribution, composition and abundance of native species, but by also allowing natural processes to perform their roles without interference. photo by Michael Bender

by Ron Crete

Partnerships for Habitat on Private Land

*E*ndangered and Threatened species, like other animals and plants, do not recognize boundaries between public and private lands. As a result, many government agencies are seeking voluntary partnerships with private landowners, other citizens, and communities to help achieve mutual conservation goals. The U.S. Fish and Wildlife Service (FWS) has taken action with private landowners and others to benefit wildlife through its Partners for Wildlife initiative.

Since its inception in 1987, Partners for Wildlife has provided significant benefits to wildlife through habitat restoration and wetland conservation activities. The initiative works to conserve biological diversity by carefully selecting, designing, and implementing restoration projects to benefit native species, especially those of national interest.

Partners for Wildlife projects often begin during a casual conversation at the kitchen table or while leaning on the hood of a farmer's truck. These settings foster mutually agreeable solutions to problems experienced by both parties. In fact, this is how many low, wet areas in the corners of farm fields, which usually are not productive enough to pay for planting costs, become restored wetlands producing wildlife and other benefits for landowners and society.

Conserving a Stronghold of Aquatic Wildlife

by Bridgett Estel Costanzo

The Upper Tennessee River Basin (Basin) of southwest Virginia and northeast Tennessee, with its karst caverns, sinks, and underground streams, supports an unusually rich diversity of aquatic animals. The Clinch, Powell, and Holston Rivers, which comprise the Basin, once harbored over 60 species of mussels. Unfortunately, many of these mollusks no longer survive in the Basin, and 26 species now are considered rare. Fourteen of the Basin's mussels, along with four fish species, are listed by the Fish and Wildlife Service (FWS) as Threatened or Endangered. Another nine mussel and three fish species are candidates for listing. Although the number of endemic mussel species in the Basin has declined by almost half, and populations of those remaining declined by 50 percent between 1979 and 1988, the Basin remains one of the world's last strongholds for freshwater mussels.

Most of the problems that led to the decline of aquatic species in the Basin are associated with certain land use changes and the resulting degradation of water quality. Urban and agricultural run-off continue to increase sediment and nutrient loading. Industrial pollution has created some serious impacts, with several chemical spills occurring over the past few decades and a Superfund site located on one of the waterways. Coal mining, a major part of this southern Appalachian region's economy, also is a major contributor to its pollution problems.

In response, concerned citizens and organizations have come together to create the Basin Initiative, a multi-faceted effort to address the natural resource issues in this watershed and conserve its globally significant ecosystem. The initiative is a partnership of over 60 Federal, State, and local agencies and organizations interested in preserving the natural and cultural diversity of the region. Partnership activities include scientific research, community outreach, and restoration of degraded habitats.

The FWS is involved in all of these activities, but particularly noteworthy are those conducted under the Partners for Wildlife habitat restoration program. In 1990, the FWS and The Nature Conservancy launched a habitat

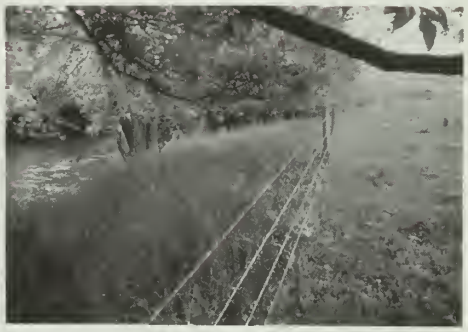
Partners for Wildlife aims to restore and protect the habitat of Federal trust species (primarily species listed as Endangered or Threatened, listing candidates, and migratory birds) on private lands and easement/transfer properties of the Consolidated Farm Services Agency (CFSA), a Department of Agriculture bureau formerly known as the Farmers Home Administration. This objective is accomplished through cooperative efforts with local governments, State wildlife agencies, and private organizations, such as Soil and Water Conservation Districts, Ducks Unlimited, the National Audubon Society, Pheasants Forever, The Nature Conservancy, and Trout Unlimited. The FWS relies on the assistance of such partners to help implement the program and share the cost of habitat restoration projects on private lands.

Targeting the Results

The FWS issued Partners for Wildlife policy in 1992 that sets priorities for restoration and directs most funding to habitat restoration work. Those projects that would conserve federally listed species, listing candidates, and other declining species or habitats are of high priority. The greatest emphasis is on projects that: (1) restore habitats that collectively benefit wildlife populations on National Wildlife Refuges (e.g., water quality improvements and wildlife dispersal corridors); or (2) occur on CFSA conservation easements or fee title transfer properties administered by the FWS or State wildlife agencies.

Partners for Wildlife projects aim to provide the broadest array of wetland and wildlife benefits. To the extent technically feasible, they will reestablish the original natural community or a successional sequence of natural communities, with the goal of eventually restoring the original natural community on at least 70 percent of the project site.

Funding is not used to purchase land rights, fee title, easement, rent, or incentive payments. At least 70 percent of the restoration funds are used for "on-the-ground" restoration activities. The remaining funds cover technical support for planning restorations, formulating agreements, monitoring,



Opposite page
Libby Herland (FWS Partners for Wildlife Coordinator, Region 5) and Don Gowan (The Nature Conservancy) visit a site on the Clinch River planned for restoration.

Above
Installation of a fence promoted vegetative recovery. Sediments and livestock wastes now are filtered before entering the river and cows are prevented from trampling mussel beds.
FWS photos

restoration program for private landowners. Since its inception, the Partners for Wildlife program has restored almost 10 miles (16 kilometers) of riparian habitat in the Basin. Many other partners have joined the effort, including the U.S. Department of Agriculture, Virginia Department of Game and Inland Fisheries, Virginia Department Conservation and Recreation, U.S. Environmental Protection Agency, and Tennessee Valley Authority.

The program is completely voluntary. Private landowners, mostly farmers, are offered technical assistance in developing a comprehensive plan for improving water quality and wildlife habitat on their property. Once a plan is agreed upon, the involved agencies pool their resources to back up the technical assistance with an offer of financial assistance for the landowner. Projects are selected based on the benefits to water quality, the downstream proximity of viable mussel beds, and the conservation ethic of the landowner. Most of the restoration work focuses on excluding livestock from the waterways by erecting fences and installing alternative watering systems. Landowners are responsible for maintaining the conservationpractices, and the projects are monitored on a regular basis.

With each passing year, the Partners for Wildlife program is growing in popularity in the local communities of the Basin. Everyone has been encouraged by the successes achieved thus far in conserving the regions' natural resources, including Threatened and Endangered species, while preserving the economic stability of local farms.

Bridgett Costanzo is the Partners for Wildlife coordinator for Virginia, and is located in the FWS White Marsh, Virginia, Field Office.

maintenance, and other such activities associated with restoration projects.

In 1994, through voluntary partnerships with private landowners and restoration work on CFSA inventory properties, 54,739 acres (22,526 hectares) of wetlands habitat, 10,518 acres (4,328 ha) of associated upland and native prairie habitat, 189.5 miles (305 kilometers) of riparian habitat, and 9 miles (14.5 km) of in-stream habitat were restored. A total of $8,878,000 in Congressionally appropriated funds were involved in completing this restoration work under 1,619 voluntary landowner agreements and on 249 CFSA tracts. Private landowners and other partners matched FWS funds for restoration projects dollar-for-dollar. In Fiscal Year 1995, approximately $10,303,000 are available to the FWS for habitat restoration activities. Since 1987, the Partners in Wildlife initiative has restored over 256,000 acres (105,350 ha) of wetlands and associated habitats, involving over 12,300 private landowners.

How to Participate

Technical assistance for habitat restoration is available to anyone contacting Partners for Wildlife coordinators. No minimum cost-share is required for funding assistance, although the FWS encourages cost-sharing whenever possible to extend the Federal funds available to the program. Nationwide, the initiative seeks an average cost-share from non-FWS sources of 40 percent. The activities are not necessarily expensive; in some cases, only a few hundred dollars of Partners for Wildlife funds are needed to complete a restoration project. Sometimes the FWS is asked by another project sponsor to become a partner. If the project meets FWS criteria, Partners for Wildlife funds can help.

The Partners for Wildlife program is being implemented in every State through a network of FWS Private Lands Coordinators. For more information about the program, contact the coordinator for your region (see list).

Protecting Cave Resources in Oklahoma

by Erich Langer and Steve Hensley

Caves and the animals that live within them are all too often misunderstood. To most people, they represent an alien world of darkness, inaccessible to humans and inhabited by strange creatures. Popular impressions of many cave animals are based on myth and superstition. Only in recent years has scientific information begun to shed light on the true nature and importance of these organisms. Once given the facts about caves and cave species, landowners and the general public have shown considerable support for the protection of these resources.

Many cave animals, particularly species that are rare or depend on specific environmental conditions for breeding and hibernation, are imperiled at least in part by their vulnerability to disturbance. The loss of critically important cave habitat through human disturbance and vandalism is the most serious threat to most cave species. Additionally, many caves and associated habitats have been damaged by urban and industrial development, reservoirs, highway and utility rights-of-way construction, dumping, and cave commercialization. Aquatic cave species, such as the threatened Ozark cavefish *(Amblyopsis rosae)* and a number of cave invertebrates, are extremely sensitive to ground water quality deterioration from pesticides and other contaminants within cave recharge areas. Collection of cave wildlife also has had an effect on some populations of cave animals.

The Partners for Wildlife program is an excellent vehicle for protecting privately-owned cave resources from disturbance. Thanks to the program, two caves important to the survival of two endangered species—the Ozark big-eared bat *(Plecotus townsendii ingens)* and gray bat *(Myotis grisescens)*—soon will have added protection. The U.S. Fish and Wildlife Service's (FWS) Oklahoma State Office is using the program to develop agreements between land

Today, as farmers, ranchers, and other private landowners face highly complex land use decisions in a changing economic environment, public-private partnerships for conservation are working effectively. The conservation of our wildlife legacy depends largely on our ability to provide effective technical and financial assistance to private landowners who are willing to provide space for wildlife habitat on their land. The assistance provided through the Partners for Wildlife initiative helps to ensure this legacy by encouraging voluntary habitat restoration on private lands.

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Above
gray bat photo by Merlin D. Tuttle Bat Conservation International
Opposite Page
photo by Steve Hensley

owners and a private caving club (Tulsa Regional Oklahoma Grotto).

By the construction of appropriately designed gates within cave entrances, approximately 2,000 feet (610 meters) of mapped passage at one cave and 1,500 feet (460 m) at the other will be protected. The gates are designed by engineers and biologists to allow access by bats and will be monitored to ensure that they function properly. If the gates are not accepted by the bats, they will be modified.

The Partners for Wildlife Program agreement stipulates that participating land owners will allow grotto members and FWS personnel access to the caves on their property, and will agree to protect the caves and the new gates. The grotto will acquire materials, construct the gates, and monitor bat use after construction. As a partner in the project, the FWS is providing $3,000 to purchase gate construction material and is assisting with bat monitoring.

In addition to preserving habitat for imperiled bats, the project will further an ecosystem approach to management by protecting a number of other biological and geological cave resources.

Erich Langer is a public outreach specialist in the FWS Tulsa, Oklahoma, State Office. Steve Hensley, a biologist in the Tulsa Office, specializes in cave species and habitats.

by William E. Lehman

Reconciling Conflicts Through Habitat Conservation Planning

The increasing use of habitat conservation planning to resolve issues involving the "take" of Endangered species and to promote their recovery shows that wildlife conservation and other social needs are not incompatible. Of the various protections in the Endangered Species Act (ESA), the prohibition against take is one of the most fundamental. The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any species[1] federally listed as Endangered or Threatened. Under Federal regulation, this definition is further broadened to include, in certain cases, destruction or modification of endangered species habitat.

The take prohibition applies to almost any activity that would directly kill or harm a listed species, as well as many activities that cause only indirect harm. Unlike some of the ESA's provisions, it also applies to virtually *everyone*—Federal and State agencies, local governments, private landowners, corporations, and individual citizens. It is this inclusive nature that makes the take prohibition so important to endangered species protection.

However, in some cases it may be necessary, even beneficial, to allow limited taking of a Threatened or Endangered species. For example, recovery efforts may require that some members of a species be captured and held in zoos for captive breeding purposes; the California condor *(Gymnogyps californianus)*, whooping crane *(Grus americana)*, and black-footed ferret *(Mustela nigripes)* are good examples. For conservation and other purposes, Congress has enacted provisions under section 10 of the ESA authorizing the Fish and Wildlife Service

to grant "exemptions" or permits for take of federally listed species.

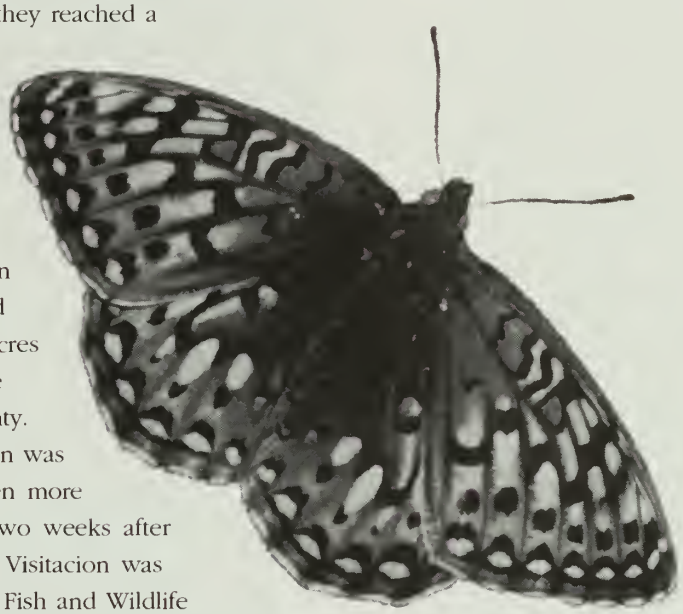
Until 1982, however, no mechanism existed under the ESA to permit take that might occur *inadvertently* during development or similar activities by private landowners. Federal agencies could obtain such authorization through the ESA interagency consultation process, but non-Federal entities, including State and local governments, had no equivalent option. Thus, housing developments, road construction, timber harvest, water projects—in short, many activities essential to economic development—could be halted because of the take prohibition.

In response to this problem, in 1982 Congress amended section 10(a)(1)(B) of the ESA to allow issuance of "incidental take" permits. (The ESA defines incidental take as take that "is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.") This change led to one of the most important and ambitious programs under the ESA—the habitat conservation planning process.

To be granted an incidental take permit, an applicant must first prepare and submit a "conservation plan" detailing, among other things, what the effects of the taking on the species will be and how those effects will be, how they will be mitigated, and how the species will benefit. Now called Habitat Conservation Plans or simply "HCPs," these plans are central to the entire section 10(a)(1)(B) process. HCPs have come to symbolize a fundamental approach to resolving endangered species issues on non-Federal lands, and it may be instructive to review a little of their history.

Congress patterned the HCP process after an unusual set of events that began in the San Francisco Bay area in the mid-1970's. In 1975, Visitacion Associates, a joint-venture development company, proposed to construct 8,500 homes and 2 million square feet of commercial space on San Bruno Mountain, a prominent and relatively undisturbed mountain just south of San Francisco in San Mateo County, California. At the time, San Bruno Mountain was an oasis in a sea of suburban sprawl, containing steep ridgesides, deep ravines, and some 3,400 acres (1,375 hectares) of undeveloped land. In 1976, the San Mateo County board of supervisors adopted a general plan allowing only 2,235 homes to be constructed on the mountain. Visitacion Associates contested the plan in court.

San Mateo County and Visitacion disputed the matter for several years until, in 1980, they reached a settlement that allowed development of one-third of the mountain, in return for which Visitacion donated or sold almost 2,000 acres (810 ha) to the State and County. But the situation was to become even more complicated. Two weeks after the settlement, Visitacion was advised by the Fish and Wildlife Service of a pending proposal to list the calippe silverspot butterfly *(Speyeria callippe callippe)*, which inhabited San Bruno Mountain, as Endangered. In fact, two other listed butterflies—the mission blue *(Icaricia icarioides missionensis)* and San Bruno elfin *(Callophrys mossii bayensis)*—also inhabited San Bruno Mountain, but their classification as Endangered in 1976 had gone unnoticed by the County and Visitacion. It was a classic land-use conflict: economic development versus open space, endangered species versus homes for people, millions of dollars at stake—and Visitacion was prepared for an all-out battle to save its project.



Callipe silverspot butterfly
Original photo by Richard Arnold

Then a remarkable thing happened. Under the leadership of a San Mateo County official, the stakeholders in this conflict—the County, Visitacion Associates, the Fish and Wildlife Service, the

Saving the Scrub

by Dawn Zattau

A unique type of scrub habitat is restricted to coastal dunes on the Atlantic and Gulf coasts of Florida and Alabama, and relict dunes on central Florida's Lake Wales Ridge. The dry, nutrient-poor soils support shrubby vegetation with a sand pine *(Pinus clausa)* canopy. Scrub provides habitat for a number of unusual plant and animal species, including some listed species and listing candidates, but much has been lost to development.

In December 1992, the Brevard County (Florida) Board of County Commissioners voted to pursue development of a county-wide scrub habitat conservation plan in an effort to resolve mounting conflicts between development activities and the conservation of rare wildlife. A six-member Steering Committee was selected and met for the first time in April 1993. A separate Scientific Advisory Committee (SAC) was appointed by the Brevard County Commissioners to provide technical support to the Steering Committee.

The resulting Brevard County Scrub Conservation and Development Plan is nearly finished. When in place, it will preserve much of the remaining scrub ecosystem in Brevard County while freeing other land for

(continuation from previous page)
State of California, and environmental groups—decided to sit down and *negotiate* a solution that would balance all competing interests on San Bruno Mountain. After 2 years of hard bargaining, the result was the San Bruno Mountain Habitat Conservation Plan, approved by the Fish and Wildlife Service in March 1983. Today, travelers driving south on U.S. Route 101 from San Francisco can see San Bruno Mountain in much the same condition it was in 20 years ago. Under the HCP, 80 percent of the mountain and 90 percent of the butterfly habitat is protected, Visitacion has the right to develop the rest, and all parties have assurances that the agreements they reached will be honored.

San Bruno Mountain exemplifies the fundamental HCP approach—negotiation, compromise, and implicit recognition of the interests of all participants. The HCP process is grounded solidly in science and real-world pragmatism, depending not only on good biology but also hard-nosed bargaining. Essentially, the process is a trade-off in which each party pursues its own interests but balances them against the benefits of a successful HCP. It depends on the belief that compromise and accommodation are preferable to gridlock and litigation.

Congress was so impressed with the San Bruno Mountain HCP that it codified the process in the 1982 ESA amendments, stating in its Conference Report that HCPs would "encourage creative partnerships between public and private sectors and among governmental agencies in the interest of species and habitat conservation." Thus, the HCP process is more than just a permitting mechanism, but a program that, at its best, can integrate development activities with endangered species conservation, provide a framework for broad-based conservation planning, and foster partnership and cooperation.

Has the HCP process lived up to its promise? After 1983, the program got off to a slow start. Between 1983 and 1989, only two other HCPs were approved. The Coachella Valley HCP involved the entire range of the Coachella Valley fringe-toed lizard *(Uma inornata)*, a species endemic to dune habitat in the Palm Springs area of southern California. It was another considerable success, resolving intense development pressures in the lizard's key habitat areas. This was followed in 1989 by the Delano Prison HCP in Kern County, California, a smaller plan that successfully resolved endangered species issues on the site of a badly needed State prison.

Between 1990 and 1992, the HCP process began picking up steam, and it is accelerating rapidly. In 1990 and 1991, two short-term permits were issued in Riverside County, California, and Clark County, Nevada, to allow some development in endangered species habitat while protecting other important habitat and promoting research; in the meantime, work proceeded on longer-term HCPs. In 1992, the Simpson Timber Company HCP was approved, allowing timber harvest in 380,000 acres (153,785 ha) of northern spotted owl *(Strix occidentalis caurina)* habitat in northern California while protecting areas critical to the owl. In 1993, the number of permits issued tripled over the previous year, and in 1994 it doubled again. The International Paper HCP was approved in 1993 for 30,000 acres (12,140 ha) of Red Hills salamander range in Alabama, resulting in the protection of 4,500 acres (1,820 ha) of optimal salamander habitat. As of September 1994, the Fish and Wildlife Service had issued 36 permits and 13 permit amendments. In addition, approximately 150 HCPs are in various stages of development, including the South Carolina Forestry Commission HCP, with a plan area of 2 million acres (809,000 ha), the 10,000-acre (4,050-ha) Brevard County HCP in Florida (see accompanying article), the 135,000-acre (54,635-ha) Washington County HCP in Utah, and the 2 million-acre Kern County HCP in California.

One of the keys to the HCP process is its flexibility. HCPs vary enormously in size and scope. Of the 36 permits issued to date, 22 have been for relatively small projects, while the rest have been for regional-scale planning efforts. Another key is creativity. The ESA and its regulations establish basic biological and procedural standards for the program but otherwise allow the creative potential of willing HCP participants to flourish. This is resulting in many innovative approaches to balancing economic activity and wildlife protection. For example, in several HCPs, participants are developing ways to create a financial benefit for landowners who contribute to endangered species recovery. In another, a market-based conservation strategy is being developed that would replace the traditional methods of regulating land-use activity within the habitats of endangered species.

The benefits of a successful HCP effort far outweigh the costs, and the Fish and Wildlife Service is attempting to improve and streamline permit processing requirements. Not surprisingly, the HCP process is beginning to get a lot of attention. Public agencies and the private sector throughout the country are turning increasingly to the HCP process as a means of conserving endangered species habitat in their areas while meeting their growing social and economic needs.

William Lehman coordinates habitat conservation planning issues for the FWS Division of Endangered Species in Washington, D.C.

[1]For the purposes of this article, the term "species" will apply only to animals. The prohibitions against take of listed plants are limited under the ESA to (1) the collection or malicious destruction of Endangered plants on Federal land and (2) removal or damage to listed plants on private or State lands in knowing violation of State law, or in the course of violating a State criminal trespass law.

Florida Scrub Jay. Painting by Luis Agassiz Fuertes.

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development. The plan uses the Florida scrub jay (*Aphelocoma coerulescens coerulescens*), a Threatened bird, as an indicator species; its presence has helped identify important scrub habitat to include within a series of reserves. The protected habitat will protect not only the jay but 20 other species imperiled because of habitat loss.

After examining over 1,000 scrub patches in Brevard County, the SAC developed four alternative reserve designs. All four are biologically equivalent to one another, with each maximizing a particular characteristic. Common to every alternative is a "core" of the most ecologically valuable scrub patches remaining in the county, comprising about 8,000 acres (3,240 ha) of habitat.

The "connectivity" alternative consists of the core habitat with small patches added to maximize the ability of jays to disperse through each subpopulation.

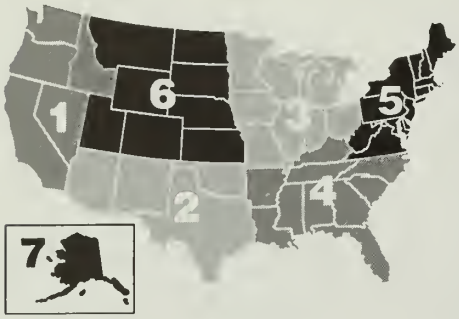
The "habitat quality" alternative consists of the core with small habitat patches added to maximize the quality of preserved scrub patches and scrub jay productivity.

The "restoration" alternative consists of the core with patches added to minimize restoration costs.

The "comprehensive" alternative enhances all three elements of the individual reserves, and is the recommended choice of the SAC. This alternative includes buffers to minimize impacts of stochastic events.

After an economic analysis of each alternative design is complete, the Steering Committee will decide which alternative to place in the county's final Endangered Species Act/ Section 10(a)(1)(B) permit application. We expect a submittal to the Fish and Wildlife Service in 1995. Once an approved plan is in place, growth in Brevard County can proceed with greater certainty, and the scrub ecosystem will have an excellent chance of long-term survival.

Dawn Zattau is the Habitat Conservation Plan coordinator in the Service's Jacksonville, Florida, Field Office.



Region 1

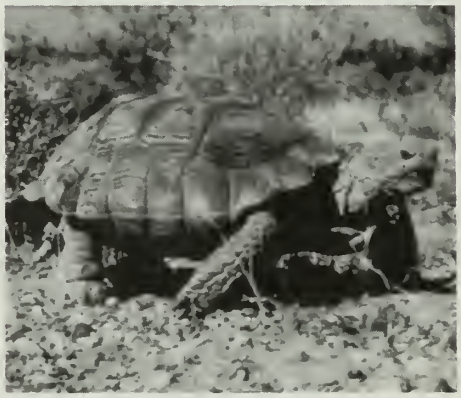
blunt-nosed leopard lizard
photo by Steve Busack

Due to the availability of trucking services and modern highways, Southern Pacific, Tulare Valley, and San Joaquin Valley railroad companies are abandoning short routes in California's Central Valley that historically were used to ship agricultural commodities. Some of the abandoned routes are within the historical range of the San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambilia silus*), Fresno kangaroo rat (*Dipodomys nitratoides exilis*), and giant kangaroo rat (*Dipodomys ingens*). The Fish and Wildlife Service (FWS) is coordinating with the Interstate Commerce Commission on the abandonments, approximately 15 of which have been reviewed for potential impacts to listed species living in or near the railroad right-of-way.

The FWS is working with the California Department of Parks and Recreation and the U.S. Coast Guard to facilitate a transfer of scenic coastal properties for dune restoration and sensitive habitat management by Asilomar State Beach. The dune habitat on these properties harbors several listed plant species, including Menzies' wallflower (*Erysimum menziesii*), Tidestrom's lupine (*Lupinus tidestromii*), beach layia (*Layia carnosa*), and Monterey spineflower *(Chorizanthe pungens* var. *pungens)*. Another listed plant, the Monterey gilia *(Gilia tenuiflora* var. *arenaria)*, and a listing candidate, the California black legless lizard (*Anniella pulchra nigra*), also may occur there. The dunes are degraded and subject to additional disturbance by unregulated human use. Dune restoration efforts at Asilomar State Beach have demonstrated high levels of success for the enhancement of sensitive habitat while allowing compatible human uses.

Region 1 staff visited a kangaroo rat breeding facility at the University of California-Berkeley. The facility, which is in its second year of operation under Dr. Sonja Yoerg, was established to develop captive breeding techniques for the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), and is funded primarily under section 6 of the Endangered Species Act. To avoid risk to this Endangered mammal, the propagation research is being conducted with a non-endangered surrogate species, the Lompoc kangaroo rat (*Dipodomys heermanni arenae*).

In addition to achieving breeding success with *D. h. morroensis*, Dr. Yoerg has been testing various techniques to teach survival skills to captive-bred animals. Section 6 funds will be used in 1995 to capture any Morro Bay kangaroo rats that may remain in the wild and place them in the facility for captive breeding. Potential exists to use the facility to develop propagation techniques for other listed kangaroo rats. The facility is maintaining, but not currently breeding, individuals of another Endangered subspecies, the Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*).



desert tortoise
photo by Ross Haley

The Desert Tortoise Management Oversight Group met in Las Vegas, Nevada, on November 1 to coordinate designation of Desert Wildlife Management Areas (DWMAs) for desert tortoise (*Gopherus agassizii*) conservation. The Technical Advisory Group recommended research priorities and announced its intent to hold workshops on tortoise nutrition and health profiles. Other workshops are planned for population monitoring protocols and fire management. FWS staff from the Las Vegas and Phoenix, Arizona, field offices submitted comments to the Desert Tortoise Council concerning draft guidelines on proper techniques to handle and relocate desert tortoises. When finalized, these guidelines are expected to replace the 1990 desert tortoise handling protocol.

Region 3

Over 7,500 children and their families visited an FWS endangered species booth during an environmental education event at the Mall of America, located in Bloomington, Minnesota. The FWS was one of 25 environmental organizations participating in the 2-day public information event.

In October, Federal and State endangered species coordinators from all Region 3 States convened in Indiana to identify and discuss endangered species issues, priorities, and opportunities for 1995. This annual event is considered vital to the success of Region 3's endangered species program.

Region 5

In keeping with the spirit of the new Interagency Memorandum of Understanding among the Departments of Agriculture, Interior, and Commerce to conserve candidate species, the FWS West Virginia Field Office and the George Washington National Forest have funded a study to identify the range of the Cow Knob salamander *(Plethodon punctatus)* in West Virginia. The recent conservation agreement between the FWS and the George Washington National Forest mainly protected areas in the Virginia portion of the species' native range.

Leroy Koch of the FWS Southeastern Virginia Field Office assisted the Virginia Chapter of The Nature Conservancy in hosting a November 3 workshop for science teachers of Russell County, Virginia. The workshop was held at the Pinnacle State Natural Area Preserve, at the confluence of Big Cedar Creek and the Clinch River, in Russel County, Virginia. Teachers and resource professionals discussed strategies for building awareness among school children for the aquatic fauna of the Clinch River watershed, home to a large number of Threatened and Endangered mussels and fish.

Region 6

Region 6 field staff assisted a contract video crew in documenting FWS efforts on behalf of listed and candidate species. Professional footage, intended for use in news and features programming, was compiled on the bull trout (*Salvelinus confluentes*), fluvial populations of arctic grayling (*Thymallus arcticus*), Wyoming toad (*Bufo hemiophrys baxteri*), greenback cutthroat trout (*Oncorhnchus clarki stomias*), and black footed ferret (*Mustela nigripes*), as well as other species native to short-grass prairie habitats.

Items for Regional News and Recovery Updates are provided by regional endangered species contacts.

Region 1

Hawaiian crow *('alala)* With the recent release of seven chicks from the hacking aviary, the wild population of *'alala* has grown by about 50 percent. Despite this significant increase, the wild population still stands at around 20 individuals. On October 25, the first bird ventured outside the aviary and eventually was followed by the others. Upon their release, the chicks almost instantly began behaving like wild birds, foraging on native plants and searching for arthropods in tree bark. Four of the birds were produced at the State-run Olinda Endangered Species Propagation Facility on Maui. This marked the first time that birds from the captive breeding flock were released into the wild.

Region 5

Virginia big-eared bat *(Plecotus townsendii virginianus)* A census of the 11 known summer colonies by the West Virginia Department of Natural Resources (WVDNR) in June 1994 found a population increase of 7.3 percent over 1993 levels. These sites comprise well over half of the species' known summer colonies. Night vision equipment enabled biologists to tally the bats with minimal disturbance.

In another WVDNR study, 14 lactating Virginia big-eared bats were fitted with radio transmitters and tracked for a 2-week period in late June and early July. The bats traveled up to 6.2 miles (10 kilometers) from the maternity cave to forage for insects. Foraging habitats included old fields, forests, and lightly grazed fields. This study was conducted at Cave Mountain Cave on the Monongahela National Forest. Funding was provided by the FWS, The Nature Conservancy, the Monongahela National Forest, and the West Virginia Nongame Wildlife Fund.

Cheat Mountain salamander *(Plethodon nettingi)* Surveys for this Threatened amphibian conducted by Dr. Thomas Pauley of Marshall University (under a Section 6 contract to the WVDNR) located two new populations. Both sites are within Blackwater Falls State Park in Tucker County, West Virginia. This species is now known from 64 sites in 4 West Virginia counties.

Northern flying squirrel *(Glaucomys sabrinus fuscus)* The State of West Virginia has requested that the FWS review the status of this subspecies to consider reclassifying it from Endangered to the less critical category of Threatened. Although there were only 10 squirrel captures in West Virginia prior to the listing of this subspecies in 1985, survey efforts resulted in 525 captures at 69 sites from 1985-1993. In 1994, surveys conducted by WVDNR, Monongahela National Forest, and West Virginia University biologists located six additional sites in West Virginia. All locations where the squirrel has been found since 1985 are on Monongahela National Forest lands and are protected by the U.S. Forest Service.

Fanshell mussel *(Cyprogenia stegaria)* Pat Morrison, a biologist at the Ohio River Islands National Wildlife Refuge, recently reported collecting a specimen of this Endangered mollusk on the refuge at the head of Neal Island in the Ohio River. The discovery marks the first time this species has been found on the refuge. Fanshell mussels are known from only two other locations in West Virginia.

Region 6

Black footed ferret *(Mustela nigripes)* In October, two introductions of captive-reared black footed ferrets were carried out on the Charles M. Russell National Wildlife Refuge in Montana. Early radio-tracking reports indicated that most ferrets were not dispersing from the black-tailed prairie dog colony on which they were released. Out of the first group of 12 ferrets released October 6, six were killed by predators, the location of one is unknown, and five were doing well and remained within the vicinity of the release site.

Also during October, the Wyoming Game and Fish Department reported that its recent black-footed ferret surveys at the Shirley Basin release site near Medicine Bow revealed an additional four wild born juveniles this year. Ferrets also were reintroduced this year into South Dakota on Badlands National Park.

Grizzly bear *(Ursus arctos)* Region 6 intends to initiate an Environmental Impact Statement (EIS) addressing the potential reintroduction of grizzly bears into the Bitterroot Mountains region of eastern Idaho, one of the largest roadless tracts in the lower 48 States. The Interagency Grizzly Bear Committee considers it good grizzly bear habitat. Grizzlies have been absent from the Bitterroot for nearly 40 years. The EIS process will consider the reintroduction as a "non-essential, experimental" population. A grassroots committee with representation from logging interests and the conservation community has expressed initial support.

Final Listing Rules October/November 1994

Four final rules listing a total of 16 species—15 plants and 1 animal—as Endangered were published by the Fish and Wildlife Service during October and November 1994. Endangered Species Act protection now applies to the following:

Thirteen Hawaiian Plants Twelve plant species endemic to the Hawaiian Islands were listed as Endangered November 10:

Adenophorus periens—an epiphytic fern in the grammitis family (Grammitidaceae);

Bonamia menziesii—a vine in the morning glory family (Convolvulaceae);

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);

Mariscus pennatiformis—a perennial in the sedge family (Cyperaceae);

Neraudia sericea, or ma'aloa—a tall shrub in the nettle family (Urticaceae);

Plantago princeps, or ale—a shrub or robust perennial herb in the plantain family (Plantaginaceae);

Sesbania tomentosa, or 'ohai—a shrub or small tree in the pea family (Fabaceae);

Vigna o-wahuensis—a sprawling annual or perennial herb in the pea family;

Solanum incompletum—a shrub in the nightshade family (Solanaceae); and

Spermolepsis hawaiiensis—an annual herb in the parsley family (Apiaceae).

In a separate November 10 rule, another Hawaiian plant, Mann's bluegrass *(Poa mannii)*, also was listed as Endangered.

Two Puerto Rican Trees A November 25 final rule listed two tree species endemic to the island of Puerto Rico as Endangered:

Eugenia haematocarpa, or uvillo—a small tree in the myrtle family (Myrtaceae); and

Pleodendron macranthum, or chupacallos—an evergreen tree in the family Canellaceae.

Appalachian Mussel The Appalachian elktoe *(Alasmidonta raveneliana)*, a freshwater mussel endemic to the upper Tennessee River system in western North Carolina and eastern Tennessee, was listed November 23 as Endangered.

Listing Proposals October/November 1994

Twelve plant species, all native to California, were proposed by the Fish and Wildlife Service (FWS) October 4, 1994, for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Kelso Creek monkeyflower/FWS photo

Ten Sierra Nevada Plants One proposal addressed 10 plant taxa found in the foothills of the Sierra Nevada in central California. The four most vulnerable plants were proposed for classification as Endangered:

Chinese Camp brodiaea *(Brodiaea pallida)*—an erect herbaceous perennial in the lily family (Liliaceae) with rose-pink flowers;

Mariposa pussypaws *(Calyptridium pulchellum)*— a compact, rosette-forming annual herb in the purslane family (Portulacaceae);

Mariposa lupine *(Lupinus citrinus var. deflexus)*—an erect annual herb belonging to the pea family (Fabaceae) bearing white flowers with pink or lavender tips; and

Kelso Creek monkeyflower *(Mimulus shevockii)*—a desert annual in the snapdragon family (Scrophulariaceae).

Because the other six plants are vulnerable but in somewhat less immediate danger, they were proposed for listing as Threatened:

Rawhide Hill onion (*Allium tuolumnense*)—an erect, herbaceous perennial in the lily family that grows from underground bulbs;

Springville clarkia *(Clarkia springvillensis)*—an annual herb in the evening-primrose family (Onagraceae) that bears lavender-pink flowers;

Carpenteria *(Carpenteria californica)*—an evergreen shrub in the mock orange family (Philadelphaceae) with large white showy flowers;

Greenhorn adobe lily *(Fritillaria striata)*—a slender, herbaceous perennial in the lily family that grows from a bulb and produces one to four fragrant, bell-shaped flowers;

Piute Mountains navarretia *(Navarretia setiloba)*—an erect annual herb in the phlox family (Polemoniaceae) with purple flowers; and

Red Hills vervain *(Verbena californica)*-a perennial herb in the vervain family (Verbenaceae) producing white-blue to purple blossoms.

The 10 proposed Sierra Nevada plants are threatened by habitat damage from one or more of the following: agricultural land conversion, urbanization, logging, overgrazing, off-road vehicle use, mining, insect predation, incompatible fire management techniques, and highway construction and roadside maintenance.

Two San Francisco Plants Two plant species from the San Francisco peninsula also were proposed for listing:

San Francisco lessingia *(Lessingia germanorum)*—a slender annual in the aster family (Asteraceae) that bears heads of lemon-yellow disc flowers. It is known only from five sites on the Presidio (an Army base at the tip of the peninsula) and one site on San Bruno Mountain to the south. Ninety percent of the plant's historical habitat has been lost, and this species was proposed for listing as Endangered.

San Bruno Mountain manzanita *(Arctostaphylos imbricata)*—a low, spreading evergreen shrub in the heath family (Ericaceae) with small, white, urn-shaped flowers. It is used sometimes as an ornamental plant. This species is restricted to five colonies on San Bruno Mountain, and was proposed for listing as Threatened.

The San Bruno Mountain Habitat Conservation Plan gives some protection to the manzanita. But some colonies face various threats, including urbanization, sand quarrying, bulldozing, collection, changes in natural fire cycles, invasions by weedy non-native plants, and the impacts of certain recreational activities.

Contributing to the Endangered Species Bulletin

Because of its increasingly diverse audience, the *Bulletin* is seeking to diversify and expand its coverage of endangered species issues. To be successful, we need your help.

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 success stories and news about recovery (both the development of recovery plans and their implementation). Material is needed on interagency consultations; 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 (703/358-2390) to determine the proper length, focus, and timing of proposed articles. We welcome submissions but 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.

As a general rule, feature articles should be between three and six 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:

- scientific and common names of all species mentioned (listed and non-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 and fax numbers.

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 submitted illustrations.

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_DES), or via Internet at R9FWE_DES.BIM@mail.fws.gov. You may also mail DOS-formatted diskettes to Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 452 ARLSQ, Washington, D.C. 20240. Submissions by FAX can be sent to 703/358-1735 (703/358-2390 to confirm). In all cases, please also mail a double-spaced hard copy.

Printing Schedule

The *Bulletin* is on a bimonthly printing schedule, with six issues per year and an index.

We welcome contributions at any time, but material not received by the "Article Due" date will be held for the next issue.

ISSUE DATE	ARTICLE DUE DATE
May/June 1995	March 1, 1995
July/August 1995	May 3, 1995
September/October 1995	July 3, 1995
November/December 1995	September 1, 1995

On the Web

To assist the ecosystem approach and to reach as broad an audience as possible, FWS has placed several electronic information items on the Internet World Wide Web, and on Internet E-mail. These items include:

- **List of Threatened and Endangered Species, updated monthly;**
- **Lists of Animal and Plant Candidates, as published;**
- **Current Distributions for Listed Species under Fish and Wildlife Service Jurisdiction by State or Territory;**
- **The Endangered Species Act of 1973, as amended through the 100th Congress; and**
- **Species Maps that indicate the number of listed, proposed, candidate, and Category 1 species by state or territory.**

The Fish and Wildlife Service World Wide Web Home Page address is:
http://www.fws.gov/
The Internet E-mail address is:
R9IRMLIB@fws.gov
When using Internet E-mail, type {Send ES Instructions} on the Subject line to receive a list of the retrieval commands for the available information.

BOX SCORE

Listings and Recovery Plans as of January 1, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTED	SPECIES W/ PLANS
MAMMALS	55	252	9	22	338	39
BIRDS	75	153	16	0	244	73
REPTILES	14	65	19	14	112	31
AMPHIBIANS	7	8	5	0	20	10
FISHES	68	11	37	0	116	66
SNAILS	15	1	7	0	23	11
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	19	4	9	0	32	17
ARACHNIDS	4	0	0	0	4	4
ANIMAL SUBTOTAL	322	496	111	36	965	297
PLANTS	422	1	89	2	514	208
GRAND TOTAL	744	497	200	38	1,479*	505**

*Separate populations of a species 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, green sea turtle, and olive ridley 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.

TOTAL U.S. ENDANGERED: 744 (322 animals, 422 plants)
TOTAL U.S. THREATENED: 200 (111 animals, 89 plants)
TOTAL U.S. LISTED: 944 (433 animals, 511 plants)
**There are 416 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.

ENDANGERED Species BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
MARCH/APRIL 1995

FISH AND WILDLIFE SERVICE
VOL. XX NO. 2

International trade in wild animals and plants is a multi-million dollar business. While the Fish and Wildlife Service supports sustainable trade in wildlife, many species throughout the world are being traded at levels their populations cannot support.

Concern about unsustainable trade in wildlife is not new. In 1973, a conference convened in Washington, D.C., to draft the Convention on International Trade in Endangered Species, or CITES—a treaty that regulates international trade in wildlife. Recently, representatives of 118 countries met in Fort Lauderdale, Florida, to celebrate the 20th anniversary of this treaty.

This edition of the Bulletin features news of the November 1994 CITES conference and several law enforcement actions that make the treaty more effective.

Henry Short, FWS

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ENDANGERED Species BULLETIN

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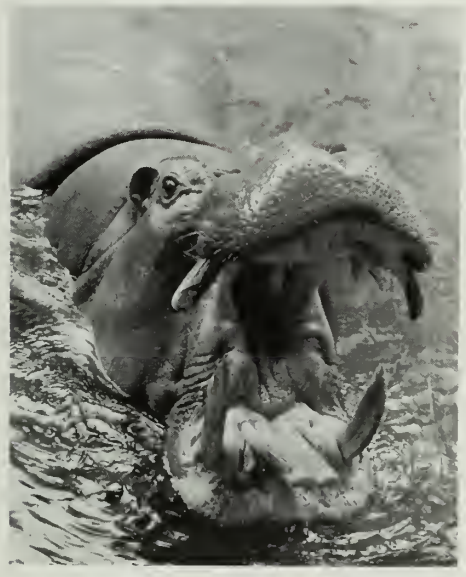


On the Cover
Although the hippopotamus is not endangered, the increasing use of its large teeth as an ivory substitute recently led to international trade controls for this species.

photo by Jessie Cohen, National Zoological Park, Smithsonian Institution

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics relating to endangered species, and may be semi-technical or popular in nature. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, cooperative ventures, changes in species' status, and significant new threats.

Contact the Editor before preparing a manuscript to determine the proper length, focus, and timing of proposed articles. We cannot guarantee publication.

Printed with vegetable-based ink on recycled and recyclable paper. If you do not keep back issues, please recycle the paper, pass them along to an interested person, or donate them to a local school or library.

IN THIS ISSUE

Butterfly Poachers Brought to Justice

One of the largest wildlife poaching cases involving Federal lands, and the first for take of protected butterflies, drew to a close January 30, 1995. Thomas Kral of Tucson, Arizona, entered a felony plea of guilty to a charge of conspiring to violate U.S. wildlife laws. Sentencing is scheduled for April 26, 1995. He faces a maximum penalty of 5 years in prison and a $250,000 fine.

Lange's metalmark
photo by Jerry Powell

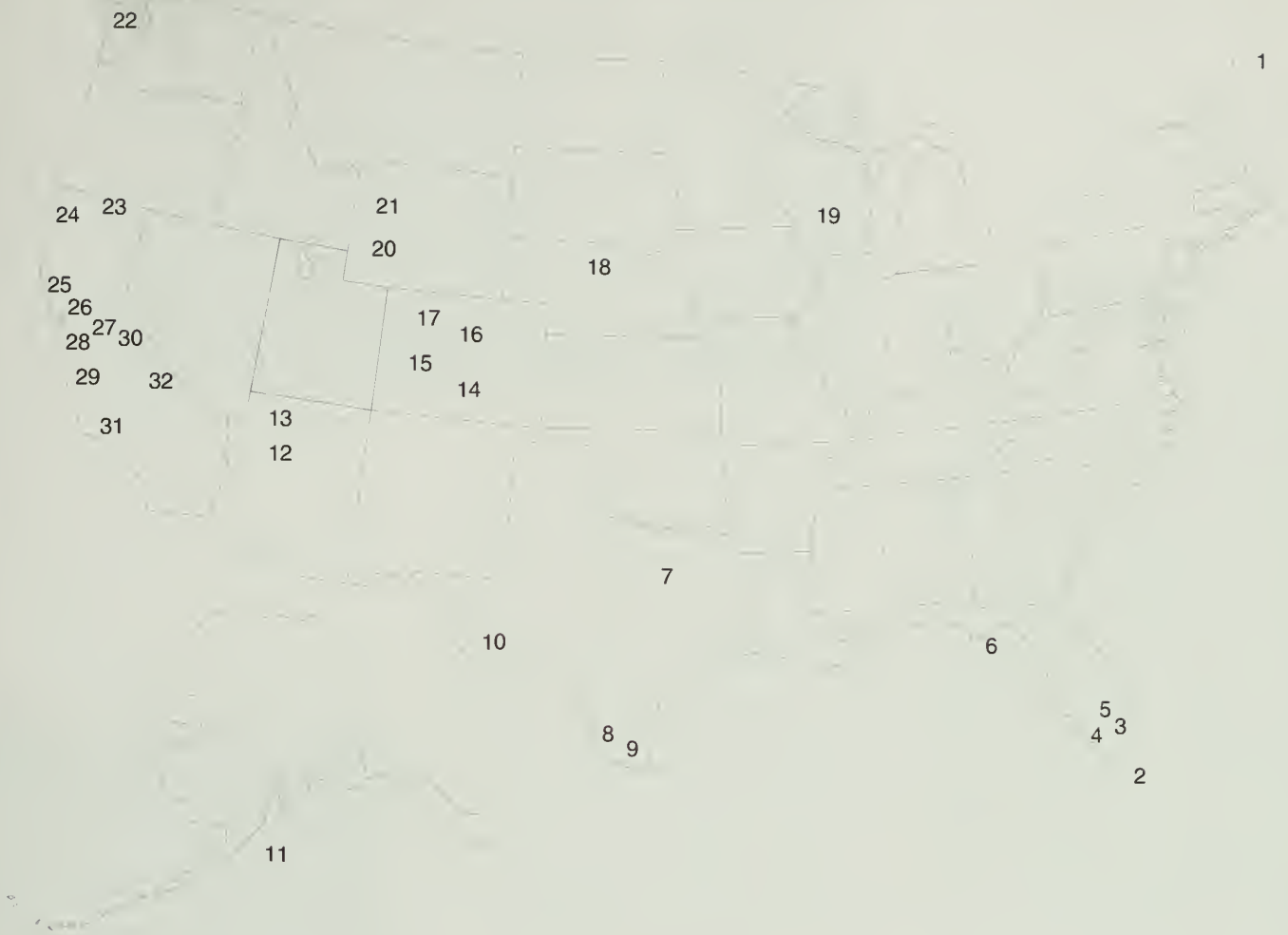
Kral was the last of three men charged in December 1993 with conspiracy to poach and traffick in endangered and other protected butterflies on national parks, national forests, and national wildlife refuges, and to traffick in butterflies taken illegally in Mexico (see map on page 17). The other two men—Marc Grinnell and Richard Skalski—pled guilty in December 1994 to the same charge as Kral and will be sentenced April 5. Both agreed to forfeit their collections of protected wildlife seized under Federal search warrants in 1992. The U.S. Fish and Wildlife Service (FWS) learned from a Stanford University biologist that Skalski was poaching a rare species of butterfly from Grand Canyon National Park. The case was investigated by the FWS and the U.S. District Attorney's office for the Northern District of California.

Adding the number of butterflies to be forfeited by Kral to those from Grinnell and Skalski yields a total of 2,012 butterflies protected by U.S. and Mexico law that were taken or trafficked in during the 9 years the conspiracy operated. At least 210 specimens from taxa protected under the Endangered Species Act were taken or traded for commercial gain. Among the listed species were the bay checkerspot *(Euphydryas editha bayensis)*, San Bruno elfin *(Callophrys mossii bayensis)*, Lange's metalmark *(Apodemia mormo langei)*, mission blue *(Icaricia icarioides missionensis)*, Oregon silverspot *(Speyeria zerene hippolyta)*, and Uncompahgre fritillary *(Boloria acrocnema)*.

According to U.S. Attorney Michael Yamaguchi, the three men kept detailed records of their poaching activities. Labels attached to most of the seized specimens identified the scientific name, the collector's name, and the date and location that the butterfly was taken. Investigators also found letters containing extensive information on techniques used by the collectors to avoid detection and arrest by law enforcement officers. The ruses included posing as amateur botanists or pleading ignorance of wildlife laws. But feigned ignorance ultimately was no

(continued on page 6)

Butterfly Poaching Locations



1. Baxter State Park
2. Key Largo area
3. Crandon County Park
4. Everglades National Park
5. Loxahatchee National Wildlife Refuge
6. Torreya State Park
7. Tyler State Park
8. Bentsen-Rio Grande State Park
9. Santa Ana National Wildlife Refuge
10. Big Bend National Park
11. Kodiak National Wildlife Refuge
12. Grand Canyon National Park
13. Kaibab National Forest
14. Pike National Forest
15. Uncompahgre National Forest
16. Rocky Mountain National Park
17. Arapaho National Forest
18. Valentine National Wildlife Refuge
19. Necedah National Wildlife Refuge
20. Shoshone National Forest
21. Bridger-Teton National Forest
22. Olympic National Park
23. Tule Lake National Wildlife Refuge
24. Del Norte County area
25. Point Reyes National Seashore
26. Golden Gate National Recreation Area
27. Antioch area
28. San Francisco, San Bruno areas
29. Morgan Hill area
30. Yosemite National Park
31. El Segundo, Palos Verdes areas
32. Death Valley National Monument

MEXICO Locations (not Shown):

SONORA
- Hermosillo
- Guaymas
- Rio Yaqui
- Tecoripa

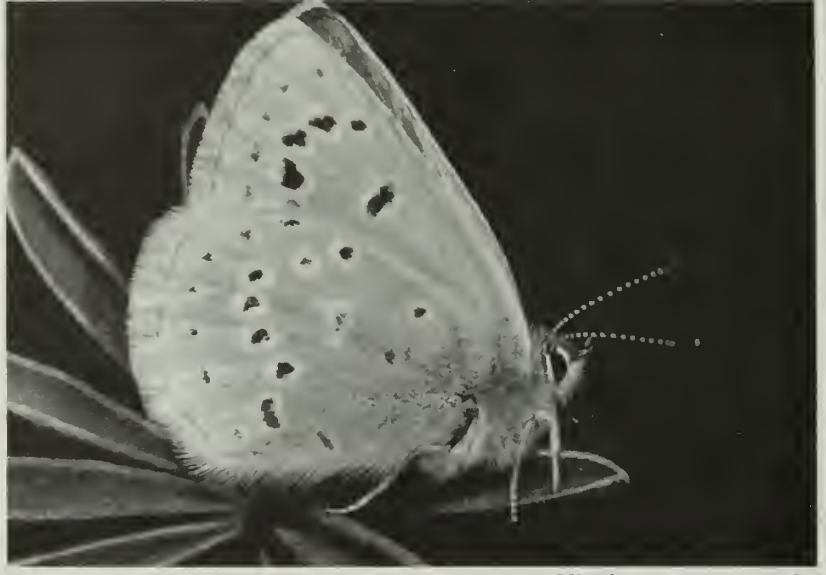
DURANGO
- Durango

Excerpts from correspondence cited in the indictments:

"I plan on really cleaning house on Rocky Mountain Butterflies next year. Am bringing about 20,000 envelopes & I expect to fill them all up! About the only way to get rare material & lots of it is to take a lot of time off & collect & that's just what I do."

"I'm one of relatively few people who knows exactly where all the rare stuff is found & can readily get material. In most cases, I have to poach the material from protected parks."

"...Technically, it is against the law to collect in the Yukon and N.W. Territories...But of course you know that laws are made to be broken so don't pay any attention to laws. Just be prepared to talk your way out of situations & and be as inconspicuous as possible..."



Mission blue butterfly
photo by Larry Orsak

(continuation from page 4)

defense; some of the letters specified in the indictments were signed "yours in crime" or "yours in poaching."

These are "egregious" matters, Yamaguchi said, adding that evidence showed the poachers targeted rare species found only on Federal lands or otherwise protected by law. "Their rarity gave these national treasures special value prized by irresponsible collectors."

The U.S. Attorney's office is soliciting comments from the public and conservation organizations on their interest in this case. These comments will be forwarded to the judge prior to sentencing. Comments should be sent to Mr. Lee Altschuler, Assistant U.S. Attorney, San Jose Branch Office, 280 South First Street, Suite 371, San Jose, California 95113.

Pawnee montane skipper
photo by Paul Opler

Bay checkerspot
photo by Paul Opler

Operation Renegade Targets Bird Smuggling

Operation Renegade, a continuing investigation into the illegal trade in protected birds, led to a 15-count indictment in late 1994 against parrot expert Tony Silva of Monroe Center, Illinois, his mother, and two other individuals. The four were charged with conspiring to smuggle more than $1.3 million worth of exotic birds into the United States.

If convicted, Silva faces a combined maximum prison term of 45 years and a maximum fine of $2.5 million. His mother faces a combined maximum prison term of 50 years and a total fine of up to $2.75 million. The remaining co-defendants each face a combined maximum prison term of 5 years and a fine up to $250,000.

The indictments allege violations of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and U.S. laws, including the Endangered Species Act and the Lacey Act (which prohibits the import of wildlife taken illegally in other countries). Two of the defendants also are charged with violating U.S. Department of Agriculture quarantine requirements, thus posing a threat to the domestic poultry industry.

According to the charges, Silva, his mother Gila Daoud of Riverside, Illinois, and co-conspirators Gisela Caseres from Asunción, Paraguay, and Hector Ugalde from Miami Beach, Florida, engaged in smuggling various species of highly protected birds, including at least 186 hyacinth macaws *(Ara hyacinthinus)*. Each hyacinth macaw can bring from $7,000 to $15,000 through legitimate retail sales. This species occurs naturally in Bolivia, Brazil, and Paraguay, where only 2,000 to 5,000 are believed to remain in the wild. Among the other species said to be involved was the vinaceous amazon *(Amazona vinacea)*, which is considered virtually priceless. Daoud was charged with assisting her son in his smuggling operations. She also was charged with smuggling an elephant ivory tusk and a parrot-feathered headdress into the U.S. Those items were discovered in her home as law enforcement agents executed search warrants.

From August 1989 through January 1992, while Silva was curator of birds at Loro Parque, Tenerife, in Spain's Canary Islands, Daoud allegedly followed her son's direction and managed smuggling activities in the United States.

In the co-defendants' indictments, Caseres is alleged to have supplied Silva and Daoud with most of the parrots smuggled during this conspiracy, and Ugalde is allegedly responsible for arranging the illegal off-loading of 50 hyacinth macaws in Mexico and smuggling them into the U.S.

Operation Renegade is the code name for this continuing international probe, which so far has led to the convictions of 30 people for taking part in parrot smuggling and related wildlife law violations.

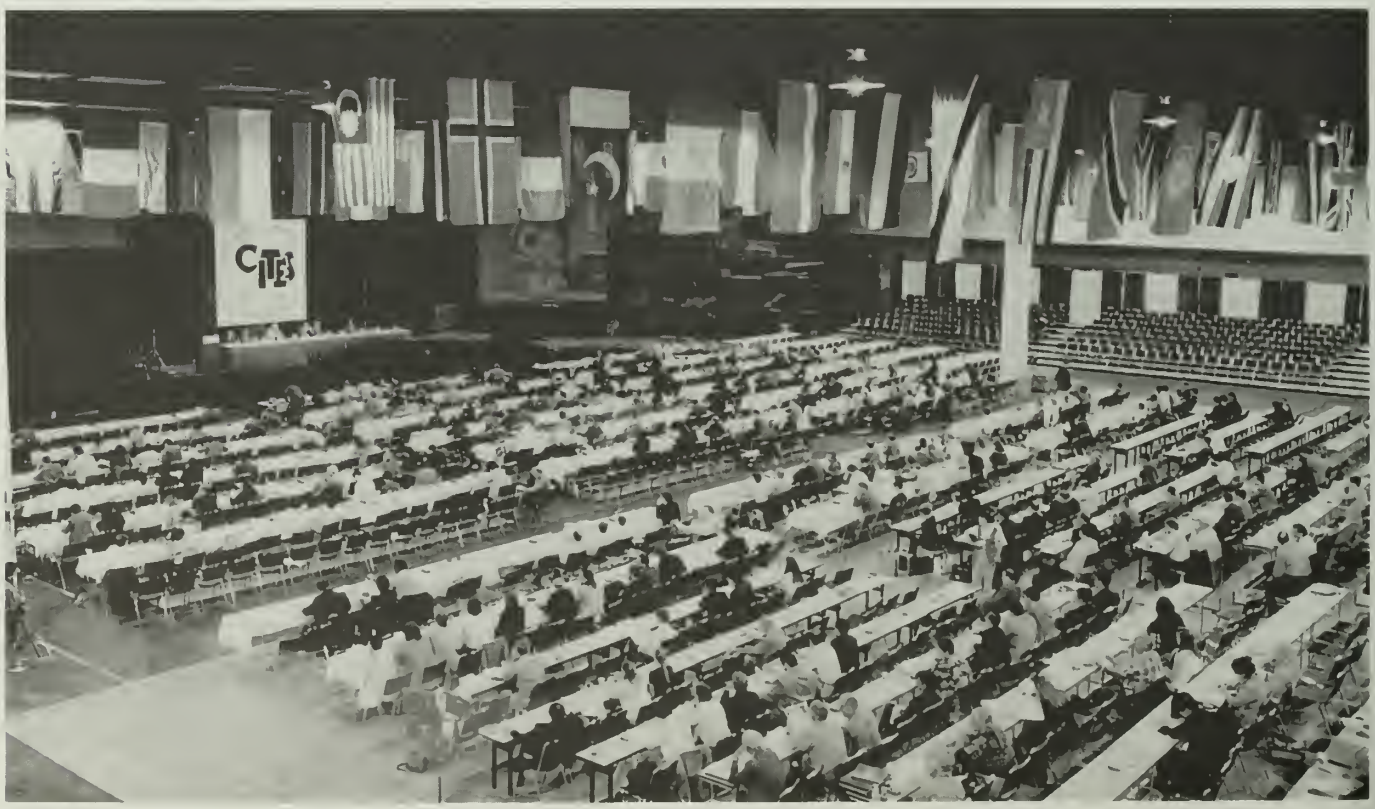
Reports indicate that as many as 90 percent of smuggled parrots perish before reaching their final destination.

Vinaceous amazon
FWS photo

by Susan S. Lieberman

Improving International Controls on Wildlife Trade

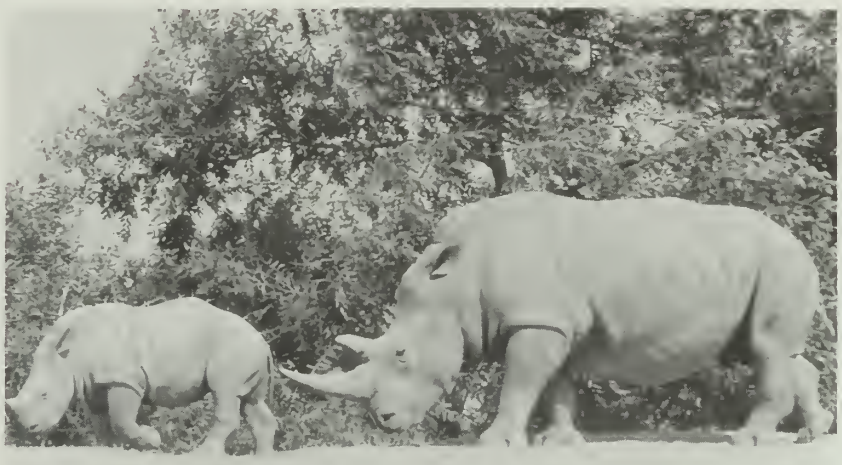
The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international treaty designed to control trade in certain animal and plant species that are, or may become, threatened with extinction. In recognition of the twentieth anniversary of CITES and our nation's commitment to endangered species conservation, the United States hosted the ninth meeting of the Conference of the Parties (COP9) to CITES November 7-18, 1994, in Fort Lauderdale, Florida.



Participation at COP9 set records. Among the attendees were delegates of 119 Party countries, 221 non-governmental observers, and representatives from several non-party governments. Delegates from around the world also were able to visit the many national parks and wildlife refuges in South Florida, and gained useful first-hand knowledge of endangered species conservation in the U.S. Despite the distractions of a major tropical storm and the national elections, the sessions were extremely productive.

After spirited discussion, the Parties adopted 25 resolutions and made 8 formal decisions on a broad range of CITES implementation and enforcement issues. The important, interesting, or controversial issues addressed at COP9 included:

✧ ***Trade in rhinoceros specimens*** Most rhinoceros populations in Asia and Africa are imperiled by the continuing trade in rhino horn and other parts for use in traditional Asian medicines. After discussing the implementation of trade controls in China, Korea, and elsewhere, the Parties adopted a resolution on this critical issue. Among several provisions, the resolution: urges all Parties to adopt and enforce effective laws to reduce the illegal rhino trade; asks for greater international cooperation in law enforcement; appeals for donations to fund range states' rhino conservation plans; and advocates educational outreach programs to eliminate the demand for rhino parts and derivatives in traditional medicines.



✧ ***Trade in tiger specimens*** Tigers also face extinction due to poaching and illegal trade in parts for use in traditional Asian medicines. (See features in *Bulletin* Vol. XIX, No. 3.) Continuing problems with the enforcement of existing trade restrictions led the Parties to adopt another resolution that advocates stronger law enforcement, promotes educational outreach to reduce demand for tiger parts, and urges all range states to join international conservation programs (including the Global Tiger Forum).

In support of CITES efforts, the U.S. is involved in bilateral discussions with importing countries, particularly in Asia, in an effort to improve CITES enforcement and halt the illegal international trade in tiger and rhino parts. The passage of the Rhinoceros and Tiger Conservation Act of 1994 also will allow the U.S. Fish and Wildlife Service to assist range states in Asia and Africa for the protection of their rhinoceros and tiger populations.

✧ ***Illegal trade in whale meat*** International trade in whale meat is prohibited under the International Whaling Commission (IWC) as well as CITES, although some trafficking still occurs. The U.S. submitted a discussion paper on this issue, leading to a resolution that recognizes the work of the IWC, urges CITES Parties to investigate illegal trade in whale meat, and encourages the sharing of trade information between the IWC and CITES.

CITES Appendices

CITES regulates international trade in plants and animals to varying degrees, depending on the species' biological status and vulnerability to commercial exploitation. Three appendices to the Convention identify how much protection is provided to each species. Appendix I lists plants and animals 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; export permits are based on a number of findings, including scientific determinations that trade will not be detrimental to the species. Appendix III lists species that individual CITES Parties identify as subject to domestic regulations for the purpose of restricting or preventing exploitation. Permits or certificates or origin are required for trade in Appendix III species.

Above
White rhinoceros
photo by Ron Singer

Opposite page
CITES Convention, November 1994
photo by Terry Adams, NPS

✧ ***Shark products trade*** Concern is growing that international trade in shark products may be detrimental to shark populations, which are not listed in the CITES Appendices. Because of insufficient data on the effects of this trade, the U.S. submitted another discussion paper. As a result, the Parties adopted a resolution directing the CITES Animals Committee to prepare a report on the status of sharks and the effects on their populations from international trade. This report will be considered in 2 years at COP10. The resolution also requests the Food and Agriculture Organization of the United Nations to submit information to CITES on impacts of the shark trade.

✧ ***Timber Trade*** The parties decided to establish a working group to address CITES implementation issues for conservation of heavily traded, commerically valuable timber species, such as mahogany. Members of the working group will include representatives of both consuming and range states. They will examine not only issues relating to tropical forests, but boreal and temperate forests as well.

✧ ***CITES Enforcement*** The effectiveness of CITES is only as good as its enforcement, which requires a commitment to continuing international cooperation. The U.S. strongly supported the establishment of a Law Enforcement Working Group to provide a venue for information sharing and training in enforcement, critical elements so lacking in many countries. Unfortunately, the COP did not establish such a group, due in part to issues of confidentiality and sovereignty. The enforcement resolution the Parties adopted does contain recommendations to strengthen the law international enforcement effort at the CITES Secretariat level.

photo by Jessie Cohen, National Zoo Park, Smithsonian Institution

✧***New Criteria for Amending Appendices*** At the 1992 CITES Conference in Japan, the Parties voted to strengthen CITES by undertaking a revision of the 1976 criteria for listing species on Appendices I and II. Several different approaches were prepared for consideration at COP9. After extensive discussion, in which the U.S. took a leadership role, the Parties adopted new listing criteria. They decided against rigid numerical thresholds applicable to all taxa, and instead adopted criteria that are scientifically-based, yet flexible.

Changes to the CITES Appendices

The Parties considered more than 110 proposals to amend the CITES Appendices, many of which passed and became effective February 16, 1995. Some changes of particular interest include:

✧***Hippopotamus*** *(Hippopotamus amphibius)* Although the hippopotamus is not endangered, populations have been declining in recent decades. Trade in its large teeth as an ivory substitute increased sharply after the ban on international trade in African elephant *(Loxodonta africana)* ivory. In order to monitor and control the trade in hippo teeth, the Parties voted to add this animal to Appendix II.

✧ ***Box Turtles*** *(Terrapene* spp.*)* The U.S. and the Netherlands proposed adding all box turtles to Appendix II (except *T. coahuila*, which is already on Appendix I)

because of increasing trade in these species and information on declines in box turtle populations. (See feature in *Bulletin* Vol.XIX, No. 5.) U.S. Fish and Wildlife Service data show that at least 20,000 box turtles per year were exported in 1992 and 1993, leading to serious concern as to whether the species can sustain this level of trade. The proposal to add box turtles to Appendix II was adopted by consensus.

A listing in CITES Appendix II will allow the Fish and Wildlife Service to assess the impacts of trade on box turtles, and will facilitate coordination of enforcement efforts between the States and the Service. In order to export box turtles from the U.S., a permit must be issued by OMA. Before such a permit can be issued, the Service is required to determine that the export will not be detrimental to the survival of the species and that the specimens were obtained legally.

✧ ***White Rhinoceros*** *(Ceratotherium simum simum)* South Africa's proposal to transfer its population of this species from Appendix I to Appendix II was amended to allow only trade in live animals and sport hunted trophies. The trade in live animals will be to "appropriate and acceptable destinations." The amended proposal, with the additional provision that the downlisting would be reviewed at COP10, was approved by a vote of 66 to 2.

✧ ***Tarantulas*** *(Brachypelma* spp.*)* The U.S. proposal to place this genus of Mexican and Central American tarantulas, known for its species with distinctive reddish markings, on Appendix II was supported by Mexico and Central American countries. One species, the red-kneed tarantula, already was on Appendix II. These tarantulas are extremely popular in the pet trade, especially in the U.S., and law enforcement agents have seized smuggled shipments numbering in the hundreds of specimens. (See related article in this edition of the *Bulletin*.)

A complete list of the plants and animals transferred onto, within, or off the CITES appendices is available from the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Room 420C, Arlington, Virginia 22203. In addition to these changes, several nomenclatural changes were adopted. The Service is republishing the entire appendices with new names and previously used species synonyms.

Proposals Not Adopted

Many proposed changes in the CITES appendices were not adopted but generated valuable and often lively discussion. Some notable examples include:

✧ ***African Elephant*** *(Loxodonta africana)* Two proposals were submitted to transfer African elephants from Appendix I to II. All African elephant populations were placed on Appendix I at the 1989 CITES meeting in Switzerland (see *Bulletin* Vol. XV, No. 5) due to the threat posed by poaching to supply the uncontrolled international trade in elephant ivory. South Africa submitted a proposal to transfer its elephant population to Appendix II and allow trade in non-ivory parts (e.g., hides). After most elephant range states opposed the proposal, it was withdrawn by South Africa. Although the U.S. believed the South African proposal was biologically sound and would not stimulate poaching, the U.S. indicated it would have abstained if the issue had come to a vote, in deference to most elephant range states.

photo by Henry Short

Appendix II to allow the sale of stockpiled ivory. This proposal was withdrawn after Sudan acknowledged that its proposal was not comprehensive enough to meet the biological and trade criteria already specified by CITES. The range states instead decided to review the issue of ivory stockpiles throughout Africa, with the cooperation of the IUCN African Elephant Specialist Group, prior to COP10. All African elephant populations remain on Appendix I.

✧ ***Minke Whale*** *(Balaenoptera acutorostrata)* A proposal by Norway to downlist the northeastern and central north Atlantic stocks of this species from Appendix I to Appendix II stimulated considerable debate. The Parties raised concern about the credibility of current population estimates and renewed the longstanding CITES support for the whaling moratorium imposed by the International Whaling Commission (IWC). Norway then revised its proposal to postpone downlisting until evidence suggests that the whale's populations are at harvestable levels, but the revision was rejected by a vote of 48 to 16.

"The eyes of the world" were watching last November as delegates from 119 countries met in Fort Lauderdale, Florida, to evaluate international trade in vulnerable animals and plants. Also attending the ninth biennial CITES conference were 221 observers from non-governmental organizations, including the World Wildlife Fund, which produced the poster illustrated below.

The center and right photos illustrate an exhibit by the Fish and Wildlife Service and the National Park Service showing illegally traded items confiscated at U.S. ports of entry. Included in the exhibit were examples of the CITES-related activities of other agencies, such as the National Marine Fisheries Service and the Animal and Plant Health Inspection Service.

The rhinoceros mounts, featured at the center of the exhibit, are believed to

✧ ***Edible-nest Swiftlets*** *(Collocalia* spp.*)* Italy proposed listing this group of swifts, whose unusual nests--made largely from the birds' saliva--are edible and in great demand as a delicacy in eastern Asia and some Pacific islands. The proposal was withdrawn in favor of a resolution to hold a workshop on sustainable use of edible-nest swiftlets.

✧ ***Bigleaf Mahogany*** *(Swietenia macrophylla)* Although a proposal by the Netherlands to list this species in Appendix II was supported by a vote of 50 to 33, the margin was 6 votes short of the two-thirds necessary for adoption by the COP.

Those of us in the Fish and Wildlife Service involved with CITES are committed to the full implementation and enforcement of this important treaty. We also are breathing a sigh of relief that the hard work of preparing to host a CITES conference is behind us. As we look forward to COP10 in 2 years, we remember the important goals embodied by the CITES treaty, which states that "... 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."

Dr. Lieberman is Chief, Branch of Operations, in the U.S. Office of CITES Management Authority, Washington, D.C.

have been legally hunted and imported into the U.S. prior to the animal's listing on CITES Appendix I. However, the price of rhino horn subsequently increased so much that, in 1990, the owner of the mounts offered them for sale at about $20,000 per pound of horn. A prospective buyer wanted to inspect the horns before he made an offer. When the owner delivered a horn for inspection, he was assaulted and locked in the trunk of his car. The prospective buyer then attempted to steal all eight rhino mounts, but the owner was able to escape and report the incident to the authorities. The rhino mounts were abandoned to the Fish and Wildlife Service in 1991.
photos by Terry Adams/ National Park Service

Tarantula Trafficking

Tarantulas in the genus *Brachypelma* are in great demand for the pet trade. The attractive reddish markings of these large, hairy spiders, their relatively docile nature, and the ease of care draw interest from people searching for a pet with exotic appeal. But the high level of trade in wild-caught adult tarantulas is raising concern about the long-term survival of these colorful species.

All tarantulas in the genus *Brachypelma* are ground-dwelling, burrowing spiders. They grow slowly, and males are mature for only one breeding season. In smaller populations, removal of the easily captured males can entirely prevent reproduction for that year. Removing adult females, egg sacs, or immature specimens also has long-term consequences on wild populations. Although up to 1,000 eggs may be produced in each egg sac, the number that hatch is much smaller, and losses of young spiders through dispersal and early development may approach 99 percent. Captive propagation of *Brachypelma* species in numbers high enough to supply the pet trade is not considered either biologically or economically feasible. Traded specimens are almost always wild-caught adults, which could threaten the survival of these species.

A California reptile and spider dealer was sentenced in November 1994 to 8 years and 9 months in Federal prison for smuggling protected tarantulas from Mexico into the United States for sale as pets. U.S. Attorney Nora Manella said the sentence is one of the longest ever handed out for a violation of U.S. wildlife law.

Stephen Earl Cook of Long Beach was convicted in June 1994 of illegally importing, transporting, and selling more than 600 Mexican red-kneed tarantulas *(Brachypelma smithi)* in violation of the Lacey Act. This act prohibits the importation of wildlife taken, transported, and acquired in violation of international or foreign law. The red-kneed tarantula is protected by Mexican law, and has been on CITES Appendix II since 1985.

red-kneed tarantula, shown here actual size
National Fish and Wildlife Forensics Laboratory photo

Cook purchased the tarantulas in Colima, Mexico, the only place where they naturally occur, from a tarantula hunter who sold them to him for $3 each. Cook stuffed them into small deli containers, placed them into suitcases, and drove them across the border. Once back in Long Beach, Cook sold the tarantulas at reptile shows, to private individuals, and to wholesale dealers for $30 to $40 each. The ultimate retail value of this colorfully-marked species is as high as $200 to $300 per tarantula.

In January 1994, Cook sold 12 Mexican red-kneed tarantulas to an undercover law enforcement agent of the U.S. Fish and Wildlife Service, and gave the agent advice on how to mislabel the spiders as another species on airway bills. A month later, Cook attempted to sell another 215 red-kneed tarantulas to an individual working with the Arizona Game and Fish Department.

Dr. Robert Wolff, one of the world's leading authorities on tarantulas, testified at the trial that collecting such a large number of this species from the wild greatly jeopardized the local population. He also told the jury that tarantula venom is being studied in conjunction with cures for Alzheimer's and Parkinson's disease for its ability to quickly enter the brain. If certain types of tarantulas are hunted to extinction, he said, potential cures or links to the cures of these diseases might perish with the spiders.

In order to monitor and control the trade in these animals, all tarantulas in the genus *Brachypelma* recently were added to CITES Appendix II.

New Clues in Map Turtle Decline

by Linda LaClaire

Research conducted by R. A. Seigel and R. J. Brauman through the Mississippi Museum of Natural Science has provided new data on the species' ecology, including data indicating that the turtle's reproductive biology may be a contributing factor.

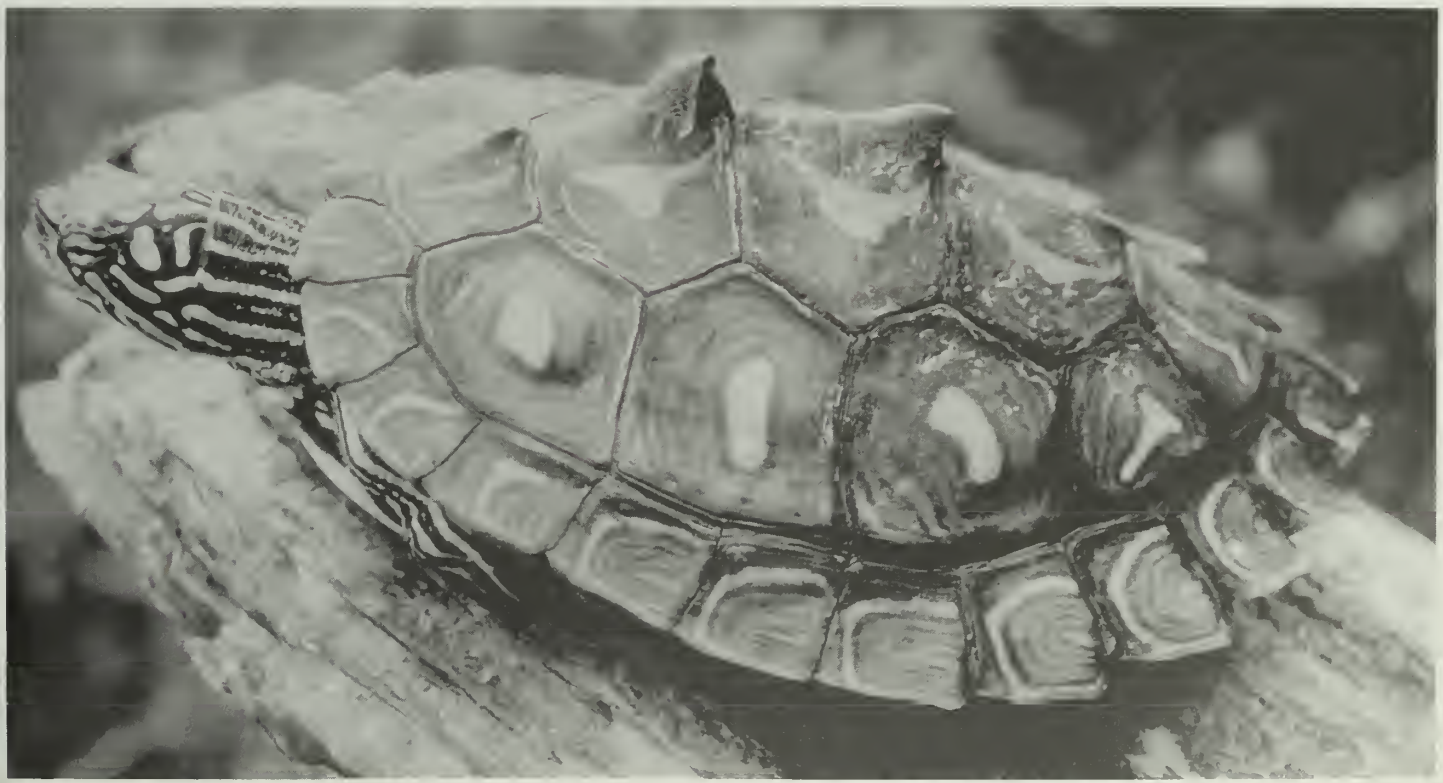
Nesting studies indicated that most (94 percent) map turtles nest on sandbars, although nests also were found in clearings along river banks. Of the 117 adult-sized females examined, only 26 (22.2 percent) were gravid. The data suggest that fewer than half of the females in the study population produced eggs in 1993, indicating a much lower reproductive frequency than other map turtle species. Moreover, radiographs of 23 turtles revealed a mean clutch size of 4.96 (with a range of 3 - 9), again a much lower level than produced by most other map turtles.

Nests also were monitored to determine hatching success and predation rates. Of the 115 map turtle nests monitored, only three produced hatchlings, for a total of only eight hatchlings for the nesting season. Eighty-four percent of mortality was predation and the most obvious predator is a bird, the fish crow *(Corvus ossifrogus)*.

The reproductive traits of low reproductive frequency, relatively low clutch size, and low proportion of successful nests may have contributed to the decline. A second year of study is being conducted.

Linda LaClaire is a biologist in the FWS Jackson, Mississippi, Field Office.

The yellow-blotched map turtle (Graptemys flavimaculata) is an attractive, distinctively marked reptile with an olive to light brown carapace and a bright yellow or orange blotch on each plate shield. This aquatic species is restricted to the Pascagoula River system in southeastern Mississippi. it was listed in 1991 as Threatened after declining or even disappearing from areas where it once occurred in abundance. The reasons cited for the decline were habitat modification (e.g., channel dredging), water pollution, and over-exploitation to supply the pet trade.
photo by Robert Jones



A Symbol of Wilderness Returns

The gray wolf *(Canis lupus)*, a species that for many people is the ultimate symbol of wilderness, has reclaimed an important part of its former range. On January 13 and 14, 1995, eight gray wolves were brought to temporary holding pens at Yellowstone National Park and four were released in central Idaho. They were the first to be reintroduced in an ongoing effort to restore the species, which was exterminated from the two areas more than 60 years ago. On January 20, they were joined by another 17 wolves; 6 went to Yellowstone and 11 were released in central Idaho.

Gray wolves were exterminated from the region by the late 1920's, and now are protected under the Endangered Species Act in the lower 48 States. The reintroduction program is a cooperative effort involving the U.S. Fish and Wildlife Service (FWS), National Park Service, and U.S. Department of Agriculture (Forest Service and Animal Damage Control program). All of the wolves were captured in west-central Alberta with the assistance of the Alberta Department of Forestry, Lands, and Wildlife and local trappers.

This is the first season of a 3- to 5-year effort. The goal is to restore the gray wolf by establishing 10 breeding pairs in each of the three designated recovery areas (Yellowstone, central Idaho, and northwestern Montana) by the year 2002, at which point the protection of the Endangered Species Act should no longer be necessary. About 75 wolves already are present in northwestern Montana, but biologists estimate natural recovery (without reintroduction) throughout all three areas would take until the year 2025.

All wolves reintroduced in Yellowstone and central Idaho are designated "non-essential, experimental" under the Endangered Species Act. Such a designation allows Federal, State, and tribal resource managers and private citizens more flexibility in managing the new wolves. Wolves that prey on livestock will be removed and, if necessary, destroyed. Ranchers will be able to kill wolves they see in the act of preying on their livestock. Land use restrictions would not be necessary.

Two wolf packs, one numbering six animals and the other five, are being held at Yellowstone in separate 1-acre enclosures, where they will acclimate to the area before being released. An adult female wolf and her female pup have been placed in a third pen with an adult male, and biologists hope the animals will breed this winter. The Yellowstone wolves are doing well and appear to be socializing. The timing of their release will be determined by National Park Service biologists on the basis of the wolves' behavior.

In Idaho, wolves from various packs were released directly into the wild. The first group included one adult male, one adult female, one subadult male, and one subadult female. On January 20, another 11 young adult wolves were freed in the Frank Church-River of No Return Wilderness. Most of the Idaho wolves are doing well. Although two shortly moved into Montana, most have remained much closer to the release area than expected.

Unfortunately, a subadult female from the second Idaho group was shot to death shortly after its release, while allegedly feeding on a calf it had killed. Under the rules of the reintroduction program, it is legal for ranchers or their agents to kill wolves that are in the act of taking livestock on their private property. In this case, however, the rancher who reported finding the wolf denies having shot it. Therefore, the

FWS has concluded that the take of this wolf is illegal, and law enforcement agents will pursue the case. Defenders of Wildlife, a private organization that compensates ranchers for livestock taken by wolves, has offered the owner the full market value the calf would have brought at sale this fall if final investigations determine the calf was killed by the wolf.

Another wolf, a naturally dispersing animal from Montana or Canada, was killed in January during routine predator control activities by the USDA Animal Damage Control program. The incident occurred in the northwest corner of the Idaho panhandle, outside of the experimental population area. The wolf died from an M-44 "coyote getter," which shoots cyanide into the mouth of animals that trigger the device. Another wolf apparently is in the area, and this case also is under investigation.

The remaining 14 wolves that were released in central Idaho are not moving as far from the release site as might be expected and are doing well. An adult male and female have been travelling together, which is particularly hopeful since breeding occurs in late February. The Yellowstone wolves also are doing better than expected. They will be released from the acclimation pens later this spring if they continue to show progress, or sooner if needed to maintain their good health.

Although unfortunate, these two wolf deaths will not have a serious impact on the success of the recovery effort. According to the environmental impact statement prepared for the program, biologists expect that up to a third of the released wolves will be lost. Wolf populations in northwestern Montana have been expanding about 22 percent annually over the past 8 years despite losing about 6 percent of the wolves each year. The Montana populations have had only minor imports on livestock operations.

NPS photo

Region 1

Bonneville cutthroat trout *(Oncorhynchus clarki* ssp. *utah)* A conservation agreement was signed for this listing candidate in the Thomas Fork drainage of the Bear River in Idaho. While the agreement covers only 10 percent of the fish's range in Idaho, it is significant in that the Caribou Cattlemen's Association and the Idaho Soil Conservation Commission were signatories, as were the U.S. Forest Service and Idaho Department of Fish and Game. The agreement sparked the Department of Fish and Game to draft a conservation strategy for the rest of the species' range in Idaho. If approved, this will set the stage for habitat to be restored on private, State, and public lands.

Steamboat buckwheat *(Eriogonum ovalifolium* var. *williamsiae)* The Fish and Wildlife Service (FWS) Nevada Field Office has distributed copies of a draft recovery plan for the Steamboat buckwheat, listed as endangered since 1986. This plant occurs only in the Steamboat Hills of southern Washoe County, Nevada, on soils derived from hot spring deposits. Its habitat is subject to disturbance from such activities as geothermal resource development, commercial and industrial construction, highway expansion, and off-road vehicle travel.

Southern sea otter *(Enhydra lutris nereis)* Biologists from the FWS Ventura, California, Field Office, the National Biological Survey, and the California Department of Fish and Game conducted a sea otter survey at San Nicolas Island the week of December 12. Sixteen independent sea otters and one dependent pup were counted. The otters at San Nicolas Island continue to produce pups but recruitment of juvenile otters into the adult population is uncertain. This count represents the highest number of otters found at San Nicolas Island since March 1994.

Desert tortoise *(Gopherus agassizii)* FWS staff from the Reno and Las Vegas offices attended a meeting on desert tortoise adoption programs in Nevada. Representatives from Nevada Division of Wildlife, Clark County, Southern Nevada Environmental Consultants, and desert tortoise adoption programs also were in attendance. The purpose of the meeting was to discuss public adoption of desert tortoises removed from construction projects in association with section 7 consultations or Clark County's 10(a)(1)(B) incidental take permit. Problems discussed include escaped tortoises, temporary holding facilities, disease transmission, captive reproduction, legal removal and handling of tortoises within urbanized areas of the Las Vegas Valley, and long-term monitoring of adopted tortoises. The meeting resulted in recommendations and possible solutions to several adoption problems.

Cyanea *(Cyanea superba* ssp. *superba)* Botanists from the FWS Honolulu Field Office assisted State of Hawaii staff in outplanting 12 individuals of this cyanea, an endangered plant in the bellflower family previously known from only six individuals in the wild. Among the threats to this species is habitat damage from non-native feral pigs. Theplants were placed in a pig-proof exclosure within the Pahole Natural Area Reserve on O'ahu, part of the species' historical range.

steamboat buckwheat illustration by Kaye H. Thorne, courtesy of Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah

Region 5

Small whorled pogonia *(Isotria medeoloides)* and Robbins' cinquefoil *(Potentilla robbinsiana)* These federally-listed plants should receive long-term protection on the White Mountain National Forest in New Hampshire as a result of agreements reached between the FWS New England Field Offices and the Laconia office of the U.S. Forest Service. Robbins' cinquefoil, an endangered herb in the rose family, occurs only on the national forest, while the pogonia, a threatened orchid, is found on the forest and other locations. Their management will be coordinated by a committee made up of representatives from both agencies.

American burying beetle *(Nicrophorus americanus)* The FWS, in cooperation with the Massachusetts Division of Fisheries and Wildlife, brought about 50 beetles of this endangered species to Nantucket Island, where one-third of the land is protected by conservation organizations. The beetles were released on land owned by the Massachusetts Audubon Society in July 1994. Preliminary results are extremely encouraging. The 22+ pairs immediately set about the business of raising families, and more than 400 young are estimated to have been produced in the population's first generation.

The Roger Williams Park Zoo, which is raising American burying beetles in captivity, hopes to raise numbers large enough to allow future releases on Nantucket. If a population can be restored to the island, it will be secure from many of the competing wildlife and human population pressures present in mainland areas. Similar efforts in the western, southeastern and Great Lakes portion of the species historic range would set the American burying beetle well on its way to recovery by the turn of the century.

Peregrine falcon *(Falco peregrinus)* A unique partnership among a local and national rock-climbers group, a private landowner, and the U.S. Forest Service gives permanent protection to New Hampshire's newest peregrine falcon nesting site. Rattlesnake Mountain in Rumney, New Hampshire, is a nationally known rock- and ice-climbing destination. In 1994, it also became the ninth cliff in the State to support nesting peregrine falcons.

England subpopulation, where the population increased 19 percent (73 pairs), while the New York/New Jersey and Southern Atlantic (Delaware to North Carolina) subpopulations posted more modest increases of 4 percent (14 pairs) and 3 percent (6 pairs), respectively. Unfortunately, increases in U.S. subpopulations were offset partially by a 21 percent decline in the Atlantic Canada subpopulation; a complete survey of sites in Atlantic Canada where piping plovers were detected during the comprehensive 1991 international census documented a 54-pair decrease. While the overall increase in the Atlantic Coast piping plover population is heartening, the population's increasingly uneven distribution leaves it vulnerable to any catastrophe that might hit its New England stronghold.

Protection and recovery of the Atlantic Coast piping plover population continues to demand intensive efforts on the part of Federal, State, and local government agencies, private organizations, and individuals. A draft revised recovery plan for the Atlantic Coast piping plover will be circulated for public review in 1995.

piping plover
photo by J.P. Mattsson

Region 7

Spectacled eider (*Somateria fischeri*) The draft Spectacled Eider Recovery Plan was completed in fall 1994. Field work on spectacled eiders in 1994 provided more clues to the species' post-breeding distribution and causes for the long-term decline in western Alaska. Satellite transmitters were implanted in 20 birds on the Yukon-Kuskokwim (Y-K) Delta. As in 1993, post-breeding females molted in a small area within Norton Sound then moved to a region south of St. Lawrence Island in the Bering Sea. Male eiders, which depart as incubation begins in June, again molted on the Russian side of the Bering Strait. By late fall, males also moved to the south side of St. Lawrence Island. The species' mid-winter range remains a mystery.

Nesting and contaminant studies on the Y-K Delta provided more alarming indications that lead poisoning is a serious threat to spectacled eiders in this area. Up to one third of the brood-rearing hens at one study site had ingested lead shot by the end of August. Ducklings also were eating lead. This lead exposure may explain, in part, the relatively high proportion of addled and infertile eggs found in the area. Eiders are eating the lead from tundra ponds where the shotgun pellets must have accumulated over decades. The FWS and the State of Alaska are developing an education program aimed at speeding acceptance of non-toxic shot for hunting upland game as well as waterfowl on the Y-K Delta

spectacled eider
photo by John Warden

Plant Candidate Review

The Fish and Wildlife Service (FWS) is the keeper of many lists--lists of national wildlife refuges, national hunting and fishing statistics, migratory bird counts, threatened and endangered species, and "candidate species."

Candidate species are plants and animals for which the FWS has information indicating a declining or vulnerable status. As a result, they are under review for possible a) conservation agreements with landowners, b) proposals to list as threatened or endangered under the Endangered Species Act, or c) removal from the candidate list on the basis of new information. On alternating years, the FWS updates its lists of plant and animal candidates.

The 1993 Plant Notice of Review (PNOR) is now under review, and the FWS hopes to publish an updated version by mid-1995. Interested parties may provide comments on the PNOR to the endangered species division in the appropriate FWS Regional Offices until April 30, 1995.

The current Animal Notice of Review was published in the November 15, 1994, *Federal Register*.

Listing Proposals

Nine species—one bird and eight plants—were proposed by the Fish and Wildlife Service (FWS) during December 1994 and January 1995 for listing as threatened or endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Cactus Ferruginous Pygmy Owl (Glaucidium brasilianum cactorum)

This owl is small (only about 6 3/4 inches, or 17 centimeters, in length) and generally reddish-brown with a cream-colored belly. It nests in cavities within large columnar cacti—such as the saguaro *(Cereus giganteus)* or organpipe *(Cereus thurberi)*—or large trees.

Two distinct populations of this non-migratory subspecies exist. One occurs along the lower Rio Grande River and the coastal plain of southern Texas and northeastern Mexico, and the other ranges from southern Arizona south through lowland areas of western Mexico to the state of Michoacan. The geographic isolation between the two populations apparently accounts for their considerable variation in plumage.

Cactus ferruginous owls inhabit a variety of lowland subtropical scrub and woodland communities, but they depend on fairly dense thickets with trees or cacti large enough to provide nest cavities. Much of the owl's habitat has been lost, especially in riparian zones, to urban and agricultural development, woodcutting, water diversion, channelization, groundwater pumping, and overgrazing. As a result, the owl is virtually extirpated from Arizona, which once constituted its major U.S. range. In Texas, it has almost disappeared from the lower Rio Grande Valley, although it survives in the coastal plain. The owl's status in Mexico is less clear, but observations suggest that habitat loss continues to occur in northern Mexico.

On December 12, the FWS proposed to list the owl's Texas population as threatened and the more vulnerable Arizona population as endangered. The proposal also would designate some of southern Arizona's remaining riparian zones as critical habitat. If approved, this provision would prohibit Federal agencies from adversely modifying designated habitats. The FWS will continue to review the owl's status in Mexico to determine if Mexican populations should be proposed for listing in the future.

Cactus ferruginous pygmy owl
FWS photo

Eight California Plants

During December, the FWS issued two listing proposals covering eight plant taxa native to California. The first, published December 15, was for four plants of southwestern California. It called for listing the two most vulnerable species as endangered:

Munz's onion *(Allium munzii)*—a perennial herb in the lily family (Liliaceae) that grows from a bulb and produces small white flowers; and

San Jacinto groundscale *(Atriplex coronata* var. *notatior)*—an erect, grayish annual in the goosefoot family (Chenopodiaceae). A designation of critical habitat was proposed for this species.

Because the status of the other two plants in this listing package is somewhat less critical, they were proposed for listing as threatened:

thread-leaved brodiaea *(Brodiaea filifolia)*—another perennial in the lily family that produces clusters of small violet flowers; and

spreading navarretia *(Navarretia fossalis)*—a perennial herb in the phlox family (Polemoniaceae) with white or white-lavender flowers arranged in compact, flat-topped heads. This range of this species extends into northwestern Baja California, Mexico.

All four southwestern California plants occur in vernal pools and other wetlands, or on clay soils and moist grasslands. Their habitats are threatened by fragmentation or destruction resulting from agricultural and urban development, off-road vehicle activity, clay mining, alteration of wetland hydrology, livestock grazing, and competition from non-native plants.

The second listing package, published December 19, addressed four northern California plants:

Contra Costa goldfields *(Lasthenia conjugens)*—a spring annual in the aster family (Asteraceae) that produces showy yellow flowers;

few-flowered navarretia *(Navarretia leucocephala* ssp. *pauciflora)*—a prostrate, spreading, annual herb;

many-flowered navarretia *(Navarretia leucocephala* ssp. *plieantha)*—a plant similar to the above but with more flowers; and

Lake County stonecrop *(Parvisedum leiocarpum)*—a low annual in the stonecrop family (Crassulaceae) with succulent leaves and small yellow flowers.

These northern California plants also depend on vernal pools and other seasonal wetlands. Their reduced habitat is subject to many of the same threats facing the southwestern California plants discussed above.

Contra Costa goldfields
FWS photo

Final Listing Rules December/January

The FWS published final rules to list 47 species–37 animals and 10 plants–during December and January as threatened or endangered:

Thirty African Birds

Endangered:

Amsterdam albatross *(Diomedia amsterdamensis)*
Thyolo alethe *(Alethe choloensis)*
Madagascar sea-eagle *(Haliaeetus vociferoides)*
Madagascar serpent eagle *(Eutriorchis astur)*
Mauritius fody *(Foudia rubra)*
Rodrigues fody *(Foudia flavicans)*
Djibouti francolin *(Francolinus ochropectus)*
freira *(Pterodroma madeira)*
Alaotra grebe *(Tachybaptus rufolavatus)*
white-breasted guineafowl *(Agelastes meleagrides)*
Raso lark *(Alauda razae)*
Ibadan malimbe *(Malimbus ibadanensis)*
Algerian nuthatch *(Sitta ledanti)*
Canarian black oystercatcher *(Haematopus meadewaldoi)*
Seychelles lesser vasa parrot *(Coracopsis nigra barklyi)*
Mascarene black petrel *(Pterodroma aterrima)*
pink pigeon *(Nesoenas mayeri)*
Madagascar pochard *(Aythya innotata)*
Marungu sunbird *(Nectarinia prigoginei)*
Taita thrush *(Turdus helleri)*
Bannerman's turaco *(Tauraco bannermani)*
Seychelles turtle dove *(Streptopelia picturata rostrata)*
Aldabra warbler *(Nesillas aldabranus)*
banded wattle-eye *(Platysteira laticincta)*
Clarke's weaver *(Ploceus golandi)*

Threatened:

Uluguru bush-shrike *(Malaconotus alius)*
white-tailed laurel pigeon *(Columba junoniae)*
dappled mountain robin *(Modulatrix orostruthus)*
Pollen's vanga *(Xenopirostris polleni)*
Van Dam's vanga *(Xenopirostris damii)*

African Frog

Threatened:

Goliath frog *(Conraua goliath)*

The other final rules cover U.S. species:

Animals

Endangered:

Morro shoulderband snail *(Helminthoglypta walkeriana)*
arroyo southwestern toad *(Bufo microscaphus californicus)*
Etowah darter *(Etheostoma etowahae)*
Hine's emerald dragonfly *(Somatochlora hineana)*
St. Francis' satyr *(Neonympha mitchellii francisci)*

Threatened:

Cherokee darter *(Etheostoma* sp.*)*

Plants

Endangered:

Chorro Creek bog thistle *(Cirsium fontinale* var. *obispoense)*
Pismo clarkia *(Clarkis speciosa* ssp. *immaculata)*
Indian Knob mountainbalm *(Eriodictyon altissimum)*
California sea-blite *(Suaeda californica)*
rock gnome lichen *(Gymnoderma lineare)*
rock cress *(Aribis perstellata)*
Melicope adscendens
Melicope balloui
Melicope ovalis

Threatened:

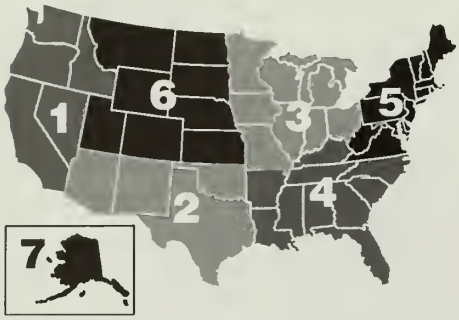
Morro manzanita *(Arctostaphylos morroensis)*

Protection and Recovery

Among the conservation benefits authorized for threatened and endangered plants and animals under the Endangered Species Act are: restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take conservation actions; 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 Federal, 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 to offset jeopardy, "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 posses, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on take do not apply. It is unlawful, however, 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 prohibiting the take of State or federally listed plants and animals.



Region 1

A cooperative agreement with Chevron U.S.A. to protect and enhance Hawaiian stilt *(Himantopus mexicanus knudseni)* nesting habitat at Chevron's Hawaiian refinery on O'ahu continued with excellent hatching and fledgling results. The FWS Pacific Islands wetland staff spent considerable time with a film company hired by Chevron to create one of the company's "People Do" commercials featuring Hawaiian stilt, to be shown on national television in 1995.

A fact sheet on gray wolves (*Canis lupus*), entitled "The Wolf in Washington," has been published and distributed thanks to a joint effort by FWS, the Animal and Plant Health Inspection Service, Animal Damage Control, Bureau of Indian Affairs, Bureau of Land Management, Forest Service, National Park Service, Washington Department of Fish and Wildlife, Washington Wool Growers Association, Wolf Haven International, and the British Columbia Ministry of the Environment. A gray wolf hotline also has been set up at 1-800-722-4095.

Northwest Trek Wildlife Park, a Washington facility that draws over 500,000 visitors per year, hosted the FWS "Road to Recovery" display in its indoor restaurant from December 14 through mid-January. FWS staff supported the display with supplies of related brochures and participated in a youth education day focused on the Endangered Species Act. Negotiations are under way for similar activities at two other locations in Wash-ington, the Seattle Aquarium and the Point Defiance Zoo and Aquarium in Tacoma.

FWS Idaho State Office staff met with a dozen Owyhee County citizens to discuss endangered species, including proposals to protect the aquifer that supplies water for the habitat of the Bruneau hot springsnail *(Pyrgulopsis bruneauensis)*. Local citizens are working with a hydrologist to prepare a habitat maintenance plan focused on stabilizing the local aquifer. Citizens expressed appreciation for Idaho State Office staff efforts to communicate with them about FWS activities in Owyhee County.

Region 7

During summer 1994, FWS biologists successfully translocated 167 Aleutian Canada geese (*Branta canadensis leucopareia*) to two fox-free islands in the Aleutian chain. Geese were released on Skagul Island in the Delarof group, and Yunaska Island in the Islands of Four Mountains group. The latter had only recently been declared free of introduced arctic foxes. Yunaska Island is approximately 500 miles (800 kilometers) from the capture site at Buldir Island, and it was uncertain how the geese would withstand the 48-hour travel time by ship. However, as a result of careful preparation and constant attention, only three birds died during transport.

Aleutian goose monitors on the wintering grounds in California have reported observing a number of the translocated birds, alleviating fears that the birds might not migrate properly. The status of the Aleutian Canada goose continues to improve, with the population expected to surpass 17,000 birds this year.

Aleutian Canada goose
photo by Forrest B. Lee

A Memorandum of Understanding (MOU) between the FWS, Forest Service, and Alaska Department of Fish and Game was signed in Juneau, Alaska, on December 20, 1994. The MOU is designed to improve cooperation and efficiency between the three agencies and achieve a common goal of conservation of species that may be candidates for listing under Federal or State endangered species laws. This MOU steps down the National MOU signed on January 25, 1994. The Alaska cooperators propose to work together in the conservation of selected species through protecting and managing the ecosystems upon which they depend.

Items for Regional News and Recovery Updates are provided by endangered species contacts in FWS regional and field offices.

Hawaiian stilt
photo by Jim Leupold

Contributing to the Endangered Species Bulletin

Because of its increasingly diverse audience, the *Bulletin* is seeking to diversify and expand its coverage of endangered species issues. To be successful, we need your help.

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 success stories and news about recovery (both the development of recovery plans and their implementation). Material is needed on interagency consultations; 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 (703/358-2390) to determine the length, focus, and timing of proposed articles. We welcome submissions but 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* 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.

Style

When preparing a manuscript, follow the *GPO Style Manual* if available. 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.

As a general rule, feature articles should be between three and six 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:

scientific and common names of all species mentioned (listed and non-listed species).

Metric equivalents for all measurements.

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 and fax numbers.

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 submitted illustrations.

Submission Format

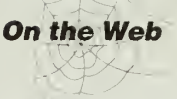
Manuscripts for the *Bulletin* can be submitted several ways. We prefer to receive computer files in Wordperfect 5.1 format. Please transmit them via CC:MAIL (send to R9FWE_DES), or via Internet at R9FWE_DES.BIM@mail.fws.gov. You may also mail DOS-formatted diskettes to Endangered Species Bulletin, U.S. Fish and Wildlife Service, 452 ARLSQ, Washington, D.C. 20240. Submissions by FAX can be sent to 703/358-1735 (703/358-2390 to confirm). In all cases, please also mail a double-spaced hard copy.

Printing Schedule

The *Bulletin* is on a bimonthly printing schedule, with six issues per year and an index.

We welcome contributions at any time, but material not received by the "Article Due" date will be held for the next issue.

ISSUE DATE	ARTICLE DUE DATE
July/August 1995	May 3, 1995
September/October 1995	July 3, 1995
November/December 1995	September 1, 1995
January/February 1996	December 1, 1995
March/Arpil 1996	January 29, 1996



On the Web

To assist the ecosystem approach and to reach as broad an audience as possible, FWS has placed several electronic information items on the Internet World Wide Web, and on Internet E-mail. These items include:

- ***List of Threatened and Endangered Species, updated monthly;***
- ***Lists of Animal and Plant Candidates, as published;***
- ***Current Distributions for Listed Species under Fish and Wildlife Service Jurisdiction by State or Territory;***
- ***The Endangered Species Act of 1973, as amended through the 100th Congress; and***
- ***Species Maps that indicate the number of listed, proposed, candidate, and Category 1 species by state or territory.***

The Fish and Wildlife Service World Wide Web Home Page address is:
http://www.fws.gov/
The Internet E-mail address is:
R9IRMLIB@fws.gov
When using Internet E-mail, type [Send ES Instructions] on the Subject line to receive a list of the retrieval commands for the available information.

BOX SCORE

Listings and Recovery Plans as of March 1, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	22	338	40
BIRDS	76	177	16	6	275	70
REPTILES	14	65	19	14	112	30
AMPHIBIANS	7	8	5	0	20	11
FISHES	68	11	37	0	116	66
SNAILS	15	1	7	0	23	11
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	325	520	111	42	998	298
FLOWERING PLANTS	406	1	89	0	496	201
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	4
PLANT SUBTOTAL	434	1	91	2	528	206
GRAND TOTAL	759	521	202	44	1,526*	504**

TOTAL U.S. ENDANGERED: 759 (325 animals, 434 plants)
TOTAL U.S. THREATENED: 202 (111 animals, 91 plants)
TOTAL U.S. LISTED: 955 (430 animals, 525 plants)***

*Separate populations of a species 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, green sea turtle, and olive ridley 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 445 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.

***Six animals have dual status.

ENDANGERED Species BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
MAY/JUNE 1995

FISH AND WILDLIFE SERVICE
VOL. XX NO. 3

Private landowners have played an essential role in the conservation of plant and animal resources since our Nation was founded. Many rare species survive partly or entirely on private land due to careful stewardship. As growth and development place increasing demands on wildlife habitat, property owners often face difficult choices when seeking to balance the use of their land with the Nation's conservation goals.

Recognizing that wildlife laws affect land management, the Departments of the Interior and Commerce have issued a set of 10 principles designed to ease impacts on private landowners and create incentives for continued cooperation. This edition of the Bulletin *features cooperative initiatives that are being carried out with private landowners in various parts of the country.*

U.S. Fish & Wildlife Service

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ENDANGERED Species BULLETIN

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On the Cover
Paul and Rosie Schluter take pride in the endangered wildflowers on their land. Flags at the lower right indicate two of the wildflower sites.

photo by Lisa Mueller, Minnesota Department of Agriculture

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

The Fish and Wildlife Service distributes the Bulletin primarily to Federal and State agencies and official contacts of the Endangered Species Program. It also is reprinted by the University of Michigan as part of its own publication, the Endangered Species UPDATE. To subscribe, write the Endangered Species UPDATE, School of Natural Resources, University of Michigan, Ann Arbor, MI 48109-1115; or call 313/763-3243.

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IN THIS ISSUE

photo by Jim Clark

photo by Hans Stuart

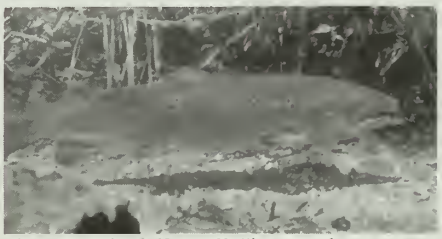

photo by John & Karen Hollingsworth

Departments

Making the ESA Work Better

Ten principles to Improve ESA Implementation

Treat landowners fairly and with consideration.

Minimize social and economic impacts.

Create incentives for landowners to conserve species.

Provide quick, responsive answers and certainty to landowners.

Base ESA decisions on sound and objective scientific information.

Prevent species from becoming endangered or threatened.

Promptly recover and delist threatened or endangered species.

Provide State, Tribal, and local governments with opportunities to play a greater role in carrying out the ESA.

Make effective use of limited public and private resources by focusing on groups of species dependent on the same habitat.

Promote efficiency and consistency in the Departments of the Interior and Commerce.

Ten principles to improve implementation of the Endangered Species Act (ESA) were announced March 6 by Interior Secretary Bruce Babbitt and Dr. D. James Baker, Under Secretary of Commerce. The changes are designed to: improve the species recovery rate while minimizing impacts of the ESA on landowners, grant more authority to State and local governments, require greater scientific scrutiny of endangered species decisions, and make implementation of the ESA more efficient.

Some of the principles can be carried out administratively or through the rulemaking process. Others, however, would require amendments to the ESA. "As changes to the law come under consideration," Babbitt said, "a key need is to balance species protection with the rights of private property owners. These principles build on our initiatives to reduce the conservation burden on small landowners and show the Administration is serious in its efforts to balance the rights of individual landowners with the community's right to a healthy environment."

Easing Impacts on Landowners

The Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) will propose regulations designed to ease the impacts of the ESA on private landowners. For species listed as threatened, the agencies would allow land uses that result in incidental take, provided that such activities have no lasting effect on the survival and recovery of the species. "Small landowners should be exempted from endangered species conservation burdens on the basis of fairness and biology," Babbitt said. In particular, the following would not be regulated under this proposal:

- activities on tracts of land occupied by a single household and used solely for residential purposes;
- one-time activities that affect 5 acres (2 hectares) or less of contiguous property if that property was acquired prior to the date that the species was listed; and
- activities that are identified as negligible.

photo by Jim Clark

The ESA allows flexibility in the management of species listed as threatened. Congressional authority would be needed, however, to grant such exemptions involving endangered species.

Minimizing Social and Economic Effects

Both the FWS and NMFS will take additional steps to minimize any negative social or economic impacts resulting from ESA activities. For example, once the agencies scientifically identify the recovery needs of a listed species, they will involve affected individuals and groups in developing and implementing recovery actions. Diverse areas of expertise will be represented on recovery teams.

Creating Incentives for Conservation

Landowners often are interested in managing their lands in ways that are compatible with, or actually improve, habitat for wildlife, including endangered and threatened species. However, some are reluctant to do so because of concern that subsequent activities that may damage the improved habitat could result in a violation of the ESA. To create incentives for voluntary habitat improvement on private lands, one of the new proposed policies would insulate landowners from ESA restrictions if they enhance habitat for listed species on their property and later need to return the land to its previous condition. The proposed policy would apply in cases where it is possible to measure a conservation benefit to a species from habitat improvements.

FWS photos

Providing Prompt Information

Earlier notifications Due to concern that delays and uncertainty in ESA decisions frustrate development and land use, the FWS and NMFS will provide more information to landowners at the time a species is listed. Both agencies will identify, to the extent known, specific activities that are exempt from, or unaffected by, provisions of the ESA.

Habitat Conservation Planning Under section 10 of the ESA, the FWS and NMFS can grant permits for the incidental take of listed species during otherwise legal activities, provided the effects of such take are minimized and mitigated as part of an approved habitat conservation plan. Both agencies recently published a draft conservation planning handbook for public review and comment. It is intended to provide more consistent answers to applicants for incidental take permits.

"No surprises" Under the "no surprises" policy, landowners who develop an approved habitat conservation plan for any listed species will not be subject to any later demands for a larger commitment, even if the needs of the species covered by the plan increase over time. No additional mitigation requirements will be required beyond those specified in the plan.

Sound and Objective Science

By law, ESA decisions must be based on the best scientific information available. Because of concern in some quarters about the quality of this information, the FWS and NMFS require independent scientific peer review of all listing proposals and draft recovery plans. These reviews will be accomplished within the timeframes specified in the law for ESA implementation.

The FWS and NMFS also have proposed tougher, uniform standards for evaluation of listing petitions. Further, petitioners would be required to furnish more proof that the petitioned action is warranted.

Preventing the Need to List

Because prevention is preferable to a cure, the FWS and NMFS are working with other agencies and interests to conserve species before need ESA protection:

Federal/State conservation The Forest Service, Bureau of Land Management, National Park Service, FWS, and NMFS have signed an agreement with the International Association of Fish and Wildlife Agencies to cooperate in efforts to reduce, mitigate, and potentially eliminate the need to list species under the ESA.

Pre-listing conservation The FWS and NMFS have published draft guidance that encourages and sets standards for the development of pre-listing conservation agreements with other parties. Again, the goal is to assess the status of listing candidates and take action to prevent the need for ESA protection.

Increasing Recovery and Delisting

The overall goal of the endangered species program is to recover listed species to the point where they no longer need ESA protection. To help speed the process, the FWS and NMFS have adopted a policy that requires completion of a draft recovery plan within 18 months of listing and a final plan within 12 months of the draft plan. Additionally, 14 Federal agencies recently entered into an unprecedented agreement to improve recovery implementation. Each agency agreed to identify opportunities for recovery and to use existing authorities toward that end.

To make recovery plans more than discretionary blueprints, Babbitt and Baker called for more certainty in recovery implementation. They asked Congress to require appropriate Federal and State agencies to develop one or more specific agreements to implement a recovery plan. Upon approval of an implementation agreement by each of the involved agencies, it then would be legally binding. Both recovery plans and implementation agreements would be reviewed and updated on a regular basis.

Another proposal requiring Congressional action is to modify the timing of critical habitat designations. Areas to be proposed as critical habitat would be identified through the recovery planning process. Critical habitat would be designated at the time the recovery plan is approved rather than when the species is listed.

Strengthening Partnerships

Recovery Building new partnerships and strengthening existing ones with State, Tribal, and local governments is essential to achieving species recovery in a fair and effective way. The FWS and NMFS will encourage States to take a greater role in the development and implementation of recovery plans. Further, Congress will be asked to give States the opportunity to assume lead responsibility for developing recovery plans and any associated implementation agreements. For cases in which a species' range extends over several States, a mechanism would be needed to ensure that each State may be involved. Under this proposal, the FWS and NMFS would approve State-developed recovery plans unless the Secretary determines that a plan does not meet ESA standards.

Listing petitions Another proposal needing Congressional approval would give States greater influence over the evaluation of listing petitions. Such petitions would be sent to each affected State wildlife management agency. If a State recommends against proposing a species for listing or delisting, the FWS and NMFS would be required to accept that recommendation. The only exception would be for a case in which the Secretary finds, after conducting independent scientific peer review, that the species does need ESA protection.

Habitat Loss

by Sally Valdes-Cogliano

Historically, the first species to be endangered by man were those killed directly for food or skins, or because they were viewed as competitors. Today, habitat loss and degradation are the greatest threats to wildlife. Some cosystems, like the tall grass North American prairie, have essentially disappeared. Other habitats have been so fragmented that they cannot support the number and variety of species found in larger blocks.

Simplification of ecosystems also can result in habitat degradation. For example, removal of standing dead wood in a forest degrades the habitat from the perspective of species such as cavity-nesting birds that rely on the dead tree microhabitat.

Pollution can be an obvious or subtle degrader of habitat quality. Organic pollution can rob fresh water of oxygen. Solid waste pollution is a serious problem in many marine environments, where entanglement in and ingestion of wastes can be a significant threat to wildlife. Finally, chemical pollution in the food chain can have obvious effects, such as fish kills, but more commonly results in chronic health and reproductive problems.

Sally Valdes-Cogliano is a biologist in the FWS Division of Endangered Species, Washington, D.C.

FWS photo

Habitat conservation Currently, habitat conservation plans and incidental take permits are approved by the FWS or NMFS. The Secretaries have requested Congressional authority for States to assume responsibility for issuing such permits. This would apply to areas within a state that have been identified for such assumption in an approved recovery plan or areas within an approved habitat-based program.

Focusing on Species Groups

To make more effective use of limited public and private resources, the FWS and NMFS have been shifting from an emphasis on individual species to a focus on groups of species and their habitats. This trend will continue as both agencies give even greater priority to multi-species listings, recovery actions, and habitat conservation plans whenever possible. (For more information on taking an ecosystem approach to wildlife conservation, see *Bulletin* Vol. XX, No. 1.)

photo by Jim Clark

Saving Room for Ocelots

Most people think of brush as merely something to be cleared, but it is vital habitat for many species of wildlife. Secretive animals like the ocelot *(Felis pardalis)* and jaguarundi *(Felis yagouaroundi)* particularly depend on dense vegetation for shelter. In southern Texas, an innovative agreement is making the conservation of brushland habitat compatible with irrigation for agriculture.

Fortunately, South Texas is becoming a friendlier place to both endangered cats, thanks to a voluntary agreement between Bayview Irrigation District 11 and the U.S. Fish and Wildlife Service (FWS) to conserve brushy habitat. District 11 owns approximately 100 miles (160 kilometers) of irrigation and drainage ditches in Cameron County, the heart of the ocelot's remaining U.S. range. Brush growing along these ditches is important cover and dispersal habitat for the region's isolated ocelot populations. In the past, much of this habitat was lost when banks were cleared during the removal of silt and debris from the ditches. Under the agreement, District 11 modified its maintenance procedures. On previously cleared ditches, the District is allowing one bank to revegetate where practical and conducting its cleaning work from the other side. The resulting regrowth of brushy habitat provides vital corridors for the endangered cats and other wildlife.

This new method increases time and costs for ditch maintenance, according to Gordon Hill, general manager of the irrigation district, "but we did it to ensure that we protect our wildlife." Steve Thompson, manager of the nearby Laguna Atascosa National Wildlife Refuge (NWR), says the agreement has wide support in the region. "We hope other irrigation districts and private landowners will take a look at this agreement and give the cats a helping hand."

Brush growing along irrigation ditches in south Texas complements the habitat managed for ocelots at Laguna Atascosa NWR, which supports the State's largest remaining population. A few miles to the south, additional habitat for the endangered cats, as well as a wide variety of birds and other wildlife, is being conserved within the Lower Rio Grande Valley NWR. Recently, local citizens proposed establishing another refuge near Harlingen, which would protect valuable habitat bordering the Arroyo Colorado. One reason the people of south Texas are so interested in conserving their rare wildlife is tourism. The region supports an unusually diverse birdlife, including a number of species found nowhere else in the United States. Birders from throughout the country flock to south Texas to observe this unique resource. Together, local refuges and parks annually attract more than 500,000 visitors who pump millions of dollars into the regional economy.

The ocelot and jaguarundi once inhabited a variety of environments from Argentina to the southern United States, but both species have declined over most of their range due to habitat loss. The ocelot also was exploited for its attractive spotted fur. An estimated 50 to 100 ocelots remain in south Texas within remnants of thornscrub brush, and the jaguarundi—if it survives in the State—is even rarer. Their prospects for survival are tied to the conservation of brushlands.

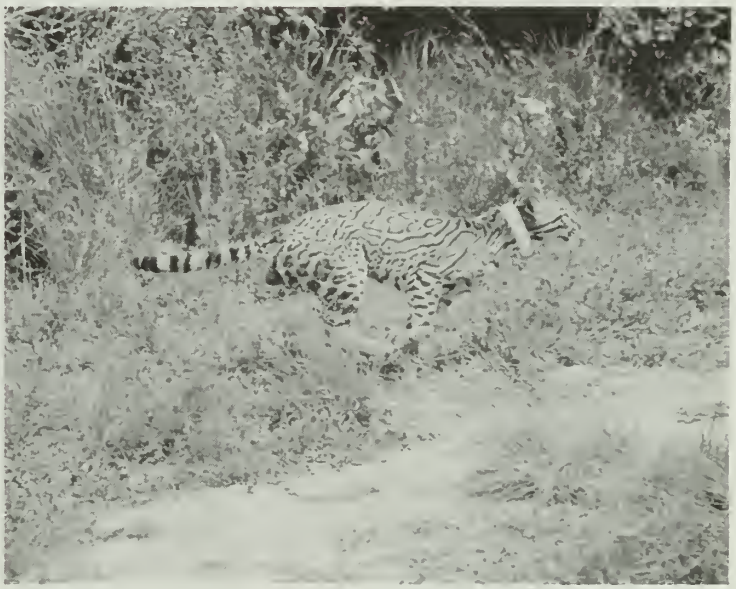

photo by John & Karen Hollingsworth

Telemetry from radio-collared ocelots has provided FWS biologists studying this species with vital information on the cat's habitat needs.

Safe Harbors

by Diana Hawkins

It was designed as "a deal too good to turn down." Secretary of the Interior Bruce Babbitt proposed a new habitat conservation approach on March 1, 1995, that was a conservation coup—not only for the endangered red-cockaded woodpecker *(Picoides borealis)* but also for private landowners. Dubbed the "Safe Harbor" proposal, the new approach demonstrates the flexibility of the Endangered Species Act in balancing species protection with the needs of landowners. It may also serve as a model for other habitat conservation plans being developed around the country.

While the plan encourages landowners to practice good stewardship that will attract endangered species to their land, it also allows them freedom to convert the land to other uses, without penalty, if they change their minds at a later date. The only provisions are that the landowners 1) cannot destroy nesting sites of endangered birds that were present on a site prior to the Safe Harbor improvements, 2) cannot develop the land during the nesting season, and 3) must allow the U.S. Fish and Wildlife Service (FWS) the option

A number of private landowners have expressed interest in joining the Safe Harbor program. First in line was the 100-year-old Pinehurst Resort and Country Club, located on 2,000 acres about 75 miles south of Raleigh, North Carolina. The resort operates seven golf courses, including the world famous Pinehurst No. 2, which hosted the 1994 U.S. Senior Golf Championship and will host the U.S. Open in 1999.

Brad Kocher, director of the resort's golf course and grounds maintenance, says that Pinehurst is excited to be the first private landowner ready to sign on to the proposed new habitat conservation plan. "We knew that golfers liked our courses, but we were happy to learn that woodpeckers find them a good substitute for their disappearing natural habitat," he said. Pinehurst president Patrick Corso added, "We view this as a common sense approach to protecting wildlife and endangered species."

Jim Bilyak, president of the Sandhills Area Chamber of Commerce, applauded the move. "A few years ago, you might not have seen a businessman nodding in agreement with the U.S. Department of Interior, the U.S. Fish and Wildlife Service and the Environmental Defense Fund," he said. "Times are a-changing. "

photo by George Gentry

Woodpecker nesting tree on golf course at Pinehurst Resort and Country Club.

to relocate the protected species if the habitat is to be adversely affected by subsequent alteration.

The plan grew out of a conference held in September 1992 at Fort Bragg, North Carolina. Co-hosted by FWS and the U.S. Army, the meeting was convened to develop a long-term program for recovering the red-cockaded woodpecker in the North Carolina Sandhills. Fort Bragg was a fitting site for the conference since this large base is home to a significant population of the woodpeckers. Discussions specifically addressed woodpecker protection needs on private lands and the necessity for a multi-agency effort to conserve this endangered species.

FWS biologists convened a meeting in March 1993 to establish a working group of representatives from public agencies, conservation interests, community groups, and private landowners to work together for the woodpecker in the Sandhills region. The group included biologists Janice Nicholls and David Horning from the FWS Asheville and Raleigh, N.C., field offices, and representatives of the U.S. Army at Fort Bragg, the North Carolina Wildlife Resources Commission, the North Carolina Natural Heritage Program, North Carolina State University, and the Sandhills Area Land Trust. Former Fort Bragg biologist Mark Cantrell joined the FWS team when he became the red-cockaded woodpecker recovery coordinator for the Sandhills region in June 1994.

It soon became clear that the key to encouraging private landowners to join in this effort was in developing suitable incentives. One idea to encourage voluntary protection of the woodpeckers by private landowners was put forward by group member Marsh Smith. Smith is a member of the Sandhills Area Land Trust, a grass roots organization established to conserve woodland, other natural areas, and farmlands in the area. He suggested that private landowners may be persuaded to provide suitable habitat for endangered species if the FWS could assure them that they would not be penalized if later they decided to convert the land to some other use not necessarily favorable to the resident species. Smith's idea became known as the "Safe Harbor" proposal.

"Some private landowners were concerned that they would be subject to restrictions under the Endangered Species Act if woodpeckers were to take up residence on their property," Nicholls said. "If we were able to remove this concern, landowners could then be encouraged to maintain old growth pine forests and attract woodpeckers to their land."

The next critical task was to determine how to implement the Safe Harbor idea. Michael Bean of the Environmental Defense Fund developed a set of possible approaches and met with FWS Atlanta Regional Office representatives. One option that emerged at that meeting was the idea of using the Habitat Conservation Plan (HCP) provisions of the Endangered Species Act to accomplish the Safe Harbor result. Together, Bean, Nicholls, and Cantrell drafted the HCP and submitted it to the FWS Atlanta Office in February 1995. The proposal was published in the February 24, 1995, *Federal Register* for public comment. After considering all comments submitted, FWS will decide whether or not to approve the HCP.

Ralph Costa, the FWS rangewide red-cockaded woodpecker recovery coordinator, calls the HCP based on the Safe Harbor proposal a "win-win" proposition. "Even if the landowner decides not to continue participating in the program, the favorable habitat conditions created will not necessarily vanish." If they do, he noted, the FWS has an opportunity to capture the affected birds and move them to another location. "Either way, we will have more woodpeckers than we have now," Costa said.

photo by John & Karen Hollingsworth

The red-cockaded woodpecker, listed in 1970 as endangered, once was abundant in the pine forests of the southeastern United States. Today, however, fewer than 4,500 family units remain scattered across an area that totals only about 1 percent of its original range. It can be found in 13 southeastern States and as far west as parts of Texas and Oklahoma. The bird is imperiled by the destruction of longleaf pine forests, its preferred habitat, which once covered 92 million acres but now total less than 4 million acres. Most of the species' remaining habitat occurs on Federal lands, but 21 percent of the birds are found on private property. The North Carolina Sandhills Region supports one of the species' largest populations.

The Shaw Family Pines

Brothers John and Frank Shaw of Fayetteville, North Carolina, and their sister Marie Shaw Dee, of Washington, D.C., have dedicated their 200 acres of long-leaf pine forest in Cumberland County, North Carolina, to protecting a number of rare species. The family's decision was driven by its desire to preserve this habitat remnant for the enjoyment of future generations and contribute to the overall recovery of endangered species in the Sand Hills of North Carolina.

Long-leaf pine forests once covered the Piedmont from coastal Virginia to Texas, but almost all have disappeared. The Shaw property, which has been owned by the family for over 150 years, is one of few tracts of this habitat remaining in the United States. Its unique characteristics are critical to the survival of the endangered red-cockaded woodpecker. The property has been recognized by the State of North Carolina as the Bonnie Doone Natural Area. The Shaws' decision will help protect habitat not only for the red-cockaded woodpecker but an array of other species, including the bog spice bush *(Lindera melissifolia)*, an endangered plant.

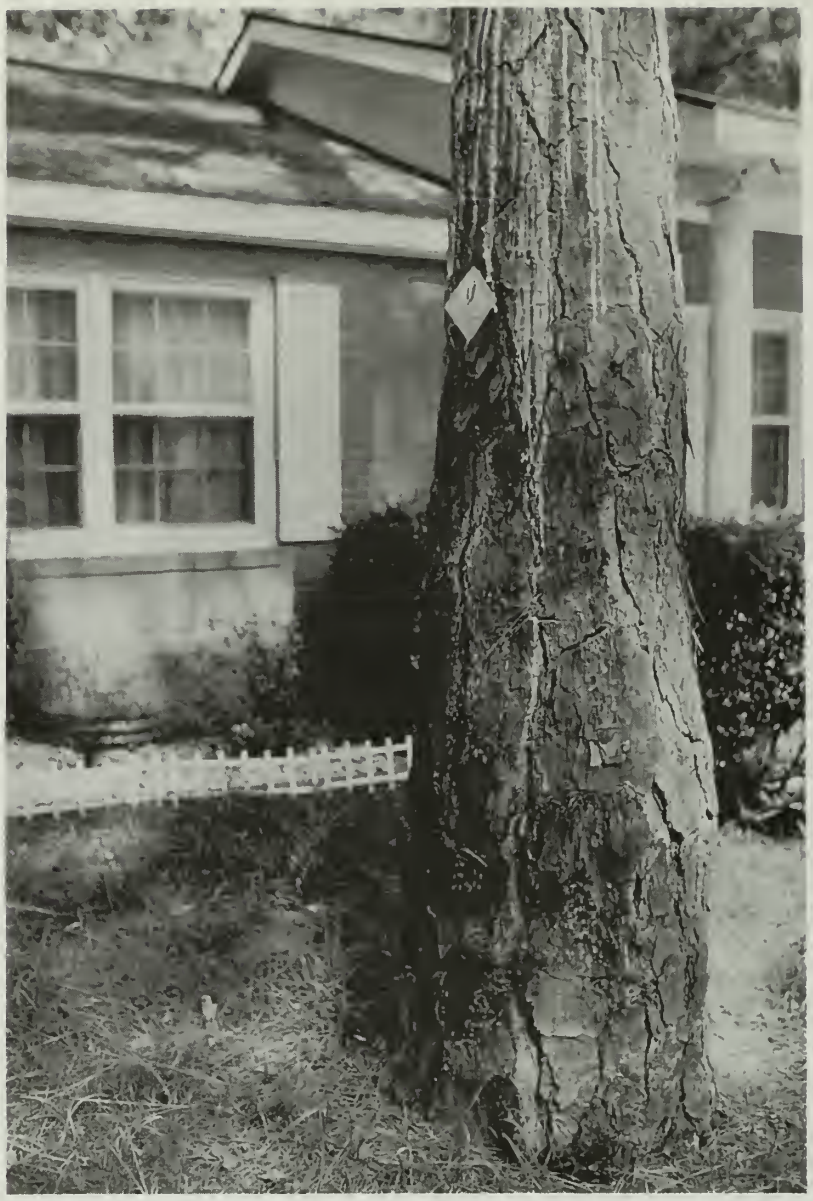

photo by George Gentry

Red-cockaded woodpeckers are good neighbors in Southern Pines, North Carolina. This RCW nesting cavity tree is within a few feet of a private residence.

FWS biologists who assisted in the development of this new-generation style HCP are pleased with the accomplishments of the working group. "I'm really proud to be a part of this group," Cantrell said, noting that he has gained a better understanding of how to make use of the great flexibility in the Endangered Species Act.

Nicholls summed it up nicely, saying "Development of this HCP is an excellent example of the kind of cooperation and creativity of numerous individuals committed to three common goals: recovery of the woodpecker, conservation of the longleaf pine ecosystem, and consideration for landowners' rights."

In addition to the "Safe Harbor" program, the FWS is negotiating 10 separate HCPs for the red-cockaded woodpecker and has signed three memoranda of agreement with industrial forest landowners. Two others are nearly completed and two more are being negotiated.

Diana Hawkins is on the Public Affairs staff in the FWS Atlanta Regional Office.

Living with Wildlife in Texas Hill Country

by Ruth A. Stanford

A community planned for construction in Georgetown, Texas, by the Del Webb Corporation will be home not only for people but two endangered species, the Bone Cave harvestman *(Texella reyesi)* and the Coffin Cave mold beetle *(Batrisodes texanus)*. Both invertebrates occur only in caves near Austin and surrounding communities in the Texas Hill Country. At the same time, the Sun City Georgetown development will add $1.4 billion in taxable property to Williamson County over the next 20 years.

Early in project planning, Del Webb employees met with U.S. Fish and Wildlife Service (FWS) officials to design a development that would not result in "take" of the endangered invertebrates. Sun City planners worked with biological, geological, and engineering consultants and used the information they gathered to produce a community design that is sensitive to the environment and preserves the biological integrity of caves on the Sun City property. The plan was reviewed by the FWS, which suggested several minor changes and concurred that the proposed development would not take the endangered invertebrates.

Del Webb's master plan includes preserves around 29 caves supporting endangered species and provides for their long-term management, including protection from non-native fire ants, which have become a major threat to the species. The interconnecting network of cave preserves provides a protected recovery area for each of the endangered species. The plan also provides protection for groundwater in the area, since several of the caves provide recharge to the northern segment of the Edwards Aquifer, an enormous underground natural reservoir that supplies water for much of the state. Additionally, Del Webb will conserve native vegetation and two riparian creekbeds within the Sun City Georgetown project.

"This development is a classic example that shows how quality-of-life concerns are linked to environmental goals," said Interior Secretary Bruce Babbitt. "It also demonstrates the Interior Department's commitment to work with developers and communities to design projects that protect natural resources and benefit local economies."

In addition to the conservation measures for endangered species caves, two large, isolated areas will be set aside for research purposes, and a display showing the nature of the caves and significance of the cave habitat will be developed as an educational exhibit. Sun City Georgetown will include four golf courses, a multi-million dollar recreation complex, and hiking and biking trails, along with homes designed for those age 55 and older.

Ruth A. Stanford is a biologist in the FWS Austin, Texas, Field Office.

"Del Webb is committed to protecting the beauty and natural resources of the Texas Hill Country," said Bob Wagoner, the company's vice president for land development. "Our corporate policy is to be sensitive to environmental issues in our development activities. Rather than destroy cave habitat, our intent was to design a community in harmony with the Hill Country environment." Sun City Georgetown will include the construction of 9,500 single family homes on 5,300 acres of land, creating more than 1,000 construction jobs.

Connie Watson of the Del Webb Corporation and FWS biologist Ruth Stanford examine the entrance to Argo Cave at Sun City Georgetown.

photo by Hans Stuart

by Larry Dean

Lending a Helping Land

photo by Ann B. Swengel

Above
Karner blue butterfly

Right
dwarf lake iris

Below
prairie bush clover

FWS photo

Voluntary participation, rigorous respect of landowners' rights, and a personalized educational approach are three important features of Wisconsin's successful landowner contact program. Initiated in 1991, the State's effort seeks to protect endangered plants and animals that occur on private lands. This goal is carried out under a signed Memorandum of Understanding (MOU) between the landowner and the Wisconsin Bureau of Endangered Resources. So far, 73 such MOU's have been signed. The following examples show how this approach works well in a variety of situations.

More than 300 miles to the east, on the cool Lake Michigan shore, grows a striking but rare plant, the dwarf lake iris (*Iris lacustris*). In this summer resort area, lakefront summer homes abound, development is big business, and realtors are busy. Yet 27 landowners and land managers in this part of Wisconsin have signed iris protection MOU's. Perhaps even more exciting is the recent cooperation of real estate agent Richard Kielpikowski. Representing a seller on whose property the iris grows, Mr. Kielpikowski agreed to alert any potential buyer of the presence of this threatened species. He views the iris both as a species he wants to protect and as a valuable feature of the property that might make it more attractive to potential buyers.

The prairie bush clover (*Lespedeza leptostachya*) is found only in dry prairies in certain areas of Wisconsin, Minnesota, Illinois, and Iowa. The owner of one site is a church in River Falls, Wisconsin. An isolated cemetery prairie owned by the church provides a home to this threatened plant species. Parishioners and priests alike have joined forces, signed an MOU and pledged themselves to reaching this conservation goal.

In sandy central Wisconsin, the endangered Karner blue butterfly (*Lycaeides melissa samuelis*) finds its home amid wild lupine patches growing in a "barrens" habitat. After one area landowner signed an MOU, she suggested that the Bureau contact her neighbor, Bob Welch, whose land also supports this species. After he signed an MOU, yet another neighbor was approached. The result is a cluster of properties where the butterfly is protected and the landowners are cultivating a community pride in their commitment to conservation.

Larry Dean is in the Region 3 Public Affairs Office.

The Lilies of Schluters' Woods

by Lisa Mueller

If you were a Minnesota dwarf trout lily (*Erythronium propullans*), you would probably like to live in the Schluters' woods. Paul and Rosie Schluter, who own a 40-acre farm near Cannon Falls, Minnesota, have been voluntary caretakers of this endangered wildflower on their maple-basswood, floodplain forest land since the species was discovered there in 1991.

In early spring of 1991, Paul and Rosie worked with biologists from the Minnesota Department of Natural Resources and a team of volunteers to search their woods for this species. Their efforts led to the exciting discovery of three dwarf trout lily colonies, which the team marked with pink flags for ease of identification and mapping.

This dwarf trout lily species occurs nowhere in the world but southeast Minnesota, and has been reduced in range to three counties. It is one of a group of spring ephemeral plants that make their living by capitalizing on the peak light available on the forest floor just after snow melt, before the trees close the forest canopy with their new leaves. The leaves of the Minnesota dwarf trout lily are speckled brown and green, resembling the pattern on the back of a trout, hence this part of its name.

The Schluters are not alone in their dedication to "doing the right thing" for the benefit of a rare plant or animal. The Minnesota Department of Agriculture's Endangered Species Protection Program works with hundreds of private landowners who are willing to adopt certain land use practices, including restrictions on pesticide use on their farms, to benefit a rare species. In a national survey commissioned recently by The Nature Conservancy, private landowners were asked whether they consider it good or bad news that they have a rare plant or animal on their property. A full two-thirds responded that they thought of this as good news. In fact, the highest positive response rate to this question was among rural residents, with 7 out of 10 saying it was good news to hear they have a rare species on their land.

Unlike many flowering plants, the dwarf trout lily almost never produces seed. Instead, flowering plants produce a single underground offshoot bearing a new bulb.

photo by Lisa Mueller

Paul and Rosie Schluter understand the scientific significance of the find and are comfortable with the "responsibility" that goes along with being the owners and managers of such a rare and fragile species. The Schluters feel that the presence of such a rare species on their land is a privelege.

Lisa Mueller is the Endangered Species Program Manager for the Minnesota Department of Agriculture.

by Vicki Finn

Metropolitan-Bakersfield HCP

After years of cooperative planning by representatives of the Fish and Wildlife Service (FWS), California Department of Fish and Game, City of Bakersfield, and Kern County, implementation of the Metropolitan-Bakersfield Habitat Conservation Plan (MBHCP) has begun. The MBHCP allows the City and County to implement conservation and urban development activities within the Metropolitan Bakersfield 2010 General Plan (2010 Plan) area while mitigating the take of four federally listed species. It also is intended to conserve other species that are listed or listing candidates under State and Federal endangered species laws. The MBHCP will be funded through the collection of mitigation fees paid on all new construction taking place within the 2010 Plan area.

On August 24, 1994, a permit was issued under the MBHCP to allow incidental take of San Joaquin kit fox (*Vulpes macrotis mutica*), giant kangaroo rat (*Dipodomys ingens*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), and blunt-nosed leopard lizard (*Gambelia silus*) by the City of Bakersfield and Kern County in a 408-square-mile (105,672 ha) area. Federally listed plant species expected to benefit from the plan include the Bakersfield cactus *(Opuntia treleasei)*, San Joaquin wooly-threads *(Lembertia congdonii)*, Hoover's wooly-star *(Eriastrum hooveri)*, Kern mallow *(Eremalche kernensis)*, and California jewelflower *(Caulanthus californicus)*. Federal listing candidates

covered by the MBHCP, include the short-nosed kangaroo rat, San Joaquin antelope squirrel, San Joaquin pocket mouse, slough thistle, recurved larkspur, Bakersfield saltbush, Tulare pseudobahia, and striped adobe lily.

The MBHCP established an Implementation Committee, which will include an FWS representative, to guide the plan's progress and evaluate additional parcels to be purchased. A FWS employee is a member of the Committee that is evaluating additional parcels to be purchased. The Committee is emphasizing large parcels to fulfill the species' long-term conservation needs. Thus far, approximately 2,000 acres (800 ha) have been purchased in an agency-preapproved area highlighted in the plan.

Vicki Finn is Chief of the Division of Consultation and Conservation Planning, FWS Region 1 Office in Portland, Oregon.

FWS officials expect that development would have significant impacts on kit fox and cactus populations. Such impacts are compensated and mitigated for by the purchase of habitat for both species, which also provide habitat for a number of other animals and plants. A 1- to 3-acre area (0.4 - 1.2 ha) will be purchased, enhanced, and managed in perpetuity for every acre developed, depending on the ecological value of the land prior to development. Projections are that about 700 acres (283 ha) per year will be acquired and the types of impacts anticipated. The permit expires in 20 years or when 15,200 acres (6,151 ha) of natural lands or 43,000 acres (17,402 ha) of open lands are developed.

photos by B. "Moose" Peterson/WRP

Top
blunt-nosed leopard lizard

Bottom
Tipton kangaroo rat

Opposite page
Bakersfield cactus
San Joaquin kit fox

Project SHARE

by James M. Sweeney and Paul Nickerson

Project SHARE was modeled, in part, on the Black Bear Conservation Committee (BBCC), which has been very successful in responding to the management needs of the black bear in Louisiana. Like the BBCC, Project SHARE is based on the principle that participation is open to all stakeholders that can contribute to the conservation goals of the organization. The keys to successful cooperation are a focus on the resource and mutual respect for the interests of all Project SHARE participants.

Atlantic salmon *(Salmo salar)* once inhabited freshwater rivers on both sides of the North Atlantic. In North America, they occurred as far south as the Housatonic River in Connecticut, and in at least 33 rivers in Maine (MacCrimmon and Gots 1979, Thorpe and Mitchell 1981, Beland 1984). By the early 1900's, however, over-harvest, habitat loss and destruction, and pollution had eliminated this important resource from most of its range (ND&T and Ritzi 1994, Netboy 1968). Concerted efforts since the mid-1900's to restore Atlantic salmon to rivers in the region so far have met with only modest success.

Sharp reductions in commercial harvest of Atlantic salmon during the marine portion of the species' life cycle offer hope for increasing the spawning runs in Maine rivers. But conserving this nursery habitat also is critically important. The "down east" rivers of Maine offer great potential for a successful habitat conservation, in part because of the relative lack of obstruction along these rivers and the presence of willing, cooperative landowners.

A New Approach

In 1993, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service were petitioned to list the naturally spawning Atlantic salmon as endangered throughout its known historic range in the U.S. In response, both agencies initiated a status review and began to seek public input.

In April 1994, the forest products industry hosted a workshop on the Atlantic salmon and the Endangered Species Act listing process. This meeting included presentations from the involved government agencies and various private landowners in down east Maine. The FWS encouraged a cooperative approach to salmon conservation, a point upon which all parties agreed.

Following the April workshop, three of Maine's major forest landowners—Baskaheagan Company, Champion International Corporation, and Georgia-Pacific Corporation, with combined

Editor's note:
On March 14, 1995, the FWS and National Marine Fisheries Service announced their finding that the petition to list the Atlantic salmon throughout its entire range in New England is not warranted. However, both agencies will continue to examine data on Atlantic salmon in seven Maine rivers for possible future listing under the Endangered Species Act, and are seeking more information to determine if salmon in four other Maine rivers warrant protection.

The Atlantic salmon historically has been an important natural resource in the northeast U.S. Its complicated life history presents unique management and restoration challenges. The Atlantic salmon spends 2 or 3 years of its life in fresh water and 1 to 3 years in the ocean.

ownership of more than 1 million acres (405,000 hectares) in the region—initiated a voluntary public/private approach to Atlantic salmon conservation and enhancement. Invitations went out to a broad list of potential interests for an inaugural meeting of Project SHARE (Salmon Habitat and River Enhancement), held June 27, 1994.

Project SHARE has grown to include at least 25 members, including forest landowners, agricultural landowners, State agencies, research and conservation groups, local businesses, and representatives of academia. The FWS has been an active cooperator from the start.

The objectives of Project SHARE fall into three general areas: habitat management, research, and education. Cooperators are identifying habitat restoration/enhancement needs in the down east rivers, prioritizing them, and assembling the resources needed to address them. Information gaps in river habitat management and survey techniques, as well as land-use/forestry/fishery relationships, are being identified, and research is being developed to fill those gaps. Members have developed Geographic Information System (GIS) maps for the Narraguagus River, delineating the various types of salmon habitat along the river course. Also, Project SHARE has instituted an education program to train members and the general public alike about the Atlantic salmon and its habitat needs.

Progress to Date

Project SHARE has held five meetings and is now formally organized as a non-profit corporation. Management projects completed or under way include the development of GIS maps delineating salmon habitat along other rivers, the removal of natural blockages to spawning areas, repair or replacement of specific water control facilities, and the installation of temporary population monitoring stations in selected streams. Research projects currently under design include:

photo by John and Karen Hollingsworth

Young hatchery—raised Atlantic salmon at the Lamar National Fish Hatchery, Maine

1) literature review of relationships between land use activities and salmon habitat, 2) monitoring of potential factors limiting salmon production, 3) energy input (coarse particulate matter) to salmon streams. A number of education projects also have been initiated, including training sessions for land managers, development of an educational facility at the Pleasant River Hatchery, video tapes on Atlantic salmon, and a logo contest for children.

Given the wide enthusiasm and support, Atlantic salmon will undoubtedly benefit from Project SHARE. But the larger benefit will be the lasting standard of cooperation that is established for dealing effectively with endangered species concerns. The resource, the ESA, and Maine's economy will be the better for it. We are hopeful that the trust established among the Project SHARE cooperators will extend to the conservation and use of other resources in Maine and throughout the United States.

James Sweeney is Manager of Wildlife Issues for the Champion International Corporation, Washington, D.C. 20006. Paul Nickerson is Chief of the Division of Endangered Species, Northeast Regional Office, U.S. Fish and Wildlife Service, Hadley, Massachusetts 01035.

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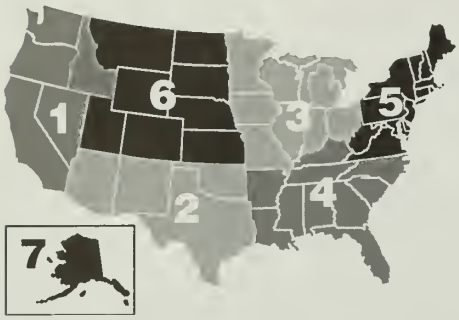

Region 1

Staff of the Fish and Wildlife Service's (FWS) Northern Idaho Field Office recently accompanied Forest Service staff on a caribou *(Rangifer tarandus)* monitoring flight in the Selkirk Mountains. The primary purpose of this flight was to observe evidence of caribou harassment by snowmobilers. Several days earlier, the Forest Service received a report that snowmobilers had been chasing caribou in the vicinity. During the flight, there was ample evidence of snowmobile tracks overlapping caribou tracks. The incident occurred outside of the area closed by the Forest Service last year after two separate incidents of caribou harassment. Both agencies are evaluating the situation to determine the best response.

Amazon Park is a city park maintained and managed by the city of Eugene in Lane County, Oregon. Habitat for native Willamette Valley plants, including the endangered Bradshaw's lomatium (*Lomatium bradshawii*), occurs on several acres of the park. The park also is heavily used for recreation and exercise. The Eugene Track Club recently provided funding and labor to install lighting around a popular jogging path. Unfortunately, the Club inadvertently used unauthorized equipment and caused damage to several areas known to contain Bradshaw's lomatium. The FWS, the Emerald Chapter of the Native Plant Society of Oregon, and city personnel met on-site and agreed to cooperate in establishing a Conservation Agreement. The city will conduct a comprehensive native plant survey and wetland delineation within the entire park, and to create a plan for managing the native wet prairie and woodland habitat remnants.

Region 3

On February 14, 1995, FWS Region 3 delivered a Biological Opinion on the Great Lakes Water Quality Guidance to the Environmental Protection Agency. The guidance provides water quality criteria and implementation procedures that are generally more stringent than existing guidelines and are intended to be consistent throughout the Great Lakes watershed. "No jeopardy" determinations were made for species considered in the Biological Opinion. EPA will conduct toxicity tests for endangered freshwater mussels to ensure that water quality criteria will protect these species. It also will gather more information and monitor bioaccumulative contaminant loads to ensure the protection of listed wildlife species.

In light of a recent discovery of the world's only known reproducing population of the purple cat's paw pearly mussel (*Epioblasma obliquata oliquata*), the FWS is working with the Ohio Division of Wildlife and Ohio Department of Transportation to conduct species surveys and bridge replacement activities in Coshocton and Wayne Counties of Ohio. Purple cat's paw pearly mussels were discovered in Killbuck Creek of Coshocton County last fall. Surveys for this mollusk and others will be conducted in Killbuck Creek in 1995, and all Ohio Department of Transportation bridge sites will be reviewed carefully before construction occurs.

Region 5

FWS biologists from Regions 4 and 5 met in late 1994 with the Dismal Swamp southeastern shrew *(Sorex longirostris fisheri)* recovery team to discuss new information about the possible distribution of this threatened subspecies. Preliminary morphometric investigations by one researcher indicate that the Dismal Swamp southeastern shrew may be more widespread on the North Carolina coastal plain than previously thought, which could lead to its delisting. These data, however, have not been substantiated, creating uncertainty as to whether North Carolina shrews should be regarded as the listed subspecies—*S. l. fisheri*—for the purposes of permitting and ESA section 7 consultations. The consensus of those at the meeting was that North Carolina coastal shrews should be regarded as unclassified until a published study undergoes peer review by the scientific community. The recovery team prepared a written position to this effect and developed a detailed research proposal. A study to determine conclusively the status of North Carolina shrews, including genetic analyses, is being initiated. In the interim, *S. l. fisheri* will continue to be considered endemic to the historical Dismal Swamp in southeastern Virginia and the northeastern corner of North Carolina.

Members of the Native Plant Society of Oregon conduct an on-site visit
photo by Laura Todd

Items for Regional News and Recovery Updates are provided by endangered species contacts in FWS regional and field offices.

Region 1

Christ's Indian paintbrush *(Castilleja christii)* The Idaho Department of Parks and Recreation (IDPR) has voted to approve the draft Conservation Strategy for this plant, a category one listing candidate. The strategy has not generated much controversy since it occurs only on Federal land managed by the Sawtooth National Forest and is threatened primarily by recreational activities. However, there was discussion on: (1) costs to the State that may be associated with implementing conservation actions for rare plants (particularly federally listed and candidate species) in the future, and (2) potential impacts of Federal listing on private landowners and the public's traditional uses of Federal lands. The Director of IDPR personally expressed support for the Service's pre-listing and candidate conservation program.

Castilleja christii

The Sawtooth National Forest is interested in implementing protection measures for the Christ's Indian paintbrush via a Conservation Agreement (CA) between the Idaho State Office and the Forest. The CA will address specific threats to this species, including scheduled road construction and powerline installation projects that could impact the Christ's Indian paintbrush population. Recreational use of the site has been increasing, and hang-gliding competitions now are staged at a rangetop within paintbrush habitat. Finalizing the CA, reducing and/or eliminating threats, monitoring impacts, and establishing the proposed Mount Harrison Research Natural Area (which currently includes 23 percent of the Christ's Indian paintbrush population) are priorities for the next several months. If protection measures specified in the CA are fully implemented by the Forest, it might be possible to reduce the need for Federal listing of this rare endemic species.

Region 3

Higgin's Eye Pearly Mussel *(Lampsilis higginsi)* The recovery teamfor this endangered mollusk met in Minnesota to identify and prioritize work items for 1995. The team discussed the need for a literature search and analysis of all data compiled since 1980, the date the original recovery plan was written. Other potential work elements include: recovery plan revision, development of mussel handling and relocation techniques, mussel survey guidelines, additional site characterizations, and genetics studies.

Region 5

Piping Plover *(Charadrius melodus)* In February, the FWS released for public review and comment a draft revised recovery plan for the Atlantic Coast population of the piping plover. On the basis of data gathered over the past 7 years, the revised plan calls for increasing the recovery and delisting target to a more appropriate number (from 1,200 breeding pairs to 2,000). At the same time, investigators proposed a program to allow additional management flexibility and reduce the impacts of plover protection on beach recreation.

Swamp Pink *(Helonias bullata)* Wetland habitat supporting a large,vigorous population of this showy plant has been purchased for inclusion into the Edwin B. Forsythe National Wildlife Refuge in New Jersey. This is the first swamp pink site to be included in the refuge system. The swamp pink, a perennial lily, is the only species in its genus. It was listed in 1988 as threatened, due primarily to habitat loss and resulting population declines.

Cherokee Clubtail Dragonfly *(Gomphus consanguis)* In early March, Leroy Koch of the FWS Southwestern Virginia Field Office met with two landowners regarding the possibility of cooperative habitat protection for this category 2 listing candidate. This species of dragonfly is endemic to the upper Tennessee River drainage, and in recent years has been recorded only from two locations in southwestern Virginia. One of these sites, a spring-fed stream near the town of Abingdon, is being damaged by cattle. Landowners are receptive to the idea of fencing cattle from the stream if an alternative water supply can beprovided. Field office staff are attempting to locate additional partners and funding for the project.

American Burying Beetle *(Nicrophorus americanus)* The FWS and Oklahoma Biological Survey recently hosted the first rangewide recovery coordination meeting for this endangered insect. FWS Region 5 has lead responsibility for recovery of the American burying beetle, which once had a very wide distribution throughout the lower 48 States. Currently, the species is known to occur in four States—Rhode Island, Oklahoma, Arkansas, and Nebraska. A remnant population also may exist in Iowa. Adding to the challenge of coordinating protection and recovery efforts, all five States fall within different FWS administrative regions.

photo by David Snyder

Helonias bullata

More than 40 participants attended the 2-day meeting. Included were representatives of all five involved FWS regions, agency and university researchers from several States, Federal agencies such as the Forest Service and Department of Defense, and large landowners such as the Weyerhauser Company. They discussed a wide variety of research and management issues. Although many questions remain about why the beetle disappeared from most of its range and what can be done to reverse the decline, substantial progress toward a better understandingof this rare and unique creature is being achieved.

Final Listing Rules February/March

The Fish and Wildlife Service published final rules during February and March 1995 listing 15 species—13 plants and 2 animals—as endangered or threatened species:

Twelve California Plants Twelve plant taxa restricted to serpentine soil outcrops in the San Francisco Bay area were listed February 3. The classification of endangered went to the 10 most immediately vulnerable plants:

Endangered:

Pennell's bird's beak *(Cordylanthus tenuis* ssp. *capillaris)*, an herbaceous perennial in the snapdragon family (Scrophulariacea);

Tiburon paintbrush *(Castilleja neglecta* ssp. *affinis)*, a semi-woody perennial in the snapdragon family;

photos courtsey of California Native Plant Society

Tiburon paintbrush

Tiburon jewelflower *(Streptanthus niger)*, an annual herb in the mustard family (Brassicaceae);

Presidio clarkia *(Clarkia franciscana)*, a annual herb in the evening-primrose family (Onagraceae);

fountain thistle *(Cirsium fontinale* var. *fontinale)*, a perennial herb in the aster family (Asteraceae);

San Mateo wooly sunflower *(Eriophyllum latilobum)*, a perennial in the aster family;

white-rayed pentachaeta *(Pentachaeta bellidiflora)*, a small annual in the aster family;

coyote ceanothus *(Ceanothus ferrisae)*, an evergreen shrub in the buckthorn family (Rhamnaceae);

Santa Clara Valley dudleya *(Dudleya setchellii)*, a low-growing perennial in the stonecrop family (Crassulaceae); and

Metcalf Canyon jewelflower *(Streptanthus albidis* ssp. *albidis)*, an annual herb in the mustard family.

Threatened:

Tiburon mariposa lily *(Calochortus tiburonensis)*, a perennial in the lily family (Liliaceae), and

Marin dwarf-flax *(Hesperolinon congestum)*, an herbaceous annual in the flax family (Linaceae).

Puerto Rican Shrub *Gesnaria pauciflora*, a small Puerto Rican shrub with no common name, belongs to the family Gesneriaceae. This species was listed March 7 as endangered due to its low numbers, restricted range, and vulnerability to habitat loss.

Southwestern Bird The southwestern willow flycatcher *(Empidonax traillii extimus)* is a small bird restricted to remnants of riparian habitat in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico. Due to population declines, this bird was listed February 27 as threatened.

Appalachian Arachnid The spruce-fir moss spider *(Microhexura montivaga)* is a tiny arachnid with a specialized habitat: damp mats of moss growing on rocks within mature, high-elevation spruce-fir forests in the Appalachian Mountains. Four populations are known to occur in western North Carolina and eastern Tennessee. Deterioration of the forest canopy is desiccating the moss, thereby threatening the spider's survival. It was listed February 6 as endangered.

Protection and Recovery

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take conservation actions; 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 Federal, State, and local agencies; independent organizations; and individuals.

Tiburon mariposa lily

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 Federal 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 prohibiting the take of State or federally-listed plants and animals.

Endangered Species Training

The Fish and Wildlife Service's (FWS) National Education and Training Center is offering three one-week technical courses related to the Endangered Species Act (ESA): Section 4—Listing and Candidate Conservation; Section 7—Consultation; and Section 10—Habitat Conservation Planning. Due to high FWS demand for these courses, space currently is limited for non-FWS personnel. However, as the training program continues to expand, interested people outside the FWS and Federal government will be encouraged to attend.

Brief course descriptions are provided below. Details can be found in the FWS Catalog of Training. For information on dates and locations of specific courses, contact the Environmental Conservation Training Section, National Education and Training Center, Route 3, Box 49, Kearneysville, West Virginia 25430, or telephone 304/725-8461 ext. 358 (fax 304/728-6772).

Section 4

Designed for FWS biologists involved with listing actions or candidate conservation activities, will cover such topics as:

- determining if a species should be listed, delisted, or reclassified
- determining if critical habitat is prudent and determinable
- the steps (including the petition process) to place a species on the candidate species list
- developing a conservation agreement for candidate species
- National Environmental Policy Act as it relates to section 4 of the ESA.

Section 7

Provided for FWS biologists responsible for reviewing potential impacts of Federal actions on proposed, listed, or candidate species. Lecture and in-class exercises will address subjects such as:

- responsibilities of FWS and other Federal agencies under section 7
- the application and limitations of section 7 when proposed activities may affect listed or proposed species and associated critical habitat
- types of consultations (including early, emergency, formal, informal)
- the major components (data needs) of biological assessments
- the relationship of section 7 to other functions of ESA and NEPA
- the difference between biological and legal perspectives

Section 10

Intended for FWS biologists responsible for assisting in the development of Habitat Conservation Plans (HCPs) under section 10(a)(1)(b) of the ESA. Topics include:

- legal authority for FWS role in HCPs
- the major steps involved in processing HCP permit applications
- the relation of HCPs with other environmental laws and other sections of the ESA
- incidental take permits and associated issuance criteria
- developing a minimization/mitigation strategy and alternative analysis.

In early April, Congress passed a moratorium on listing species under the Endangered Species Act through the end of fiscal year 1995. The measure, which prohibits final determinations listing species as endangered or threatened (including emergency rules) and designations of critical habitat, was attached to a Department of Defense supplementary spending bill signed by the President April 10. The bill also rescinded $1.5 million from the budget allocated to the FWS listing program. As a result, the FWS will not be adding any animals or plants to the list of threatened and endangered species through September 30, 1995.

BOX SCORE

Listings and Recovery Plans as of April 30, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	19	335	40
BIRDS	76	177	16	6	275	70
REPTILES	14	65	19	14	112	30
AMPHIBIANS	7	8	5	0	20	11
FISHES	68	11	37	0	116	68
SNAILS	15	1	7	0	23	11
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	325	520	111	39	995	300
FLOWERING PLANTS	406	1	90	0	497	200
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	12
PLANT SUBTOTAL	434	1	92	2	529	213
GRAND TOTAL	759	521	203	41	1,524*	513**

TOTAL U.S. ENDANGERED: 759 (325 animals, 434 plants)
TOTAL U.S. THREATENED: 203 (111 animals, 92 plants)
TOTAL U.S. LISTED: 955 (430 animals, 526 plants)***

*Separate populations of a species listed both as Endangered and Threatened, are tallied twice. Those species are the leopard, gray wolf, bald eagle, piping plover, roseate tern, chimpanzee, green sea turtle, and olive ridley 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 411 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.

***Six animals have dual status.

ENDANGERED Species BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
JULY/AUGUST 1995

FISH AND WILDLIFE SERVICE
VOL. XX NO. 4

Restoring threatened and endangered plants and animals to a secure status is one of the main goals of the endangered species program. Unfortunately, recovery is seldom an easy process. It may involve extensive research, habitat protection or restoration, close coordination among agencies and landowners, captive propagation and release, control of harmful non-native species, and a considerable amount of time.

Nearly 40 percent of listed U.S. plants and animals are stable or improving in status. This progress is the result of hard work by State and Federal agencies, independent organizations, landowners, businesses, and concerned citizens. This edition of the ***Bulletin*** *highlights recent successes in the continuing effort to restore balance to wildlife and its habitat.*

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ENDANGERED Species BULLETIN

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On the Cover
Recovery of the aplomado falcon took a promising turn this year with the first chick born in the United States in over 40 years. The photo to the left shows an adult bird.

photo by Tom Urban

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

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IN THIS ISSUE

FWS photo

photo by Bill Heinrich

Craig Koppie, FWS photo

Yellowstone Wolves Bear Pups

Recovery of the gray wolf *(Canis lupus)* in the Rocky Mountains came another step closer in early May when eight pups—four males and four females—were born to a wolf reintroduced this year into Yellowstone National Park. Biologists believe that the pups are the first wolves born in the Yellowstone region in over 70 years.

Working with biologists from the National Park Service and the Department of Agriculture's Animal Damage Control program, Fish and Wildlife Service biologist Joe Fontaine found the pups under a spruce bough near Red Lodge, Montana, a short distance northeast of the park. They were born to the alpha female from the Rose Creek pack, so named for the location of the acclimation pen that temporarily held a group of three wolves transported from Canada to Yellowstone National Park in January.

Under normal conditions, other members of a wolf pack assist the alpha female in care of the young. The alpha male provides some of the food for the female, who stays with or near the pups most of the time until they are weaned, which usually occurs within 10 weeks. In this case, unfortunately, the alpha male was illegally killed in April, leaving the female to raise the pups by herself. The only other member of the Rose Creek group, a juvenile female offspring of the alpha female, struck out on her own shortly after leaving the acclimation pen in March.

For a few days, wildlife biologists assumed the role of the missing pack members by providing animal carcasses for food. But because the female and her pups needed continued human assistance for several weeks, wildlife managers captured and moved them on May 18 to the acclimation pen at Yellowstone National Park. A veterinarian pronounced them all in excellent condition. The wolves will stay in the enclosure until the pups have a better chance for survival in the wild.

The two other packs released into Yellowstone National Park are doing well. One remains in the park, where over 3,00 visitors have seen wolves so far this year. The other pack (the Soda Butte pack) moves in and out of the park to the nearby U.S. Forest Service Absaroka-Beartooth Wilderness Area. In mid-June, more good news came to light: during a routine monitoring flight, a National Park Service biologist observed a pup following one of the Soda Butte females. Biologists suspect there may be others.

Yellowstone is not the only reintroduction site; 15 gray wolves were released this spring in central Idaho. One was killed illegally and another has not been

located since early spring, but the remaining 13 wolves appear to be doing well. During June, 12 of them were staying within the central Idaho wilderness, while one was located within the experimental population area on nearby Forest Service land in Montana.

This good news complements the successful wolf recovery program in northwestern Montana, where the population is expanding due to several years of good reproduction and continued dispersal of wolves from Canada. Currently, northwestern Montana supports about 70 wolves. Biologists estimate that several litters are being raised. No conflicts with livestock have been reported so far this year.

The progress of the wolf reintroduction program in its first year has exceeded all expectations. Breeding began ahead of schedule, mortality has been less than projected, and the wolves are remaining closer to their release areas than biologists anticipated. No conflicts with livestock had been reported as of early July. With additional releases in Yellowstone and central Idaho over the next 2 to 4 years and continued natural recovery in northwestern Montana, the gray wolf should be restored and eligible for delisting by the year 2002, if not earlier. Assuming the reintroduction effort continues to be as successful as it has been, the total cost of reaching wolf recovery in the Rocky Mountains will be significantly less than the $6.7 million originally predicted.

FSW photos

The wolves reintroduced into Yellowstone National Park were not expected to breed the year of their release, and the pups were a pleasant surprise. This good news was tempered, however, by the death of the Rose Creek pack's alpha male. Biologists monitoring the released wolves discovered the wolf's radio collar in late April. Acting on a tip, FWS law enforcement agents—working closely with the local sheriff and wardens of the Montana Department of Fish, Wildlife, and Parks—found the wolf's hide and skinned carcass. Chad McKittrick, a carpenter in Red Lodge, was charged with illegally taking the protected animal, and trial was scheduled for July 10. Under the experimental population rules governing the reintroduction program, ranchers and their employees in designated areas are allowed to kill wolves that are in the act of taking livestock; however, no livestock depredation was involved in this case, and McKittrick is not involved in the ranching industry.

Opposite page
FWS biologist Joe Fontaine preparing to relocate the Red Lodge pups

by Marie M. Bruegmann

Protecting Habitat for Silversword Recovery

Once, the slopes of Haleakala Crater on the Hawaiian island of Maui glowed at night from fields of unusual silvery plants that reflected the moonlight. By the 1920's, however, the plant that had become a popular tourist attraction was near extinction. But thanks to the efforts of the National Park Service, the Haleakala silversword *(Argyroxiphium sandwicense* var. *macrocephalum)* has increased in number dramatically.

photo by Joan Canfield, FWS

Before Haleakala Crater became a national park, visitors to the area would collect silversword plants as proof that they had made the journey all the way to the summit. Silverswords even were uprooted and rolled down the slopes of cinder cones for fun. Although the species is not a preferred food of goats and cattle, the sparse vegetation in the subalpine reaches of Haleakala made silverswords susceptible to browsing by these non-native animals. By the 1920's, the Maui Chamber of Commerce felt so strongly about the declining population that it petitioned Congress for efforts to save the species. As a result, Congress established Haleakala National Park.

The first ranger was stationed at Haleakala Crater in 1930, greatly reducing the vandalism problem, and cattle were removed from the park in the 1930's. In 1935, however, silversword population estimates were only 4,000 individuals, with fewer than 300 plants flowering. By 1971, the silversword population had increased to about 45,000 plants. Later, in the 1980's, the park boundary was fenced, and goats were evicted from the upper reaches of the park to remove the threat from browsing. The population grew to just under 65,000 plants by 1991.

Although the Haleakala silversword has increased dramatically in numbers, it was listed in 1991 as threatened because of other problems, the most dangerous of

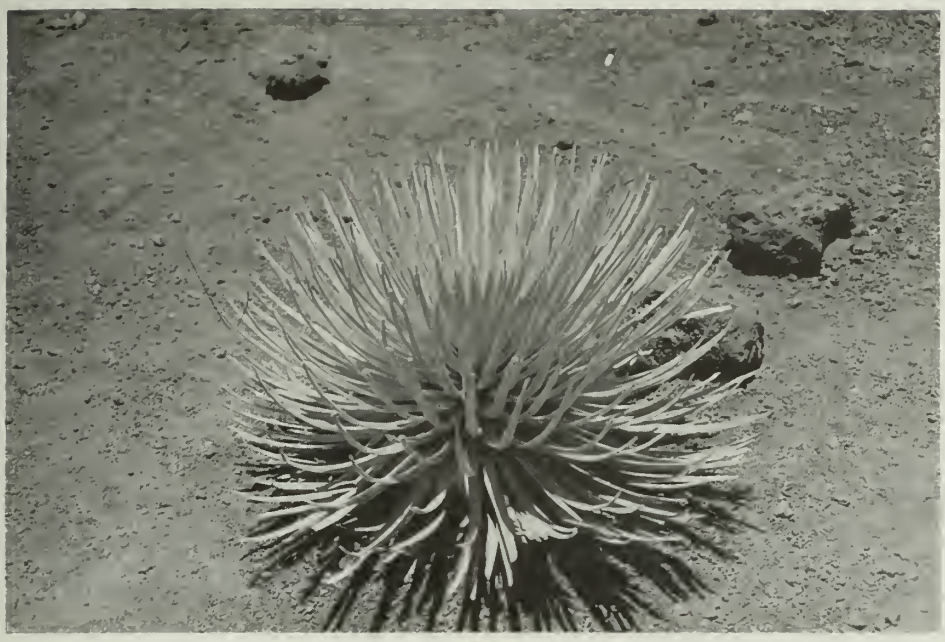


photo by M.M. Bruegmann, FWS

The Haleakala silversword is found only in a 250-acre (100-hectare) area in the crater and on the outer slopes of Haleakala, Maui's largest volcano, at elevations between 6,900 and 9,850 feet (2,100 and 3,000 meters). Most populations occur within the park boundaries. This majestic, globe-shaped plant with sword-like leaves is covered densely with silvery hairs. After 15 to 50 years, it produces one central flowering stalk up to 10 feet (3 m) tall bearing 50 to 600 pink or wine-red, daisy-like flowering heads. After flowering, the plant dies.

which is the loss of pollinators. Silverswords are self-incompatible, meaning that flowers from one plant must receive pollen from another plant to produce viable seeds. The localized, endemic insects that pollinate the Haleakala silversword are highly threatened by the introduced Argentine ant, which preys on native insects. Scientists have not yet found a way to effectively control the ants.

Constant monitoring also is required to maintain the fences that keep non-native ungulates out of the park. Illegal collecting, trampling, and increased erosion of the cinder substrate caused by the high number of visitors to the park have become threats again as Haleakala has grown in popularity. In addition, 60 percent of silversword seeds are eaten by some of the remaining native insects, greatly reducing the plant's reproductive success. Insects also eat leaves, stems, and roots of the silverswords, jeopardizing future growth and reproduction. Predation by native insects would not be a problem if the Haleakala silversword were not so reduced in range and numbers.

The dedicated work of the National Park Service saved the Haleakala silversword from extinction, but the species has not yet fully recovered. The remaining threats are difficult to control, and this magnificent plant may remain on the threatened list for several more years. Further recovery of the Haleakala silversword will require a concerted effort to address the numerous effects of introduced species in previously isolated ecosystems like the Hawaiian Islands.

Marie Bruegmann is a botanist with the FWS Pacific Islands Office, located in Honolulu, Hawaii.

photo by M.M. Bruegmann, FWS

by Daniel R. Tardona

Anastasia Island's Endangered Mouse

The beach mouse is nocturnal, foraging on sea oats, fruits of the prickly pear cactus *(Opuntia* spp.), other types of vegetation, and insects. These nightly forays are not without danger; raccoons *(Procyon lotor)*, opossums *(Didelphis marsupialis)*, and possibly eastern diamondback rattlesnakes *(Crotalus adamanteus)* include beach mice in their diets. Other threats to the Anastasia Island beach mouse include coastal storms and hurricanes. At current population levels and distribution, a single hurricane could destroy all that is left of this unique subspecies.

The major threat to the survival of the Anastasia Island beach mouse is loss of habitat. Coastal development not only alters habitat but also introduces new predators, such as free-roaming domestic and feral cats *(Felis catus)*, and competitors like the house mouse *(Mus musculus)*. Exotic vegetation can compete with native plants that provide food for the mouse and stabilize the dunes. Even in areas where good habitat still exists, it often is fragmented or reduced.

Early in the morning on a misty northeast Florida beach, a small mammal scurries along the foredunes in sea oats *(Uniola paniculata)* and other grasses as ocean waves crash onto shore. It takes the bait of dry oatmeal and is safely live trapped. A short time later, biologists and natural resource managers retrieve the animal. They observe its condition, determine whether it is male or female, and measure its weight before releasing the mammal back into its fragile environment unharmed. After a moment of hesitation, the animal plunges into a small hole in the side of the sand dune.

Why would such a small animal warrant this kind of attention? This particular mammal, endemic to a barrier island off northeast Florida, is the Anastasia Island beach mouse *(Peromyscus polionotus phasma)*, listed in 1989 as endangered.

Currently, two areas on Anastasia Island provide relatively undisturbed habitat for the beach mouse. Anastasia State Recreation Area, managed by the Florida Park Service, and Fort Matanzas National Monument, a unit of the National Park Service, contain small amounts of dune habitat for the beach mice. The National Park Service and the Florida Park Service protect beach mouse habitat by controlling feral cats, monitoring visitor use, and providing public education.

Recovery efforts depend on the cooperation of many State and Federal agencies. For example, research has been funded and/or conducted by the Florida Game and Fresh Water Fish Commission, University of Florida, Florida Museum of Natural History, and U.S. Fish and Wildlife Service.

Another facet of the recovery plan is to reestablish a population of the Anastasia Island beach mouse at another location within its former range. This would add some insurance against the animal's extinction if a severe storm were to wipe out the populations on Anastasia Island. A reintroduction was attempted at Guana River State Park on a barrier island north of Anastasia Island in the fall of 1992. As of spring 1995, the reintroduction effort was going well.

The Anastasia beach mouse and people can coexist. Protecting beach dune habitat benefits both the public as well as the beach mouse. Intact dune systems also help protect inland structures during storms and provide a buffer against beach erosion.

photo by Daniel R. Tardona, NPS

Daniel Tardona is the West District Supervisor for the Timucuan Ecological and Historic Preserve, National Park Service, in Jacksonville, Florida.

Aplomado Falcons Nest in Texas

Wildlife biologists were thrilled in early May to discover a pair of northern aplomado falcons *(Falco femoralis septentrionalis)* nesting near Brownsville, Texas, just south of Laguna Atascosa National Wildlife Refuge. Until this year, the last known nesting of an aplomado falcon in the U.S. was near Deming, New Mexico, in 1952. But even better news came in June, when biologists made their way to the nest and found a healthy aplomado chick.

The adult falcons were propagated by the Peregrine Fund, an organization devoted to birds of prey that has been releasing aplomado falcons at Laguna Atascosa NWR since 1985.

The recovery effort began in 1982, when a remnant population was discovered in southern Mexico. Mexican officials allowed the Fund to collect 10 chicks from 10 different nests for propagation at the organization's World Center for Birds of Prey, located in Boise, Idaho. As the breeding stock increased, reintroduction techniques were developed. Since 1985, 62 aplomado falcons have been released at Laguna Atascosa NWR and adjacent lands. Working with the FWS, the Fund plans to continue falcon releases at the refuge. Five chicks were released at Laguna Atascosa in late June, and the Fund hopes that improved captive propagation techniques will allow the release of 30-40 aplomado falcons in the refuge area this year.

Biologists had not expected any of the released birds to nest for at least several more years. Refuge Manager Steven Thompson gives credit for the success to cooperating individuals and organizations, such as the Peregrine Fund and the Cameron County Agriculture-Wildlife Coexistence Committee. The Committee, comprised of farmers, representatives of agricultural chemical companies, and wildlife officials, negotiated reductions in the use of some pesticides to avoid contaminating the falcon's food supply. Conservation of the falcons seems to be compatible with current land use. The new nest, for example, is on land currently leased for cattle grazing. "Basically, what is good for cattle is also good for aplomado falcons," said J. Peter Jenny, vice president of the Fund.

"The aplomado falcons are on the top 10 list of birds to see," according to Thompson. "People from all over the world come to the Rio Grande Valley just to see this rare falcon." A recent study states that bird watchers visiting the Laguna Atascosa area contribute almost $8.5 million annually to the Cameron County economy.

photo by Tom Urban

Aplomado falcons once flew widely over the grasslands of Texas and New Mexico, where they perched on yuccas and the crowns of scattered trees. But the species declined dramatically in the early part of this century, due primarily to changing land use practices that promoted the encroachment of brushy plants on grassland habitat. Any of the falcons that survived habitat alteration likely were contaminated by the chlorinated hydrocarbon insecticides (such as DDT) that came into use after World War II. These chemicals interfered with eggshell formation in falcons and led to reproductive failure.

The aplomado falcon is named after the Spanish word for lead because of the bird's grayish coloring. Adults are characterized by a gray dorsum, rufous underparts with a black "cummerbund," distinctive black and white facial markings, and a long, banded tail.

Endangered Birds Found on Maui

by Michelle Reynolds, Tom Snetsinger, and Thane Pratt

Many of the unique birds native to the Hawaiian Islands have declined dramatically since the archipelago was settled. Extensive habitat loss and the effects of introduced predators, competitors, and diseases caused the extinction of some species and reduced others to such a low point that their current status is unknown. Of the 30 Hawaiian bird species listed under the Endangered Species Act, 15 forest birds are among the most rare. Some now are seldom if ever seen. Efforts to find these species and obtain basic information on their numbers, distribution, and ecological requirements are needed if we are to protect and restore the unique Hawaiian avifauna.

The National Biological Service recently initiated surveys for four critically endangered Hawaiian birds inhabiting the windward rainforests of Maui's Haleakala Volcano: the po'ouli (*Melamprosops phaeosoma*), Maui akepa (*Loxops coccineus aureus*), Maui nukupu'u (*Hemignathus lucidus affinis*), and Bishop's o'o (*Moho bishopi*). These species inhabit dense, high-elevation rainforests that cover some of the most inhospitable terrain in the world, a dissected landscape of steep ridges and deep gulches. Rainfall can be as high as 350 inches (890 centimeters) per year. The remoteness and difficulty of working in forests where the rare bird species are found hindered previous research attempts, but recent surveys have yielded some encouraging results.

Opposite page
Nukupu'u

Below
Po'ouli
paintings by Sheryl Ives Boynton

Biologists with the National Biological Service's Hawai'i Field Station led three expeditions last year into portions of the State's Hanawi Natural Area Reserve and Haleakala National Park. A family group of three po'ouli was discovered during the first expedition in August and September, and a juvenile po'ouli was observed begging and being fed by an adult. Few sightings of this elusive species have been made since the mid-1980's, and evidence of successful breeding was very exciting.

The Hawaiian name for this small chunky brown bird with a black mask and light underparts means "black-faced." Although all historic records of po'ouli have been from 'ohi'a (*Metrosideros polymorpha*) forests with dense native understory, fossil records from dry forests on the southwest slope of Haleakala indicate that the species once enjoyed a much wider range. Po'ouli feed on snails and insects gleaned from trees and understory plants. These birds are harmed by feral pigs that destroy microhabitats essential to native

snails and other invertebrates. Mosquito-borne avian diseases (malaria and avian pox) at lower elevations and non-native mammalian predators are additional likely threats. A population estimate for po'ouli made in 1980 was less than 150 birds. Today, researchers believe that fewer than 30 individuals remain.

A second expedition in October 1994 found an additional po'ouli about 1 mile (2 km) from the family group. An adult male nukupu'u was also discovered. The last confirmed sighting for the very rare Maui nukupu'u was in 1986. Its Hawaiian name describes its decurved bill: "nuku" means bill, and "pu'u" a round hill. The nukupu'u's upper mandible is twice the length of the lower. The plumage is olive green. Males have a bright yellow head, throat and breast. Nukupu'u feed on wood boring beetles, spiders, nectar, larvae, and flower nectar. Historic records suggest they were originally more common in the lower elevation koa forest *(Acacia koa)* that have been nearly eliminated by cattle ranching.

The third search effort in February 1995 found a po'ouli nearly 1,000 feet (330 meters) lower in elevation than the previous sightings. Perhaps the Maui akepa and Bishop's o'o will be rediscovered next!

Survival of po'ouli and nukupu'u continues to be threatened by the invasion of non-native animals and plants into the birds' nearly pristine habitat. To ward off this invasion, the National Park Service, Hawaii Division of Forestry and Wildlife, Nature Conservancy of Hawai'i, and U.S. Fish and Wildlife Service (FWS) are hard at work fencing and removing feral pigs from the historic range of the po'ouli and other critically endangered forest birds. To date, 900 acres (400 hectares) are pig free, and the remaining 600 acres (250 ha) of the po'ouli's known range should be so by 1997. Adjacent forests are similarly managed and are showing signs of recovery.

This year, the FWS funded an initial 2 years of research and further management for the po'ouli and nukupu'u. This new project, to be carried out by the National Biological Service, will conduct research on the birds' population ecology. Management actions may buy the po'ouli and nukupu'u time until their habitat has recovered from pig damage and the bird populations can increase in numbers and range.

If successful, the surveys will locate additional birds and may lay the groundwork for their recovery.

Michelle Reynolds, Tom Snetsinger, and Thane Pratt are wildlife biologists with the National Biological Service, Hawaii Field Station, Hawaii National Park.

Supreme Court Affirms Habitat Protection

On June 29, the U.S. Supreme Court upheld the provision of the Endangered Species Act that protects endangered and threatened wildlife from harm due to habitat modification or degradation. The 6-3 ruling in the "Sweet Home" case was welcomed by Secretary of the Interior Bruce Babbitt as "a common sense approach" consistent with the actions of past Republican and Democratic Administrations in protecting listed species. "At the same time," Babbitt said, "it makes it all the more important that we work to make this law more flexible and user-friendly for landowners. Cooperation with landowners, big and small, is the best way to ensure both the health of wildlife habitat and sustainable economic development. We will continue to aggressively pursue a variety of reforms to make the Act less onerous on private landowners."

"Our objective is to encourage landowners with endangered species habitat to integrate economic development and conservation through practical conservation efforts on their land. Habitat conservation plans are the solution that demonstrate the compatibility of wildlife habitat conservation alongside resource use and land development. "

by Sarah E. Rinkevich

Mexican Spotted Owl Draft Recovery Plan

A draft recovery plan for the Mexican spotted owl *(Strix occidentalis lucida)* was released March 27, 1995, for public review and comment. It describes the actions biologists believe are necessary to restore this threatened subspecies to a secure status.

The draft plan was written by a recovery team that included owl experts and other wildlife biologists, landscape ecologists, forest ecologists, and silviculturalists. A Mexican representative was appointed to the team to facilitate owl recovery efforts in Mexico, where land management practices differ substantially from those in the United States. In addition, representatives from various Federal and State agencies, plus a tribal representative, played substantial roles in the recovery plan's development.

FWS photo

The draft recovery plan calls for areas to be treated according to three categories: protected, restricted, or unrestricted. Protected areas include 600-acre "Protected Activity Centers" around occupied or recently occupied owl sites, plus forests within the owl's range that are over 40 degrees in slope. Restricted areas include mixed conifer and pine-oak forests outside protected areas, where logging can take place if conducted in a manner compatible with the owl's habitat. Finally, "unrestricted" areas include the remaining forested lands, such as spruce-fir, pinyon-juniper, and ponderosa pine forests. The team presumes that current management will provide adequate habitat for foraging and dispersal, the owl's primary uses of these forest types.

A major recommendation is to conduct a scientifically based population trend analysis. The Mexican spotted owl was listed based on the projected loss of old-growth or uneven-aged forest habitat. It assumed that the existing Mexican spotted owl population will survive if sufficient habitat is maintained. However, to determine recovery, the trend in owl abundance will be needed. This will be most important in Arizona and New Mexico where most of the owls exist. Peripheral areas, such as Colorado and Utah, support low densities of spotted owls that would be expected to fluctuate considerably over time. These peripheral populations may have significant genetic importance.

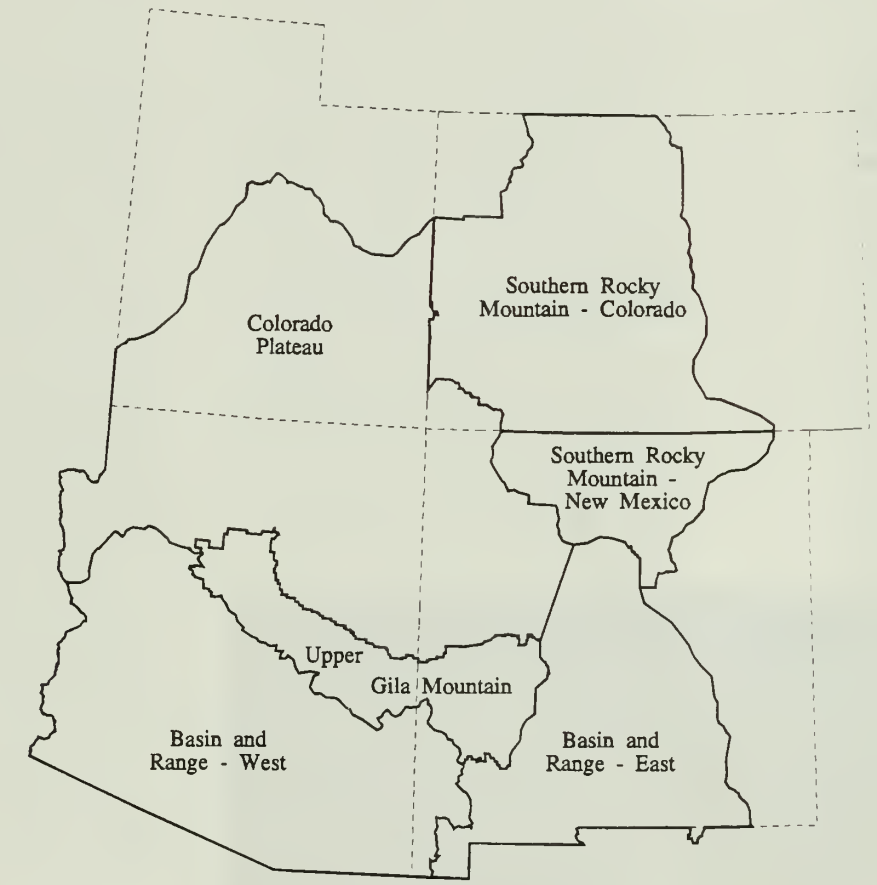
As the primary administrator of lands supporting Mexican spotted owls in the United States, the Forest Service will have a leading role in the recovery effort. Earlier plans for extensive management of southwestern National Forests as even-aged stands are no longer in effect. The Southwestern Region of the Forest Service has been proactive in the recovery effort by considering the draft recovery plan as an alternative in its Draft Environmental Impact Statement to Amend Forest Plans. The Fish and Wildlife Service (FWS) will work closely with the Forest Service to carry out the final recovery plan. In addition, the FWS is assessing the significance of private lands for owl recovery and considering whether a special rule under section 4(d) of the Endangered Species Act, to allow greater flexibility in the use of these lands, would be appropriate. Several private land owners already are working with the FWS in New Mexico to reach agreements on logging within owl habitat.

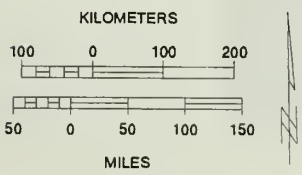
Sarah E. Rinkevich is a wildlife biologist in the FWS New Mexico Ecological Services State Office in Albuquerque.

The range-wide population of the Mexican spotted owl is fragmented naturally into geographically distinct subpopulations. Within these regions, owls inhabit diverse assemblages of biotic communities ranging from mixed conifer and ponderosa pine/oak forests to steep-walled canyons with varying amounts of coniferous and riparian vegetation. In northern portions of the range (i.e., southern Utah and Colorado), nests have been found in caves or on cliff ledges in rocky canyons. Elsewhere, most nests appear to be in trees. Forests used for roosting and nesting often contain mature or old-growth stands with complex structure and high canopy closure. Spotted owls may be relatively intolerant of high temperatures, causing them to prefer closed-canopy forests and deep, shady canyons for roosting and nesting. Although the Mexican spotted owl appears to be quite similar to both the northern and California spotted owls (*S. o. caurina and S. o. occidentalis*, respectively) in behavior and ecology, the Mexican spotted owl uses a wider range of habitat types.

Potential threats to the owl and its habitat vary throughout the Southwest. Although a plan to convert the management of most National Forest land in the southwest to even-aged timber production was the main reason for the owl's listing, other adverse effects on the habitat could result from grazing and certain recreational activities. The team's conclusion was that recovery measures cannot, and should not, be applied uniformly across the owl's entire range. Consequently, the owl's range was divided into 11 geographic areas or Recovery Units. Six were designated within the United States (see map) and five were delineated in Mexico.

Mexican Spotted Owl Recovery Unit Index Map





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Produced by NationalBiological Service
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by Hans Stuart

Protecting the White Sands Pupfish

The pupfish is essentially a relict of the Pleistocene epoch, according to Craig Springer, a biologist in the FWS Albuquerque Ecological Services Office. Some 20,000 years ago, a huge body of water known as Lake Otero inundated the present-day Tularosa Basin. Over time, as the climate became more arid, the lake subsided, and waters in the Tularosa Basin became separated from waters outside the basin. Consequently, several species of pupfish were isolated and left to adapt to the harsh desert environment in which they now remain.

An historic agreement among five agencies will protect the habitat of the White Sands pupfish *(Cyprinodon tularosa)*, a small fish endemic to a few desert springs and streams in the Tularosa Basin of south-central New Mexico. Signing the agreement were representatives of the White Sands Missile Range, U.S. Fish and Wildlife Service (FWS), New Mexico Department of Game and Fish, White Sands National Monument, and Holloman Air Force Base.

"Our agreement protects this unique fish and precludes the need to add it to the Federal list of threatened and endangered species," said Lynn Starnes of the FWS Southwest Regional Office in Albuquerque, New Mexico. "Each of the parties will help the pupfish by studying, protecting, and managing its habitat, which is also quite rare."

The White Sands pupfish, listed by the State of New Mexico as endangered, is found on White Sands Missile Range. An introduced population of the fish has been established in the Lost River, which flows through Holloman Air Force Base and White Sands National Monument.

The White Sands pupfish has evolved to tolerate environmental conditions that would kill most other fishes, Springer added. They can endure water temperatures ranging from near freezing to 92 degrees Fahrenheit, flourish in water three times saltier than seawater, and persist in the smallest of pools. Threats to the species include water withdrawals, pollution, and competition from non-native fish that have been introduced into its habitat.

A conservation plan accompanying the interagency agreement addresses each of these threats and calls for introducing the fish into additional waters within the Tularosa Basin. Water withdrawals from pupfish habitat are now prohibited; in the past, water occasionally was used for construction activities within the Missile Range. Biologists from each of the five agencies will develop a monitoring program to track pupfish populations and their habitat. In addition, non-native fishes within pupfish habitat on the Missile Range (e.g., carp and mosquitofish) will be controlled. Permanent waters not presently inhabited by the pupfish are being examined for their potential in expanding the range of the pupfish.

photo by Hans Stuart, FWS

Hans Stuart is a public affairs specialist with the FWS Southwest Regional Office.

Back From the Brink

by Hugh Vickery

The bald eagle *(Haliaeetus leucocephalus)*, the national symbol that almost disappeared from most of the United States just 25 years ago, is back from the brink. After a year-long review of public comments and scientific information, the Fish and Wildlife Service (FWS) recognized the continuing recovery of this magnificent raptor on July 12 by upgrading its official status from endangered in the lower 48 states to the less critical category of threatened.

This action marks a dramatic turnaround for the eagle, which was down to as few as 417 nesting pairs in the lower 48 states in the 1960's. Since that time, the number of nesting pairs has climbed to nearly 4,500, and the population is still increasing.

The reclassification rule, proposed on June 30, 1994, would have retained the bird's endangered status in Arizona, New Mexico, western Texas, and part of southeastern California. New data revealed that the eagle could be reclassified in those areas as well, and the final rule made this change.

The decline of the bald eagle was caused primarily by habitat loss and widespread use of the pesticide DDT. Eagles ingested the chemical by eating contaminated fish. In the late 1960's and early 1970's, scientists at the Patuxent Wildlife Research Center found that DDE, the principal breakdown product of DDT, accumulated in the fatty tissues of adult female eagles and impaired the release of calcium needed for eggshell formation. As eggshells thinned, reproductive success plummeted. After DDT was banned in the U.S. in 1972, however, populations gradually began to increase.

In addition, the Endangered Species Act (ESA) promoted bald eagle recovery by curbing habitat destruction and protecting nesting sites. Some areas of particular importance were added to the National Wildlife Refuge System. Other recovery actions included the release of healthy young eagles in habitat where natural reproduction no longer occurred and the rehabilitation of injured birds. "While banning DDT was vital," FWS Director Mollie Beattie said, "the eagle could not have recovered had there not been strong laws such as the Endangered Species Act to protect its habitat and promote recovery."

Since the late 1970's, bald eagle numbers have been doubling every 6 to 7 years. Surveys indicate the population has risen 10 percent since 1993. Due to continuing threats, however, this species has not attained complete recovery. Episodes of poisoning still occur periodically, and the cumulative effects of incremental habitat loss are a problem in some areas. As a threatened species, the bald eagle will remain under the protection of the ESA.

photo by Paul Sykes, Jr.

Bald eagles historically ranged throughout North America except extreme northern Alaska and Canada and central and southern Mexico. The species is not listed as endangered or threatened in Canada and Alaska because populations there are considered healthy. A provision of the original reclassification proposal would have extended ESA protection to the species in Mexico, but action has been deferred because of a Congressional moratorium on adding taxa to the list of endangered and threatened wildlife.

Hugh Vickery is a public affairs specialist in the FWS Washington, D.C., Office.

by William E. Lehman

Relief for Private Landowners

One of the main criticisms of the ESA in recent years is that it excessively restricts the activities of private landowners, especially owners of small areas of land. Several recent Department of the Interior and Fish and Wildlife Service initiatives have addressed this controversial topic (see *Endangered Species Bulletin*, Vol XX, No. 3). In addition, a new and far-reaching solution to this problem is being crafted to allow private landowner activities that have only minor effects on species listed as threatened and, in the past, may have violated section 9 of the ESA.

The primary restriction affecting private landowners under the Endangered Species Act (ESA) is the section 9 prohibition against "take" (defined in part as killing, harming, or harassing a federally listed species). However, a proposed "Residential/Small Impact Exemption" would essentially remove from the take prohibition certain classes of private landowner activities determined to have a minor or negligible impact on threatened species. This exemption would be accomplished under the authority of section 4(d) of the ESA, which allows for the development of special management programs for threatened species. However, because section 4(d) applies only to threatened species, endangered species would not be included in the proposed Residential/Small Impact Exemption.

Three kinds of activities would be affected by the proposed exemption: (1) activities conducted on a contiguous parcel of land 5 acres or less in size that is or will be occupied by a single household dwelling and is used principally for residential, non-commercial purposes; (2) activities conducted on a parcel of land that result in the cumulative disturbance of no more than 5 total contiguous acres for the entire parcel; and (3) activities likely to have negligible adverse effects upon the species.

Each of these categories is designed to address a specific or generic set of circumstances. The first is targeted toward residential homeowners and would essentially relieve the maintenance, enhancement, and general use of residential properties from ESA restrictions. Included would be building a new home on a recently purchased lot, adding to an existing home, landscaping, gardening, and similar activities. The key to this category is that the activities are for *residential* purposes, and the affected property could not exceed 5 acres.

The second category is targeted toward *low-impact* activities, whether they are commercial or non-commercial in nature. This exemption would allow construction of a small to mid-sized business, for example, or use of part of a residential property for income-producing purposes. There is no restriction in the size of the affected property under this exemption. However, the total area of habitat disturbance over time could not exceed 5 acres, and the disturbance area must be contiguous.

The third category is undefined, allowing exemption of activities other than those described above when the FWS determines that the effects on the threatened species would be negligible.

The proposed Residential/Small Impact Exemption would be instituted in accordance with Federal regulations dealing with threatened species (50 CFR 17.33), under the general presumption that the effects of small landowner activities on threatened species are not significant.

For species listed in the future as threatened, the new regulation would require the Fish and Wildlife Service (FWS)—during the listing process—to evaluate the effects the exemptions would have on the species. If the FWS judges the effects are not likely to be significant, the exemptions would apply when the species is listed. However, if the effects *are* expected to be significant, the FWS would issue a special 4(d) rule concurrently with the final listing rule that would limit the exemptions as necessary to prevent significant effects.

For species already listed at the time the exemption authority takes effect, the FWS would evaluate exemption impacts on a case-by-case basis. Where the effects on a species are not likely to be significant, the FWS would then issue a special 4(d) rule applying the exemptions to that species.

A proposed rule describing the Residential/Small Impact Exemption is expected to be published in the *Federal Register* by late July 1995. A final rule codifying the exemption framework into Federal regulation could be in effect about 6 months later. Furthermore, Secretary Babbitt's March 9, 1995, ten-point plan for improving the ESA calls for an amendment extending the exemption process to endangered as well as threatened species. These will be important steps in balancing conservation goals with the need for easing ESA impacts on families, small landowners, and other property owners whose activities have only minor effects on listed species.

William Lehman is a wildlife biologist in the FWS Division of Endangered Species, Washington, D.C.

FWS photo

Under current law, private landowners either avoid take or, if it cannot be avoided, obtain an "incidental take permit" under section 10(a)(1)(B) of the ESA (see *Bulletin* Vol. XX, No. 1). The proposed exemption, in many cases, would remove ESA restrictions on such activities as home construction.

Soaring to Recovery

The American peregrine falcon's population is now estimated at nearly 1,000 nesting pairs in the lower 48 states and more than 300 in Alaska, with additional nesting birds in Canada and Mexico.

The American peregrine falcon *(Falco peregrinus anatum)*, one of nature's most beautiful and exciting birds of prey, may soon wing its way off the list of threatened and endangered species. "After a narrow

photo by Skip Ambrose, FWS

brush with extinction, the peregrine falcon is coming back," Secretary of the Interior Bruce Babbitt said at a June 30 press conference. "Once a tragic symbol of what was wrong with our environment, the peregrine is now a symbol of hope."

FWS photo

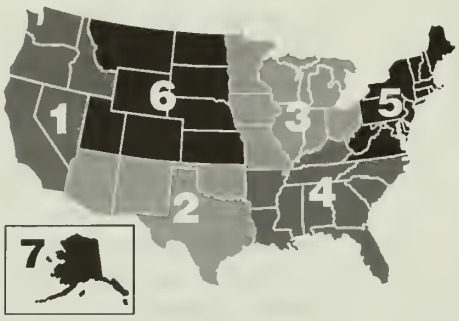
In recent years, peregrines have made themselves at home in a number of cities, including Baltimore, Boston, Chattanooga, Denver, Phoenix, and Seattle, where the birds feed on pigeons and nest on the ledges of tall buildings. The parents of this chick used such a ledge as a substitute for the cliffside nesting sites used by peregrines in more remote areas.

The Fish and Wildlife Service (FWS) is not yet removing the peregrine from the endangered list, Babbitt said, but is taking the first steps in that process by publishing a notice of intent to propose delisting the species. The notice, published in the June 30 *Federal Register*, called for additional information on the status of the American peregrine falcon throughout its range. Data collected during the 60-day public comment period will help the FWS decide whether it is appropriate under the Endangered Species Act (ESA) to propose the peregrine for delisting.

Like the aplomado falcon, the American peregrine falcon fell victim to contamination by the pesticide DDT, which caused eggshell thinning and reproductive failure. The impact of DDT on peregrines was most profound in the eastern U.S. and southeastern Canada, where the peregrine was virtually eliminated from the wild by the mid-1960's. In the west, some American peregrines managed to withstand the impacts of pesticides, although numbers declined by as much as 80 to 90 percent.

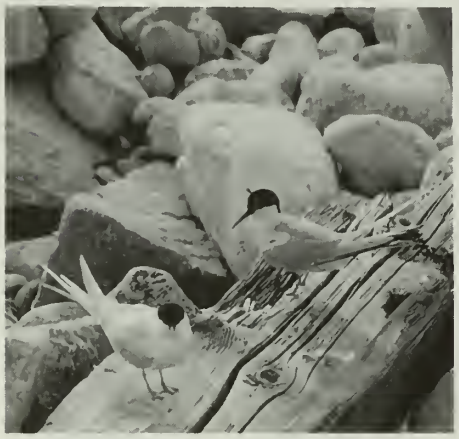
Populations began to increase after DDT was banned in 1972, but the effort to restore the falcon has been long and intensive. Reintroductions of captive-bred peregrines helped to reestablish the bird in parts of the country where it had completely disappeared. Organizations such as The Peregrine Fund and a number of state wildlife agencies also launched reintroduction programs.

As part of its notice of intent, the FWS invited comments and additional information on the species' status, distribution, population size, and vulnerability to threats. All information received by the U.S. Fish and Wildlife Service, 2493 Portola Road, Suite B, Ventura, California 03003, by August 29, 1995, will be considered. After a review of all comments, the FWS will decide whether to propose delisting the American peregrine. If a proposal is issued, the public will again have an opportunity to comment on the change in status before a final decision is made.



Region 3

Biologists with the FWS Migratory Bird and Ecological Services programs in Regions 3 and 5 are initiating a status assessment for the Great Lakes population of the common tern *(Sterna hirundo)*. The assessment will determine whether or not there is enough information to warrant proposing this species as a category 1 listing candidate.



Common tern
photo by Mike Bender

Endangered Species was the theme of this year's Michigan Science Teachers Conference, which was attended by more than 2,500 teachers. FWS East Lansing Field Office staff spoke to the group about Michigan's threatened and endangered species. The FWS "Endangered Species: Road to Recovery" display was featured in the conference exhibition hall.

The FWS delivered a biological opinion to the U.S. Forest Service, Huron-Manistee National Forests, to complete formal consultation on their 6-year plan to manage habitat for recovery of the endangered Karner blue butterfly *(Lycaeides melissa samuelis)*. The "no jeopardy" opinion allows incidental take of butterfly eggs, larvae, and adults during burning, cutting, mowing, and scarification of selected sites occupied by the butterfly.

Region 4

West Indian manatee *(Trichechus manatus)* recovery staff in the FWS Jacksonville, Florida, Field Office recently participated in the Metro-Atlanta Outreach Partnership program, co-sponsored by FWS and Zoo Atlanta. This program seeks to enhance public awareness and stewardship of natural resources and to challenge young people to pursue careers in resource conservation. Since October 1994, FWS Ecological Services staffers have given 12 presentations around Region 4 to students, youth groups, associations, and conferences. Topics included the manatee, red wolf *(Canis rufus)*, red-cockaded woodpecker *(Picoides borealis)*, Louisiana black bear *(Ursus americanus luteolus)*, other endangered species, and careers with the FWS.

Among the approaches being used in the outreach program is the Georgia Statewide Academic and Medical System (GSAMS). GSAMS is an interactive television network that feeds into 150 electronic-learning classrooms. High school students throughout Georgia were introduced to manatees through two presentations on this network.

Region 5

The Fifth Annual New England (and New York) Freshwater Mussel Meeting was held in Concord, New Hampshire, on April 17 and 18. Organized by Susi von Oettingen, endangered species specialist in the FWS New England Field Office, the 2-day meeting featured research presentations, general discussions of species' status, a taxonomy/anatomy workshop, and a field trip for a look at some local mussels. Over 50 people attended, including representatives of academia, government agencies, conservation organizations, a utility company, and museums, along with consultants and students. Attendance was a record, almost tripling from last year.

Many mussel species depend on a specific host fish during their larval stage. Information on the host fish for the brook floater *(Alasmidonta varicosa)*, dwarf wedge mussel *(Alasmidonta heterodon)*, and triangle floater *(Alasmidonta undulata)* was presented at the conference. Attendees also learned about a toxicity study of larval and juvenile mussels. Recognizing the growing interest in freshwater mussels, the group decided that a meeting of this type will be held every other year.

The FWS Southwestern Virginia Field Office hosted the second meeting of the Upper Tennessee River Basin Protection Planning Committee in Abingdon, Virginia, on April 5. The committee is an informal technical group that aims to coordinate the efforts of all agencies, organizations, and others interested in 1) identifying and protecting sites that harbor rare species and 2) restoring sites that contribute to water quality problems. Attendees discussed nearly 30 sites in need of some level of protection and/or restoration.

Others participating on the committee include representatives of the Virginia Department of Environmental Quality, Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Virginia Department of Transportation, Virginia Cave Board, Black Diamond Resource Conservation and Development Council, Tennessee Valley Authority, Clinch and Powell River Action Team, Holston River Action Team, U.S. Natural Resource Conservation Service, National Biological Survey, U.S. Geological Survey, U.S. Forest Service, and The Nature Conservancy (Virginia and Tennessee Chapters).

Endangered Species is the focus for the 1995 *Earth Stewards* program in New Jersey. *Earth Stewards* is a new approach to educating students about environmental issues and empowering them to become stewards of wildlife habitats in their area. Developed by the National Fish and Wildlife Foundation and the FWS Office of Training and Education, the program maximizes the use of FWS and National Biological Service expertise by forming partnerships among these agencies and local schools.

As one of six nationwide pilot sites to implement *Earth Stewards* in 1995, the FWS New Jersey Field Office, in partnership with the faculty of the Smithville Elementary School in Galloway Township, chose endangered species as their theme. By using existing environmental programs and information such as the State's Project WILD, the National Wildlife Federation's packets, and the FWS Endangered Species Issue Pac, a 6-week endangered species curriculum for grades K-6 was developed for the 750 Smithville students. In addition to activities such as planting a butterfly garden and constructing endangered species displays for their school, the *Earth Stewards* students are exploring various wildlife habitats at the nearby Edwin B. Forsythe National Wildlife Refuge.

The 1995 *Earth Stewards* program in New Jersey is supported by contributions from the Smithville Elementary School's PTA, Bally's Park Place Casino Hotel, TropWorld Casino and Entertainment Resort, and grants from the Geraldine R. Dodge Foundation and National Fish and Wildlife Foundation. *Earth Stewards* programs also are being piloted in Pierre, South Dakota; Anchorage, Alaska; Willows, California; Columbia, Missouri; and Lafayette, Louisiana.

On June 7, 1990, the oil tanker *B.T. Nautilus*, owned by the Nautilus Motor Tanker Company of London, England, grounded in the Kill Van Kull waterway between New Jersey and New York. Approximately 267,000 gallons of fuel oil spilled from the ship into the Kill Van Kull and adjacent waterways. Damages outside of the New York/New Jersey Harbor Estuary area included lost recreational use of beaches and injuries to threatened piping plovers *(Charadrius melodus)*, that were nesting at the time of the spill.

A settlement resolving all Federal and State (New York and New Jersey) claims with the Nautilus Motor Tanker Company was reached in June 1993. Nautilus Motor Tanker Company paid a total of $3.3 million in compensation for natural resource injuries. Settlement for injuries to populations of the piping plover accounted for a major component of the damage claim.

State and Federal biologists involved with protecting the piping plover in New Jersey decided that the most effective means to restore piping plover numbers would be to reduce human disturbance and predation from feral and domestic animals at nesting sites. A cooperative restoration plan developed by the State of New Jersey, the National Park Service, The Nature Conservancy, and the FWS calls for such measures as fencing, predator exclosures, and a Memorandum of Understanding with coastal municipalities to promote beach management compatible with nesting plovers.

Funding resolutions for the piping plover restoration plan have been signed by the B.T. Nautilus trustees. The resolutions allow the transfer of $679,000 over a 5-year period from the B.T. Nautilus settlement to the New Jersey cooperators for measures identified in the plan. Implementing the restoration measures is expected to result in incremental increases in the number of piping plover chicks that successfully fledge, thereby compensating for losses in New Jersey from the oil spill. A similar restoration plan is being developed to compensate for piping plover losses in New York.

Region 3

Indiana Bat *(Myotis sodalis)* Three Indiana bats were discovered hibernating in an 80-year-old hollow concrete dam located about 130 miles (209 kilometers) north of the previously known range of this species in Michigan. In addition to the Indiana bats, over 20,000 bats of other species were found hibernating in the dam.

Niangua Darter (*Etheostoma nianguae*) In cooperation with the Niangua Darter Recovery Team, Jerry Hamilton, a hatchery manager with the Missouri Department of Conservation, has successfully propagated this threatened fish in captivity for the first time. The Niangua darters reproduced this spring at the state's Blind Pony Fish Hatchery. Nine fingerlings attained a length of up to 1.5 inches (3.8 centimeters) in about two months. On July 17, five of the fingerlings were released back into the habitat where the adults were captured. Captive propagation of the darter may be essential in the future for the recovery of this fish, which is endemic to Missouri.

Kirtland's Warbler *(Dendroica kirtlandii)* Recovery efforts in Michigan for the endangered Kirtland's warbler are showing impressive results. In early June, census takers counted a record 765 singing males in Michigan, up from 633 in 1994 and a low of 167 recorded in 1987. The number of Kirtland's warblers using jack pine plantations this year dramatically increased; 57 percent of the birds were located in areas specifically planted for nesting habitat. The recovery of the Kirtland's warbler is a cooperative effort of the FWS, Michigan Department of Natural Resources, U.S. Forest Service, National Biological Service, and Michigan Audubon Society.

Region 5

Virginia Big-eared Bat *(Plecotus townsendii virginianus)* and Indiana Bat During the winter of 1994-95, biologists with the West Virginia Nongame Wildlife and Natural Heritage Program monitored endangered bat populations in most of West Virginia's significant endangered bat hibernacula. Included in the surveys was a count at Hellhole Cave, one of the most significant bat caves in the eastern United States. Twelve people spent over 100 person-hours tallying a total of 80,263 bats of 6 species in the cave. Hellhole Cave harbors the largest known concentration (6,378 individuals) of the endangered Virginia big-eared bat *(Plecotus townsendii virginianus)*, the largest wintering population (6,808) of the endangered Indiana bat *(Myotis sodalis)* in the East, and over 66,600 little brown bats *(Myotis lucifugus)*. Also observed were such non-endangered bats as the eastern pipistrelle *(Pipistrellus subflavus)*, big brown bat *(Eptesicus fuscus)*, and northern myotis *(Myotis septentrionalis)*.

Compared to the numbers observed during the 1993-94 Hellhole Cave survey, the Virginia big-eared bat population increased 28.5 percent and the number of Indiana bats grew 21.2 percent. An additional 1,171 *P. t. virginianus* and 515 *M. sodalis* were tallied in other caves during the winter 1994-95 surveys. These surveys were funded largely by an FWS grant to the State under Section 6 of the Endangered Species Act.

Townsend's Big-eared Bat
photo by Merlin D. Tuttle, Bat Conservation International

Riparian Habitat In February, biologists in the FWS Southwestern Virginia Field Office met with representatives from the Tennessee Valley Authority, Natural Resources Conservation Service, and local Soil and Water Conservation Districts to discuss partnerships for restoring riparian habitat on the South, Middle, and North Forks of the Holston River in southwestern Virginia. Several species of endangered mussels in the Holston River drainage are affected by cattle waste and bank erosion along reaches where cattle are allowed to access streams for water. Although the Clinch, Powell, and Holston Rivers are all a part of the upper Tennessee River basin, until now the FWS has undertaken riparian restoration partnerships only in the Clinch and Powell River drainages.

Proposed Listing Rules

Two plants and a salamander endemic to cienegas—a type of wetland—in southern Arizona and northern Mexico were proposed by the Fish and Wildlife Service on April 3 for listing as endangered. If the proposal is approved, Endangered Species Act (ESA) protection will be extended to the following:

Canelo Hills ladies'-tresses ***(Spiranthes delitescens)***—a slender, terrestrial orchid that reaches a height of approximately 20 inches (50 centimeters) when in bloom. Five to 10 grasslike leaves grow basally on the stem, and the top of the flower stalk contains up to 40 small white flowers arranged in a spiral.

Huachuca water umbel ***(Lilaeopsis schaffneriana var. recirva)***—a small, herbaceous, semi-aquatic perennial in the family Apiaceae. The cylindrical, hollow leaves of this plant are segmented at regular intervals and grow from creeping rhizomes. Generally, the erect leaves are only 1 to 2 inches (2.5 to 5.0 cm) tall, but they can grow to 8 inches (20 cm) in favorable conditions.

Sonora tiger salamander ***(Ambystoma tigrinum stebbinsi)***—a large salamander with light-colored blotches on a dark background. The snout-vent length of metamorphasized individuals can reach 4.9 inches (12.5 cm). Larvae are aquatic with plume-like gills and well-developed tail fins.

All three taxa depend on cienegas, perennial streams, and other wetlands, which are extremely rare in the desert southwest. Cienega is a Spanish word for a distinctive type of mid-elevation wetland community often surrounded by an arid environment. Cienegas typically are associated with permanent springs and stream headwaters, have saturated, highly organic soils, and have a low probability for flooding or scouring. Cienegas support diverse assemblages of plants and animals, including many species with limited distributions.

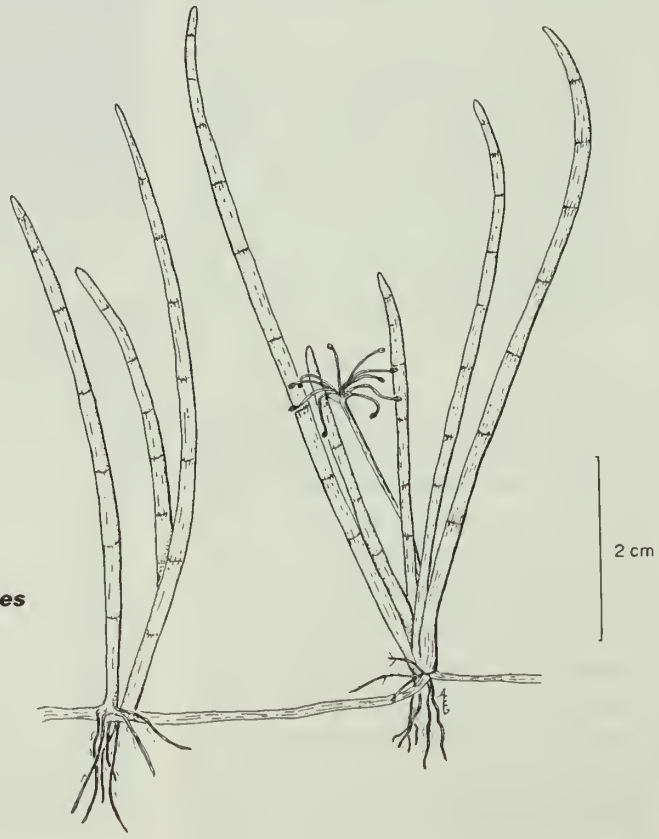
People have affected wetland and riparian systems in the southwest for at least several thousand years. Human settlement in what is now southern Arizona and northern Sonora, Mexico, initially centered on oasis-like cienegas and streams. Much greater impacts came with settlers in the 1800's. By the late 1800's, many of the region's watersheds were in poor condition due to uncontrolled livestock grazing, mining, haying, logging, and other practices. Many wetland and riparian ecosystems have not fully recovered and in some cases may never recover from these activities.

Wetland degradation in the southwest continues due to many of the same threats, as well as such factors as groundwater overpumping, surface water diversions, channelization, and introductions of non-native plants and animals. The ecological effects of these activities is expected to increase with the region's growing human population.

The Canelo Hills ladies'-tresses occurs at four cienegas in the San Pedro River watershed near the Mexican border within the San Rafael Valley and the Canelo Hills, Arizona. Its occupied habitat totals less than 200 acres (81 hectares), all on privately-owned land. Botanists have surveyed potential habitat in Sonora, Mexico, but without success.

The Huachuca water umbel once was known from 21 locations in Santa Cruz and Cochise Counties and adjacent Sonora, but has been extirpated from 6 sites. Fifteen populations survive on private and public lands within four major watersheds—the San Pedro River, Santa Cruz River, Rio Sonora, and Rio Yaqui. A reintroduction into wetlands on the San Bernardino National Wildlife Refuge appears to have been successful, although overgrazing on adjacent land has led to erosion that threatens the site. The FWS has funded a project to reintroduce the plant along the Santa Cruz River and its tributaries.

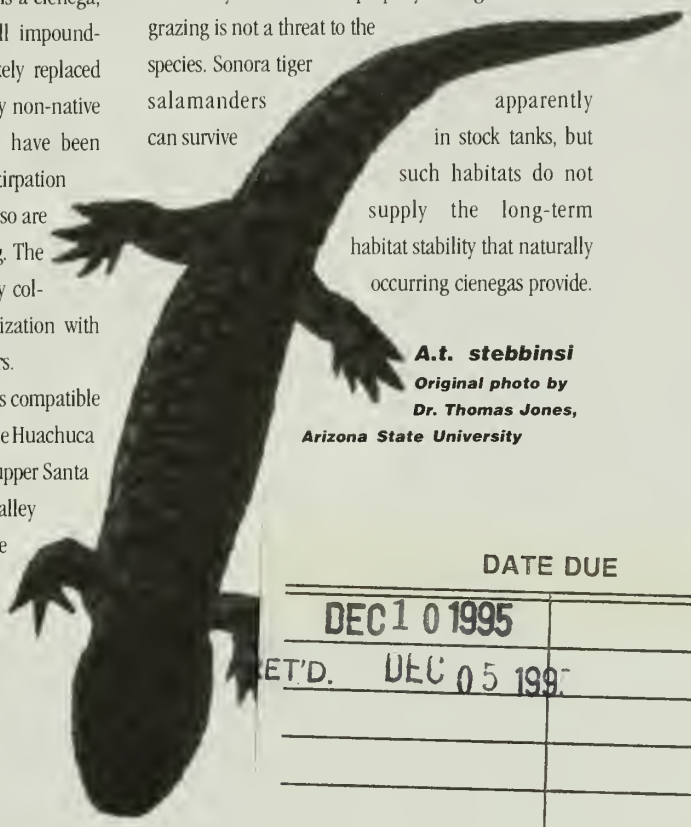
Sonora tiger salamanders occur at 17 sites in the headwaters of the Santa Cruz and San Pedro Rivers in



Center
Huachuca Water Umbel
Right
Canelo Hills Ladies'-tresses
FWS drawings

Santa Cruz and Cochise Counties, and possibly at a site in Sonora, Mexico. One of these locations is a cienega, and the others are livestock tanks (small impoundments created to water animals) that likely replaced natural wetlands. Disease and predation by non-native fish and bullfrogs *(Rana catesbeiana)* have been implicated in the salamander's recent extirpation from 3 of the 18 sites. Tiger salamanders also are used widely in the region as bait for fishing. The Sonora subspecies is threatened directly by collection for bait and indirectly by hybridization with other salamander taxa released by anglers.

Conservation of these proposed species is compatible with well-managed land use. The fact that the Huachuca water umbel and its habitat remain in the upper Santa Cruz River system in the San Rafael Valley attests to the good land stewardship of the landowner. Although the effect of livestock on the ladies'-tresses is unclear, the primary conclusion reached by the FWS is that properly managed grazing is not a threat to the species. Sonora tiger salamanders apparently can survive in stock tanks, but such habitats do not supply the long-term habitat stability that naturally occurring cienegas provide.



A.t. stebbinsi
Original photo by Dr. Thomas Jones, Arizona State University

In early April, Congress passed a moratorium on adding species or critical habitat to the list of threatened or endangered species. The moratorium is in effect through September 30, 1995, was attached to a Department of Defense supplementary spending bill signed by the President on April 10, 1995. The bill also rescinded $1.5 million from the budget allocated to the FWS listing program. As a result, the FWS will not be adding any animals or to the list of ened and endangered es through mber 30, 1995.

Science Panel Releases Report on ESA

On May 24, 1995, a National Research Council committee released a long-awaited report, "Science and the Endangered Species Act." This study, prepared in response to a bipartisan request from congressional leaders over 2 years ago, set out to address whether the ESA conforms to contemporary scientific knowledge regarding habitat, risks to species, recovery factors, and identification of species and subspecies.

The committee concluded that there has been a good match between science and the ESA since its passage in 1973, but recommended certain changes to improve its implementation. Conclusions publish the report include:

- ✓ **The ESA's empha species, subspec and distinct vert populations (taxa the rank of subs is soundly justifi current scientific knowledge.**
- ✓ **The ESA's emph protecting habit reflects current scientific under of the crucial relationship between species and their habitats.**
- ✓ **Recovery planning is an essential component of any program to protect endangered species. To**
- ✓ **with long-term or irreversible consequences should be evaluated in terms of long-term recovery of the species.**

notiation of ionally-based habitat servation plans uld continue under dance from FWS, luding advice on nagement options l application of risk alyses.

or Secretary Bruce tt welcomed cation of the report, g "The Endangered ies Act is not perfect, his report tells us that urrent law is built on oundation of sound biological science. The report tells us that the only way to prevent extinctions is to protect the natural habitat of threatened and endangered plants and animals."

BOX SCORE

Listings and Recovery Plans as of June 30, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	19	335	40
BIRDS	76	177	16	6	275	69
REPTILES	14	65	19	14	112	30
AMPHIBIANS	7	8	5	0	20	11
FISHES	68	11	37	0	116	68
SNAILS	15	1	7	0	23	11
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	325	520	111	39	995	300
FLOWERING PLANTS	406	1	90	0	497	200
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	12
PLANT SUBTOTAL	434	1	92	2	529	213
GRAND TOTAL	759	521	203	41	1,524*	513**

TOTAL U.S. ENDANGERED: 759 (325 animals, 434 plants)
TOTAL U.S. THREATENED: 203 (111 animals, 92 plants)
TOTAL U.S. LISTED: 956 (430 animals, 526 plants)***

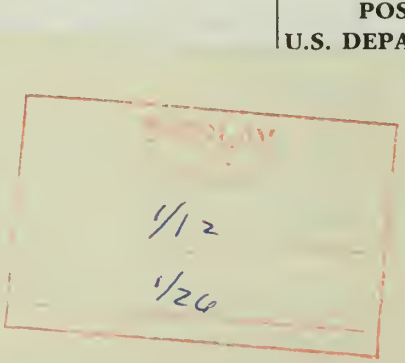
*Separate populations of a species listed both as Endangered and Threatened, are tallied twice. Those species are the leopard, gray wolf, bald eagle, piping plover, roseate tern, chimpanzee, green sea turtle, and olive ridley turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**There are 411 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.

***Six animals have dual status.

ENDANGERED Species BULLETIN

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



ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
SEPTEMBER/OCTOBER 1995

FISH AND WILDLIFE SERVICE
VOL. XX NO. 5

Coastal ecosystems are highly dynamic, diverse areas of enormous ecological significance. They contain some of the nation's most productive wildlife habitats, support valuable fisheries, and provide recreation for millions of people. With proper stewardship, these areas should continue to meet many differing human demands without compromising ecological integrity or biological diversity. But some living resources of our coastal areas are showing signs of stress. One indicator of the problems facing coastal ecosystems is the fact that almost half of the nation's endangered and threatened species are found there. As highlighted in this issue, the Fish and Wildlife Service is working to conserve coastal resources for the enjoyment of future generations.

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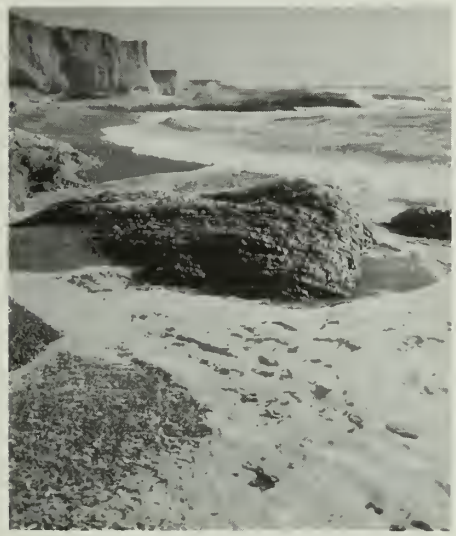

On the Cover
California's coast supports a wide variety of dwindling habitats, including kelp beds, rocky intertidal areas, eelgrass beds, salt marshes, beaches, and riparian systems.

photos by B. "Moose" Peterson/WRP©

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

The Fish and Wildlife Service distributes the Bulletin primarily to Federal and State agencies and official contacts of the Endangered Species Program. It also is reprinted by the University of Michigan as part of its own publication, the Endangered Species UPDATE. To subscribe, write the Endangered Species UPDATE, School of Natural Resources, University of Michigan, Ann Arbor, MI 48109-1115; or call 313/763-3243.

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IN THIS ISSUE

by Steve Glomb

Protecting Coastal Ecosystems

"*Let's go to the beach!*" Such a popular refrain about such a popular destination. In fact, coastal areas have become so popular that many people have decided to live there year-round. The coastal zone is home to over one-third of the U.S. population, and that proportion is expected to grow to 75 percent in the next 15 years. Many of the same characteristics that attract people to coastal areas make these areas prime habitat for fish and wildlife resources. Although they comprise less than 10 percent of the Nation, coastal ecosystems are home to nearly two-thirds of the Nation's fisheries, half of the migratory songbirds, and one-third of our wetlands and wintering waterfowl. The coasts also harbor 45 percent of all threatened and endangered species, including three-fourths of the federally listed birds and mammals.

Can our crowded coastlines provide enough high-quality habitat for people, other animals, and plants? How can we restore threatened and endangered coastal species? How can we keep other coastal species from reaching low population levels? A search for answers to these and other questions led the Fish and Wildlife Service (FWS) to create the Coastal Ecosystems Program (Program). The Program integrates many FWS programs and authorities and focuses them on 11 of the Nation's highest priority coastal watersheds. It encompasses both open coastal areas and inland portions of watersheds, looking broadly at living resource interactions within an ecosystem.

The goal of the Coastal Ecosystems Program is to eliminate or reduce threats to coastal habitats and species. Since no single agency can manage entire coastal ecosystems on its own, the FWS works with Federal, State, and private partners to conserve and protect important coastal habitats. Program funds support a variety of projects: gathering and distributing information for use by local decision-makers; targeted education to catalyze volunteer action; and, most importantly, on-the-ground actions to conserve and restore habitats.

From the Gulf of Mexico to the Gulf of Maine and on to the Pacific Ocean, the Program has funded dozens of

projects in support of threatened and endangered species.

Texas

The sandy, marshy shoreline of Galveston Bay is home to not only several threatened and endangered species, but also over 3 million people, the world's second largest concentration of petrochemical facilities, and one of the nation's busiest ports. Despite all the surrounding industry, the Bay still has significant natural vitality and productivity. Shorebirds, wading birds, endangered brown pelicans (*Pelecanus occidentalis*), and other birds flock to Galveston Bay's shores. At the same time, a tradition of broad public access exists in Texas, including a State law mandating that beaches be open to the public. One challenge undertaken by the Galveston Bay/Texas Coast Ecosystem Program is to channel the access of thousands of people away from the most sensitive habitats, especially at critical times such as nesting.

Working closely with local government officials, the Program built traffic barriers to limit vehicle access to one stretch of beach, and created the 210-acre (85-hectare) Big Reef Nature Park, which includes a wetland/dune/lagoon complex. These traffic barriers reduced the stress the birds feel from close contact with humans and reduced the amount of litter within the park. To compensate for the closure of public beach access, the partners built a pedestrian boardwalk over the dunes and added interpretive signs to educate the public about the importance of the habitat to endangered species and other wildlife. Brown pelicans, Arctic peregrine falcons (*Falco peregrinus tundrius*), and numerous shorebirds can be seen foraging and seeking shelter in the park. Plans are in place to revegetate the dunes, improve shorebird nesting habitat, build observation areas in the Park, and create similar parks in two other spots along Galveston Bay's barrier islands.

Little Pelican Island is the largest and most productive colonial waterbird rookery on the Texas Coast. In past years, hundreds of brown pelicans roosted and attempted to nest on the island, but with little success. Together with the Houston Audubon Society, the Texas Parks and Wildlife Department,

Cape Cod National Seashore is an important recreational resource. With careful planning and management, beaches can serve the demands of people while providing habitat for wildlife. ***National Park Service photo***

Endangered brown pelicans and a variety of shorebirds benefit from seasonal protection of important nesting beaches on Little Pelican Island.

Will Roach/FWS

Additional Coastal Projects

Projects of the Fish and Wildlife Service Coastal Ecosystems Program not only benefit listed species, but can help prevent the need to list others:

- **Portions of the Connecticut River, Delaware Bay, and Chesapeake Bay have been designated as "wetland complexes of international importance," largely because of their significance to migratory birds along the Atlantic flyway. Several partnerships are already in place, and others are being formed to protect these areas from urban encroachment and to restore degraded marshes.**

- **On the Eastern Shore of the Chesapeake Bay, 10 northern diamondback terrapins (*Malaclemys terrapin terrapin*), a species of concern, quickly moved into an area that the Program protected from erosion and dredge disposal.**

and others, the Program designed and installed large signs advising boaters, campers, and anglers to stay off the island during nesting season. After this seemingly simple action, pelicans had a very productive year, with 125 nesting pairs. Preliminary estimates for 1995 show an increase to 200 nesting pairs.

Maine

Maine's craggy headlands are a far cry from beaches in the Gulf of Mexico, yet they too provide sites for the Coastal Ecosystems Program to help conserve endangered and threatened species. The rocky islands off the coast of Maine offer breathtaking scenery and exceptional habitat for colonial shorebirds, including endangered roseate terns (*Sterna dougallii*), wading birds, waterfowl, threatened bald eagles (*Haliaeetus leucocephalus*), and other raptors. The rugged beauty and location of these islands has also attracted tourists with plans for development of seasonal homes.

Long-term monitoring of bird habitat, along with outreach programs to educate local people about the ecological importance of these habitats, were conducted by the Coastal Ecosystems Program and the Petit Manan National Wildlife Refuge, setting the stage for action. Sharing this information with groups such as the Maine Audubon Society, the Maine Coast Heritage Trust, the Damariscotta River Association, the Island Institute, and The Nature Conservancy was a critical first step toward protecting these islands. Partnerships with these local land trusts have led to conservation easements and acquisition to protect about 125 acres (51 hectares) of highly significant habitat for threatened and endangered birds. Some islands are now owned by the land trusts, and some have been added to the FWS's National Wildlife Refuge System. The most significant nesting sites are protected, but access is allowed for environmental education and some recreation.

California

Southern California attracts even more people and provides habitat for more listed species than the Texas Coast. The "River of Birds" along the Pacific flyway has lost most of its native, undisturbed habitat for nesting, resting,

and feeding. A partnership with the San Diego County Parks Department, State agencies, and local conservation groups is attempting to reverse the trend by restoring tidal flow to a degraded coastal lagoon. Restoration of the San Elijo Lagoon will likely benefit three endangered species, the California least tern (*Sterna antillarum browni*), light-footed clapper rail (*Rallus longirostris levipes*), and tidewater goby (*Eucyclogobius newberryi*); two threatened species, the western snowy plover (*Charadrius alexandrinus nivosus*) and coastal California gnatcatcher (*Polioptila californica californica*); and Belding's savannah sparrow (*Passerculus sandwhichensis beldingi*), a species of concern.

Pacific Northwest

While most of the Nation's salmon populations are not currently listed as threatened or endangered, stocks are not as abundant as they once were. Salmon populations in the Northwest have fallen tremendously from the levels of a few decades ago. Projects in four priority embayments within Puget Sound are restoring tidal and intertidal wetlands vital to the survival of juvenile and adult salmon during migration. These efforts will provide direct benefits to salmon populations, helping to keep them from shrinking to the point where the salmon will require protection under the Endangered Species Act. The projects in Puget Sound also serve to demonstrate effective conservation techniques for other coastal managers.

Despite the success of the Coastal Ecosystems Program, it has become clear that to overcome the increasingly rapid pace at which coastal areas are being altered, more innovative, comprehensive, and preventative approaches are necessary. Through its leadership of the Program, the FWS is reaching out to other Federal, State, and local agencies and all interested citizens to come together for the restoration and protection of our Nation's precious coastal resources.

Steve Glomb is a fish and wildlife biologist in the FWS Division of Habitat Conservation in Washington, D.C.

- **Atlantic white cedar forests, a rare plant community, are being restored along the shores of Albemarle-Pamlico Sounds. These forests will provide additional areas for many migratory songbirds whose habitat has been shrinking throughout their migratory pathways.**

- **Wetland restoration in San Francisco Bay, soon to move from the planning to the implementation stage, will provide similar benefits to endangered, threatened, and candidate species on the west coast.**

Coastal California gnatcatcher
Arnold Small

by Jim Kraus

Florida Manatee Soft Release

The Florida manatee *(Trichechus manatus latirostris)*, a large, herbivorous aquatic mammal sometimes called a sea cow, is one of the nation's most vulnerable animals. Fewer than 2,000 still swim the waters of the southeastern United States, primarily in coastal areas of Florida. As Florida's human population continues to grow, threats to the manatee and its habitat also increase.

Historically, human activities have accounted for about one-third of the known manatee deaths in Florida each year. Approximately 80 percent of these human-related deaths are related to collisions with boats. In 1994, at least 193 manatees died from all causes, marking one of the worst years on record for the beleaguered population. Of this total, 49 deaths were watercraft-related and 16 involved water control structures. In addition to those killed, many more manatees are injured or orphaned each year. Most adults bear permanent scars from boat propeller strikes. Others need assistance to be freed from fishing and crab pot lines, or require treatment due to cold stress or illness.

FWS photo

As part of the manatee recovery effort, a statewide partnership has evolved to rescue, rehabilitate, and—whenever possible—release manatees back into the wild. Private citizens, non-profit organizations, businesses, and government agencies at all levels contribute to the rehabilitation effort. Manatee rescues in the State are coordinated by the Florida Department of Environmental Protection, in cooperation with the Florida Marine Patrol and 11 other organizations. Authorized participants in the rescue program respond to hundreds of reports of manatees in distress annually, and 20 to 30 animals are rescued for treatment each year. Five Florida facilities currently work with the Fish and Wildlife Service (FWS) in the rehabilitation effort. Sea World of Florida (Orlando), Miami Seaquarium, Lowry Park Zoo (Tampa), Homosassa Springs State Wildlife Park, and Living Seas at EPCOT Center (Lake Buena Vista) are now caring for over 50 manatees.

The captive population has gradually increased due to the growing number of injuries, orphaned manatees, and captive births. Although many manatees have been released successfully, an acute crowding situation has developed at some facilities. In response, participants in the recovery program have developed an ambitious "soft-release" approach to introduce rehabilitated manatees to a semi-natural environment, providing an intermediate phase between the captive facility and truly wild habitat. The results of this approach may show whether long-term captives, orphaned, and possibly captive-born manatees can be integrated into the wild population. When possible, however, injured manatees judged suitable for direct release are still returned to the general vicinity of their rescue as soon as they are fit.

The FWS developed the first soft-release site in 1994 at Merritt Island National Wildlife Refuge near Cape Canaveral. In cooperation with the Kennedy Space Center, and with financial support from the 38,000-member Save the Manatee Club and the Florida Department of Environmental Protection (with money raised from sales of specialty license plates), three fenced enclosures covering 4.5 acres were constructed in a seagrass bed. Manatees with minimal wild experience now can be introduced to a semi-natural habitat and diet in a setting where managers can keep a close eye on their condition and progress.

Soon after construction was completed in August 1994, the soft-release area was occupied by several manatees, known to their caretakers at Sea World of Florida as "Scott," "Moose," and "Monroe." Scott was native to the area and had been in captivity only briefly

Left
At the Merritt Island staging area or soft release site, a team pulls nets to allow the examination of a Florida manatee.
Jim Valade/FWS

for treatment. His role was to introduce the novices in the group to their new surroundings and a natural diet of seagrass. This method shows great promise, and is used whenever suitable individuals are available in the captive population. In other cases, temporary supplemental feeding of familiar food items, and gradual weaning to encourage the transition to the wild seagrass diet, is probably necessary for inexperienced manatees.

On-site observations by teams of volunteers and various program partners are coordinated by the National Biological Service's Sirenia Project. Manatees are observed closely over a period of several weeks and are screened for signs of medical complications. Observations of feeding behavior, interaction with other manatees, and general activity levels are used to assess each manatee's acclimation to its new surroundings and its suitability for eventual release.

Upon arrival at the soft-release site, manatees are fitted with peduncle (tail) belts to which floating radio transmitters are attached. Color-coded tags enable observers to monitor the location and activity of each manatee within the enclosures. Periodic medical examinations give biologists important data on the health of each animal. The decision to release a manatee is based on a combination of factors, including medical histories and the behavior of the animal during its stay in the enclosure. The actual release event can be as simple as opening the gate leading into the Banana River, where manatees can join the resident population. In some cases, however, a short transport by truck to a familiar release site may be needed. To date (August 1995), four manatees have been set free from the soft-release site.

Evaluating the success of the soft release approach will take time and a sustained effort by all parties involved. Many creative techniques will be employed on a case-by-case basis, and every trial will provide new lessons. With the spirit of cooperation and determination shown by partners in the recovery effort, the long-term prospects for released manatees in the "real world" of Florida's busy waterways are looking brighter.

Jim Kraus, the FWS Assistant Manatee Coordinator, is located in the Jacksonville, Florida, Field Office.

by Susan Saul

Songbirds Sing Again in California

The mating call of the male least Bell's vireo *(Vireo bellii pusillus)* was heard in southern California during 1994 in a chorus louder than anyone had heard in years. Preliminary results from this year's surveys indicate that the population continues to show impressive growth.

Once common in streamside thickets from Red Bluff, California, south into Mexico, only about 300 breeding pairs of the gray-olive songbird were found in the United States when it was listed in 1986 as endangered. In 1994, over 1,000 males were heard singing along southern California rivers and streams.

Fish and Wildlife Service biologists Loren Hays and Larry Salata attribute the bird's comeback to both stream preservation and management of a competing species, the brown-headed cowbird *(Molothus ater)*. They also credit the vireo's progress to the local, State, and Federal agencies that have created and managed new vireo habitat to compensate for habitat damage resulting from highway and flood-control projects.

The greatest progress has occurred on Camp Pendleton, a Marine Corps base north of San Diego. It was home to only 26 breeding pairs in 1981. That year, the Marine Corps and the Navy began managing habitat for vireos, and their work became a model for vireo recovery elsewhere in southern California. By 1994, at least 300 breeding pairs nested along the Santa Margarita River and the base's creeks—about as many as were estimated to remain in the entire State in 1986.

Another vireo success story can be found in the Prado Basin of the Santa Ana River near Riverside, where 19 breeding pairs were counted in 1986. Biologists counted about 150 breeding pairs there in 1994, due both to new plantings of willows and mule fat (a low, bushy shrub) and cowbird control. Much of the cost for this work is being paid by Orange County water and flood control agencies to compensate for habitat damage caused by their projects.

Three vireo nesting areas along the San Luis Rey River are being maintained by the California Department of Transportation to compensate for habitat damage caused during the widening of a State highway, and by the Army Corps of Engineers to compensate for damage from a flood control project. In those 3 sites, 22 vireo males established breeding territories. Along the entire San Luis Rey River, from Interstate 15 to the Pacific Ocean, the number of territorial vireo males has grown from about 40 in the mid-1980's to 142 in 1994.

In 1989, biologists heard only 5 male vireos along the 2 to 3 miles of the Tijuana River inside California. By 1994, 80 male vireos staked out territories; 65 of those found females and mated.

Similar population growth has been documented in vireo habitats elsewhere, and birds from the largest vireo populations are recolonizing historic habitats. Vireos that were color-marked in managed San Diego County areas are appearing and attempting to breed in areas over 80 miles to the north in Riverside and Orange Counties.

Cowbird management has been critical to this recovery because cowbirds practice brood parasitism—laying their eggs in the nests of smaller birds like the vireo. Cowbird eggs hatch first, and their larger chicks eat most of the food vireo parents bring to the nest. Cowbird chicks may also crowd vireo eggs and chicks out of the nest. Many songbirds in the eastern and midwestern United States have evolved defenses against this kind of parasitism. However, cowbirds have been in California for only about 75 years. It is unknown whether the vireos will be able to develop a means of defense.

Hundreds to thousands of cowbirds and their eggs are removed each year. Once the vireo's population becomes large and healthy enough to sustain the cowbird's onslaught, the control efforts can stop.

Biologists are encountering new problems, however, that illustrate the challenges to habitat restoration and vireo recovery. For example, people are dismantling wire-mesh cowbird traps in hopes of selling the parts, according to Barbara Kus, an ecologist at San Diego State University who studies vireos and conducts habitat restoration. Encampments along the San Diego, San Luis Rey, and other rivers in San Diego County are also damaging breeding habitat, disturbing nesting birds, and trampling nests.

The ultimate recovery goal is to have the vireo firmly reestablished in at least one-third of its former range in California before it can be considered for removal from the endangered species list. It appears the vireo is well on the way to reaching that goal.

Susan Saul is a public affairs specialist in the FWS Portland, Oregon, Regional Office.

Left

The least Bell's vireo prefers dense, willow-dominated habitat adjacent to streams. It nests primarily in willows but will use other trees and shrubs.

B. "Moose" Peterson/WRP©

Beach Mouse Summit

by L. Karolee Owens, Lorna Patrick, and Jim Moyers

The coastal dunes of Alabama and Florida are home to five threatened or endangered subspecies of the oldfield mouse *(Peromyscus polionotus)*. In April 1995, biologists from Fish and Wildlife Service (FWS) field offices in Jackson, Mississippi, and Panama City, Vero Beach, and Jacksonville, Florida, met in Jacksonville for the first "Beach Mouse Summit" to discuss the status of these mammals and strategies for their recovery.

Beach mice inhabit coastal dunes and feed upon sea oats, other dune plant seeds and fruits, and insects. Dune habitats are threatened by destruction and fragmentation resulting from continued urban and residential growth along the coast. Human presence also increases chances of predation by free-ranging or feral cats and competition for habitat from house mice *(Mus musculus)*. Hurricanes and tropical storms can fragment or destroy dune habitat. Although such storms have always been present, they now pose a greater threat to the beach mice because their habitat is already reduced due to other factors.

Gulf Coast Subspecies

Three of the endangered subspecies occur along the Gulf of Mexico coast: the Alabama beach mouse *(P. p. ammobates)*, Perdido Key beach mouse *(P. p. trissyllepsis)*, and Choctawhatchee beach mouse *(P. p. allophrys)*. Management and recovery actions, which are being conducted in cooperation with the Alabama Cooperative Fish and Wildlife Research Unit at Auburn University, include status assessments, genetic analyses, and supplemental translocation.

Preliminary assessments for the Gulf Coast subspecies include both good news and bad news. The Perdido Key beach mouse appears to be the most imperiled. Currently, two separate sites are occupied—one in Alabama on State lands and the other in Florida on Gulf Islands National Seashore, administered by the National Park Service. The Alabama population is currently stable, but few mice survive at the Florida site, which was supplemented with mice from Alabama in March 1995. Additional augmentation of the Florida population will depend upon the continued stability of the Alabama population. With the onset of the hurricane season, concern for the protection of the Perdido Key beach mouse is paramount. FWS biologists and the Auburn research unit have been working with National Park Service biologists to provide supplemental feeding for beach mice and to fertilize dune vegetation in their habitat.

Results for the Choctawhatchee beach mouse are encouraging. Populations remain at Grayton Beach State Recreation Area, Shell Island (owned by the State of Florida and the Federal government), and Topsail Hill (recently purchased by the State of Florida). The Grayton Beach population, which resulted from a 1987 reintroduction, may need augmentation before it becomes stable.

The range of the Alabama beach mouse has been reduced from 30 miles of coastline to 15 miles. Populations were known to survive at three areas—

Gulf State Park, Fort Morgan State Park, and Bon Secour National Wildlife Refuge—when the subspecies was listed in 1985. Biologists believe that predation by free-roaming house cats is responsible for the apparent loss of the Gulf State Park population. The subspecies is still in relatively good shape at Bon Secour NWR and Fort Morgan Park, although house cats and loss of scrub dune habitat continue to pose threats.

Atlantic Coast Subspecies

One endangered subspecies, the Anastasia Island beach mouse *(P. p. phasma)*, and a threatened subspecies, the southeastern beach mouse *(P. p. niveiventris)*, inhabit the dunes of Florida's Atlantic Coast barrier islands. The Anastasia Island beach mouse is protected on State and National Park Service lands (see *Bulletin* Vol. XX, No. 4). In 1992, beach mice from Anastasia Island were reintroduced to Guana River State Park, on an island to the north within the taxon's historical range. Subsequent surveys indicate the reintroduced population is surviving and has probably expanded beyond the boundaries of the park.

The range of the southeastern beach mouse has become fragmented. Healthy populations survive on public lands at Cape Canaveral National Seashore, Merritt Island National Wildlife Refuge, and Cape Canaveral Air Force Station at the northern end of the subspecies' current known range. To the south, populations remain on State and county lands in northern Indian River County. However, the subspecies has been extirpated from the center of its range, creating a considerable gap between the two extremes. Some areas of suitable habitat between these areas remain on the Archie Carr National Wildlife Refuge. The potential for successful reintroduction is good if predation by feral cats can be controlled.

Biologists attending the beach mouse summit believe the information exchange was valuable and there are plans to make it an annual event. The FWS will continue to work with other Federal and State agencies, local governments, and developers on beach mouse issues.

L. Karolee Owens is a biologist in the FWS Jacksonville Field Office, and Lorna Patrick and Jim Moyers are biologists in the Panama City Office.

An Alabama beach mouse prepares to enter its burrow.
FWS photo

Coastal Plovers on the Rise

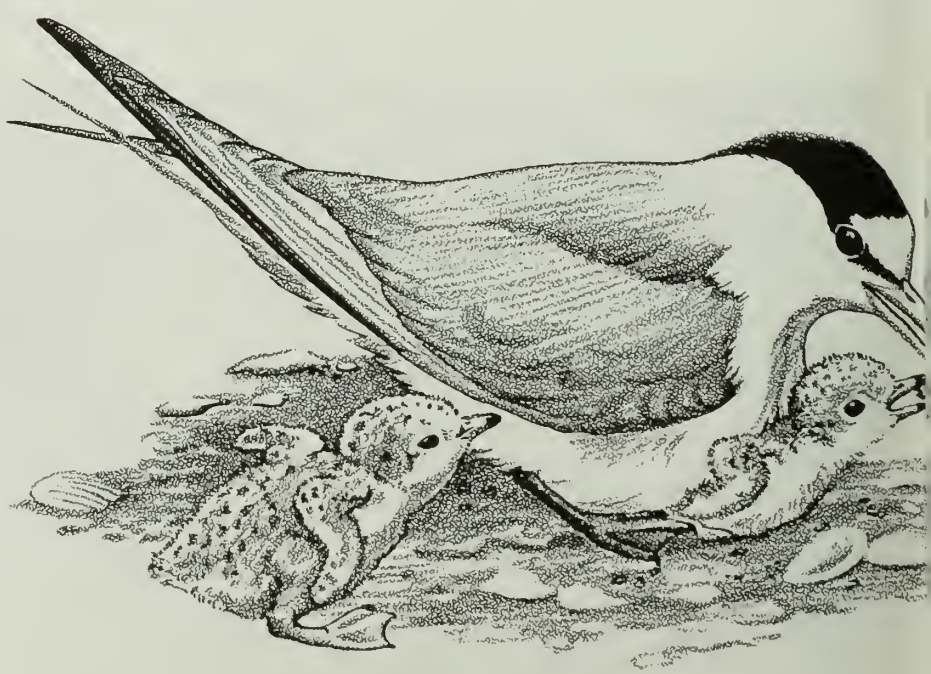
by Anne Hecht

Piping plovers were added to the list of threatened and endangered species in January 1986. Three distinct breeding populations are recognized; the birds found along the Great Lakes are designated as endangered, while those nesting on the Atlantic Coast and in the northern Great Plains are considered threatened. The Atlantic Coast population breeds on ocean beaches from Newfoundland to North Carolina (and very occasionally in South Carolina). These small shorebirds winter primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Gulf Coast, Bahamas, and West Indies.

Biologists engaged in the effort to restore piping plovers *(Charadrius melodus)* along the Atlantic Coast are now cautiously optimistic that numbers of this threatened population can be increased to the point where Endangered Species Act (ESA) protection is no longer needed. Intensive protection efforts are yielding impressive gains for the species, particularly in the New England portion of its range.

Common along the Atlantic Coast during much of the 19th century, piping plovers nearly disappeared due to excessive hunting for the millinery or hat trade. Following passage of the Migratory Bird Treaty Act in 1918, numbers recovered to a 20th century peak in the 1940's. The subsequent population decline is attributed to increased development and use of beaches since the end of World War II. By 1986, the Atlantic Coast piping plover population was estimated at 800 pairs.

Loss and degradation of habitat due to development and shoreline stabilization have been major reasons for the species' decline. In addition, disturbance by humans and pets often reduces the suitability of habitat, and can cause the direct or



Julie Zickefoose

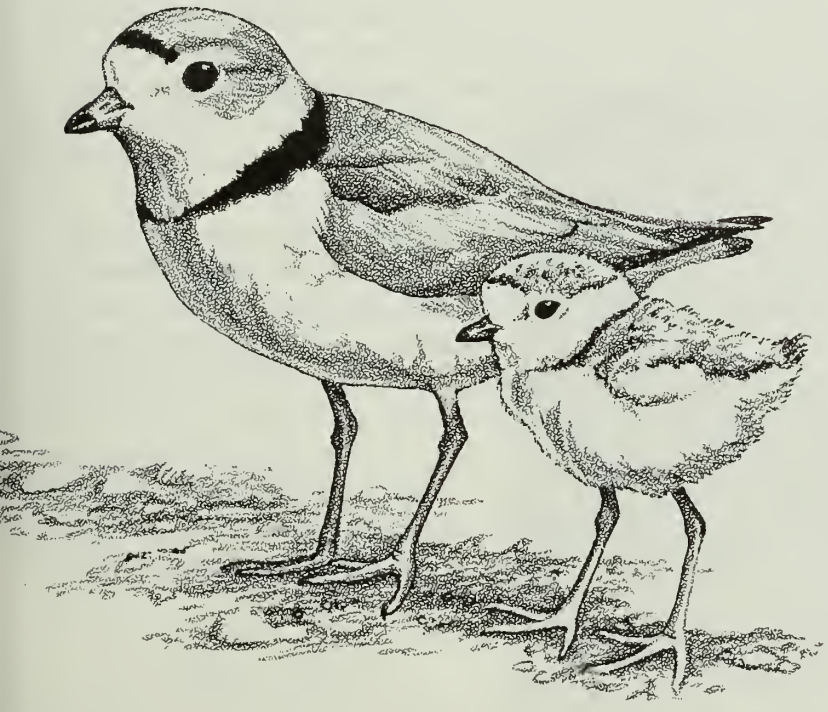
indirect death of eggs and chicks. Predation also is a major limiting factor at many Atlantic Coast sites, where the number and types of predators can be affected by human activities (e.g., littering, which attracts raccoons).

The plight of the plover also is an indicator of an entire ecosystem in trouble. Since the listing of the piping plover, two other beach-dwelling species native to the Atlantic Coast, the northeastern beach tiger beetle *(Cicindela dorsalis dorsalis)* and the seabeach amaranth *(Amaranthus pumilus)*, have been listed under the ESA as threatened species. Two distinct breeding populations of a fourth species, the roseate tern *(Sterna dougallii dougallii)*, were listed in 1987, one as threatened and one as endangered. The loggerhead sea turtle (*Caretta caretta*), another threatened species, nests on plover nesting beaches in North Carolina.

The Atlantic Coast piping plover population count has increased from around 800 pairs in 1986 to approximately 1,150 pairs in 1994. Biologists attribute some of this increase to intensified surveys, but real progress also is being made. In New England, for example, the population grew 118 percent between 1989 and 1994, from 206 to 449 pairs. Less progress has occurred throughout the rest of the range, and sub-populations in Canada and the southern portion of the range have actually decreased over the last six years. While the overall status of the population remains precarious, success in New England demonstrates that recovery is possible.

Recovery accomplishments in the northeast have come through a coordinated effort by many organizations and individuals. Protection measures include the fencing of nesting and foraging habitat, seasonal beach closures to vehicles and/or pedestrians, restrictions on pets, and public education. Measures to reduce predation pressure include placing wire fences around nests and predator removal. Beach stabilization activities also have been modified to prevent or minimize degradation of habitat.

Implementing labor-intensive protection measures for a sparsely distributed species like the plover is only possible because of cooperation by many agencies and organizations. In Massachusetts, for example, 16 Federal, State, county, and



Piping plovers (right) return to their breeding grounds in late March or early April. Following establishment of nesting territories and courtship rituals, the pair forms a depression in the sand. This "nest" is sometimes lined with small stones or shell fragments. Up to four eggs hatch in about four weeks, and the flightless young are soon able to follow their parents in foraging for marine worms, insects, and amphipods. Young are able to fly at around 30 days of age.

The camouflage that helps to protect piping plover eggs and young from predators can make them vulnerable to unintentional destruction by people.
FWS photo

municipal agencies and private organizations marshalled 32,500 hours of paid and volunteer work for the on-site protection of 289 pairs of plovers in 1993. Similar partnerships form the foundation of plover protection throughout the range of the Atlantic population.

Revised Recovery Plan

In February 1995, the Fish and Wildlife Service (FWS) opened a 90-day public comment period on a Draft Revised Recovery Plan for the Atlantic Coast Piping Plover. The draft revision calls for:

- revised delisting criteria based on the results of new data and population viability modelling,
- establishing four recovery units within the plover's Atlantic Coast range, with required population goals for each,
- a summary of existing and needed management activities at 178 current or potential plover breeding sites along the Atlantic Coast, and
- guidelines for protecting piping plover breeding habitat while minimizing conflicts with beach recreation.

The final revised recovery plan should be published soon.

Continuing challenges

The overall outlook for the piping plover has certainly brightened over the last 10 years, but the species is not yet out of danger. While the gains in New England have improved the security of the population as a whole, low numbers and poor productivity in the rest of the population's range leave it vulnerable. Increases in breeding pairs and productivity must be achieved in other portions of the species' range in case some disaster strikes the New England breeding grounds. Another major concern is protection of wintering plovers and their habitat.

Pressure on Atlantic Coast beach habitat from development and recreation will continue. Except on National Wildlife Refuges, where the primary management objective is wildlife protection, it is neither feasible nor desirable to eliminate beach recreation in plover habitat. Biologists are examining ways to reduce restrictions on some types of recreational activities while giving vulnerable wildlife the protection it needs. This poses a formidable challenge, but the rewards for plovers and the beach ecosystem are clear.

Anne Hecht is a special projects coordinator for endangered species in Region 5, and is stationed at Great Meadows National Wildlife Refuge, Massachusetts.

Turtles Dig the Dark

by Sandy MacPherson

Globally, sea turtles have declined because of commercial exploitation, incidental catch during commercial fishing operations, development of coastal nesting habitat, and pollution of the world's oceans. One of the more manageable threats is the presence of "light pollution" on nesting beaches. Artificial lighting can be detrimental to sea turtles in several ways. Studies have shown that light pollution can deter female sea turtles from coming onto the beach to dig their nests; in fact, brightly lit beaches are used less frequently for nesting. Also, females attempting to return to sea after nesting can become disoriented by beach lighting and have difficulty making it back to the ocean. In some cases, nesting females have ended up on coastal highways and been struck by vehicles.

Artificial beach lighting is even more detrimental to sea turtle hatchlings, which emerge from nests at night. Under natural conditions, hatchlings move toward the brightest, most open horizon, which is over the ocean. However, when bright light sources are present on the beach, they become the brightest spot on the horizon and attract hatchlings in the wrong direction, making them more vulnerable to predators, desiccation, exhaustion, and automobiles.

Growing concern about the impact of beach lighting on sea turtles has led many coastal counties and municipalities in the southeastern U.S. to pass lighting ordinances. Some of these local ordinances have been in place since 1987, but compliance has varied widely. As a result, the Fish and Wildlife Service (FWS) continues to receive numerous reports of sea turtle hatchling deaths related to beach lighting.

Education is the key to addressing the impacts of artificial lighting on sea turtles. FWS biologists, working closely with State conservation agencies, have contacted individuals and facilities with lighting problems, explained the effects on sea turtles, and provided information on effective and inexpensive methods to light facilities for human safety while avoiding harm to sea turtles. For example, problem lights often can be turned out during the nesting season or easily shielded. Coastal residents and visitors also are encouraged to turn off exterior lights on beachside balconies and to close all blinds and drapes in oceanfront rooms at night from May 1 to October 31 of each year.

While there is still a long way to go in the effort to darken sea turtle nesting beaches, headway is being made, and the FWS will continue to educate the public on this issue.

Sandy MacPherson, the FWS Southeast Region's Sea Turtle Recovery Coordinator, is located in the Jacksonville, Florida, Field Office.

Four sea turtle species regularly nest on the beaches of the southeastern United States mainland, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. The world's second largest nesting aggregation of loggerhead sea turtles *(Caretta caretta)*, for example, occurs along the southeastern coast. Other species nesting on the mainland and U.S. Caribbean islands include the leatherback *(Dermochelys coriacea)*, green *(Chelonia mydas)*, and hawksbill *(Eretmochelys imbricata)* sea turtles.

Below

A leatherback sea turtle hatchling emerges from its shell.

FWS photo

Spectacled Eider Mystery is Solved

Spectacled eider drakes sport a distinctive white eye patch circled by a black ring, giving the appearance of spectacles. This colorful species was listed in 1993 as threatened after western Alaska populations declined more than 90 percent in 30 years. No one knows the cause for the decline. In Alaska, spectacled eiders spend summers and breed in tundra areas along the coast. However, more than 90 percent of the species' world population is believed to breed in the Russian arctic.

Above
Spectacled eider drake
Below
Spectacled eider hen
Glen Smart

Where does the spectacled eider, a threatened species of arctic sea duck, go during the winter? It's a question that has stumped biologists for decades. This past spring, biologists of the Fish and Wildlife Service (FWS) and the National Biological Service (NBS) solved the longstanding mystery.

Satellite-tracking technology made the discovery possible. During the spring of 1994, NBS biologist Margaret Petersen headed a study team that fitted tiny transmitters to 22 spectacled eiders captured on the Yukon-Kuskokwim Delta National Wildlife Refuge in Alaska. The transmitters provided information on the birds' locations until December 1994, when the batteries became too weak to send signals strong enough for tracking. At that time, the eiders were dispersed in the Bering Sea south of Saint Lawrence Island, where the ocean had not yet frozen solid.

Unexpectedly, in February 1995, a location signal was received from a transmitter that had been inactive since August 1994. Biologists tracking the eiders found it strange that the signal came not from an area of known open water but from a spot about 200 miles within the arctic icepack.

In March, responding to the signal, FWS biologists Bill Larned and Greg Balogh chartered a plane and flew out over the frozen Bering Sea to search for the answer. To their amazement, they discovered tens of thousands of the elusive ducks jammed into tiny holes in the Bering Sea pack ice, which the birds kept unfrozen by their own body warmth and movement despite the minus 20° F temperature.

Larned and Balogh returned to the remote location in early April to document the presence of 140,000 spectacled eiders, which biologists estimate to be at least half the species' world population.

"The density of the flocks was unprecedented," said Balogh. "It looked like every eider was touching six others. One flock flushed as we passed, and when they flew, a thick cloud of steam rose off the water surface into the icy air."

"The discovery of the wintering area is a major step toward understanding how these birds live, what problems they may be facing, and other important questions we have about the Bering Sea ecosystem," said FWS biologist Russ Oates, leader of the interagency Spectacled Eider Recovery Team. "Now we have a starting point for planning the next phases of the recovery effort."

Envirothon Attracts Students

by Linda Finger

"What is the common name for Casmerodius albus? How many endangered species occur in the United States? Describe the mark-recapture method of estimating a population. Name the most species-rich group of living organisms."

These questions and others were asked recently of local high school students as part of the Envirothon, a natural resource education program in which teams of high school students compete in five study areas—aquatics, soils, wildlife, forestry, and current environmental issues. The Fish and Wildlife Service's (FWS) Jacksonville Field Office took an active role in Florida's "First Coast" (or northeast coast) Envirothon, a regional contest held at the University of North Florida in Jacksonville.

The Jacksonville Field Office developed the wildlife curriculum for the 1995 First Coast Envirothon and staffed the station on test day. This year's competition attracted over 250 students from high schools throughout a three-county area. Student teams were challenged by questions about such wildlife-related topics as identification basics, trapping and marking techniques, biodiversity, and endangered species. Each team had about 30 minutes to answer 25 questions in each subject area. The winning team from the First Coast competition, "The Bio Girls," will travel to Florida's statewide contest courtesy of local Soil and Water Conservation Districts.

Ultimately, a winning team from each State travels to the national competition. The Envirothon program is an excellent opportunity for FWS biologists to interact with other agencies and encourage environmental awareness among high school students. Information about the program is available from local offices of the Natural Resources Conservation Service (formerly known as the Soil Conservation Service).

Linda Finger is a wildlife biologist in the FWS Jacksonville, Florida, Field Office.

The Envirothon is billed as a problem-solving, environmental "quiz bowl." For the students, this one-day competition is the culmination of many months of study. Each team, consisting of five students and a teacher/sponsor, reviews material provided by resource agencies representing the five study areas. The students enjoy selecting the names for their teams, which this year included the Ecocentrics, Wetland Warriors, and Toxic Crusaders.

Below
FWS biologist Linda Finger instructs a team of Envirothon students.
Marc Epstein/FWS

Will *el Lobo* Return?

by Wendy M. Brown

An important milestone was passed recently in efforts to restore the critically endangered Mexican gray wolf *(Canis lupus baileyi)*. The draft environmental impact statement on the Fish and Wildlife Service's (FWS) proposal to reintroduce Mexican wolves to historic range in Arizona and New Mexico was released June 27, 1995. The FWS will host 14 public open house meetings and 3 formal public hearings through October to gather comments on the proposal, and plans to complete the final EIS and record of decision in early 1996.

The Mexican gray wolf, or *el lobo* as it was christened by the Spanish-speakers who shared its range, is the southernmost and most genetically distinct of the five gray wolf subspecies in North America. Only 137 Mexican wolves are known to exist today, and all are being held at 24 zoos and other facilities in the U.S. (19) and Mexico (5). Biologists know little about this species in the wild because viable populations were exterminated before the animals could be studied. Although it is possible that a few wolves may remain in the wild in northern Mexico, no sightings have been confirmed since 1980.

Historically, the Mexican wolf roamed montane woodlands from near Mexico City up through southeastern Arizona, southern New Mexico, and southwestern Texas. Mexican wolves are generally smaller than their northern cousins, weighing 60-90 pounds, and have a richly-colored coat of dark grey, brown, cinnamon, and buff over light-colored underparts. They typically have a well-developed ruff or mane of longer hair around the neck.

Livestock husbandry gradually expanded into the American southwest with Spanish settlement in the seventeenth and eighteenth centuries, and some wolves that took advantage of this new food source were killed. However, the lobo population probably followed the ebb and flow of native prey through the mid 1800's. Completion of the railroads brought settlers and livestock to the southwest in larger numbers, and the war on the wolf began in earnest.

Bounties, private "wolfers," and government agents all did their share. Ironically, the last authenticated reports of Mexican wolves in the U.S. occurred around the time the lobo gained protection under the Endangered Species Act (ESA) in 1976. Meanwhile, wolves in Mexico continued to be persecuted by traps and poisons (particularly compound 1080) as their prey populations were depleted.

In 1977, the FWS contracted biologist/trapper Roy McBride to capture the remaining live wolves in Mexico. The goal was to prevent extinction of the subspecies by establishing a captive population. Between 1977 and 1980, McBride trapped five Mexican wolves from Chihuahua and Durango, including one pregnant female and four males. Two of the captured males, the female,

Mexican wolf pups raised in zoos may be released into former habitat if the reintroduction plan is approved.
Living Desert, Palm Desert, California

and her uncaptured wild mate became the founders of the first certified lineage of Mexican wolves, which now numbers 104 animals. Advanced techniques in molecular genetics analysis recently made it possible to determine that two other captive lineages—the Aragon lineage in Mexico and the Ghost Ranch lineage in the U.S.—are pure *C. l. baileyi*. This important development added 33 individuals from 4 valuable founders to the captive breeding program in July 1995.

The FWS and cooperating agencies (the USDA Animal Damage Control program, U.S. Forest Service, U.S. Army, Arizona Game and Fish Department, and the New Mexico Department of Game and Fish) have developed a proposal to reintroduce the Mexican wolf to a portion of its historical range. Two geographically distinct areas are proposed, the White Sands Wolf Recovery Area in south-central New Mexico, and the Blue Range Wolf Recovery Area in the Apache and Gila National Forests of Arizona and New Mexico (see map). Each area has advantages and drawbacks. The White Sands area is primarily on a military reserve closed to public use and livestock grazing most of the year, but an analysis of habitat suitability and prey density suggests it could support only about 20 Mexican wolves. The Blue Range area includes about 7,000 square miles of contiguous public lands, most of which is suitable wolf habitat with good prey densities and an estimated capacity to support 100 wolves, but much of the land is grazed by livestock.

If both areas are used, about 120 Mexican wolves could range across approximately 6,000 square miles of public lands. However, the FWS proposal calls for reintroduction into *either* the White Sands area *or* the Blue Range area first, with reintroduction into the second area if necessary and feasible. This would allow an "adaptive management" approach, whereby the project would periodically be evaluated and refined to achieve recovery goals with minimum economic effects.

As with wolf reintroduction efforts in other areas, the greatest public concern in the southwest is livestock depredation. However, under even the worst-case scenario, wolves would be expected to take less than 0.1 percent of available livestock. Further, the private organization Defenders of Wildlife has extended its Rocky Mountain wolf compensation program to pay full market value for any documented livestock losses caused by Mexican wolves.

Recent surveys show that the overwhelming majority of people support Mexican wolf recovery. With the possibility of natural recolonization appearing increasingly remote, reintroduction may provide the last hope for restoring this unique southwestern animal to its native ecosystem.

Wendy Brown is a biologist with the FWS Mexican Wolf Recovery Program in the Albuquerque Regional Office.

Four alternatives are evaluated in the draft EIS, including reintroduction as a "nonessential, experimental" population with limited dispersal allowed; reintroduction with no dispersal allowed; reintroduction under full ESA protection with unlimited dispersal; and "no action/natural recolonization." The FWS has proposed reintroduction of a nonessential, experimental population into primary recovery zones, with dispersal into secondary recovery zones allowed (see map). An experimental population boundary would define the legal status of any wolf found within the area, and wolves would not be allowed to disperse outside secondary recovery zones. The experimental population would be managed under special rules that would minimize any potential conflicts and allow the control of problem wolves.

Grizzlies in Swan Valley

by Kristy J. Pelletier and Christopher Servheen

Swan Valley is situated within the boundaries of the 9,600 square mile Northern Continental Divide Ecosystem grizzly bear *(Ursus arctos horribilis)* recovery zone, where many other large carnivores, such as the gray wolf *(Canis lupus)*, mountain lion *(Felis concolor)*, black bear *(Ursus americanus)*, and lynx *(Lynx lynx)* coexist. Grizzlies enter the valley bottom seasonally in search of food and cross it to reach the large areas of intact habitat on either side. However, grizzlies are finding increasing human development in areas that were once productive and secure habitats. Activities that may affect wildlife include timber harvest, road building, other private and commercial development, and agriculture.

The Swan Valley is a rural area of some 329,000 acres in northwestern Montana, nestled between the towering Mission Mountains and the Swan Range on the western boundary of the Bob Marshall Wilderness. It is a place where people still know each other by name, where there is still some open space between them, and where they continue to coexist on their land with native wildlife. The people of the Swan Valley are interested in maintaining their rural quality of life, but they also want an economic base that includes timber, recreation, and tourism.

Grizzlies living in the Mission Mountains on the west side of the valley and in the Swan Range/Bob Marshall Wilderness on the east side are finding travel across the valley bottom increasingly difficult. The grizzly bear population in the Mission Mountains is thus becoming isolated from the larger and more secure Bob Marshall Wilderness population, and this isolation threatens the future of the grizzly in the Mission Mountains.

As wildlife habitat shrinks, wild areas valuable to humans also disappear. Residents of the Swan Valley live there, in part, because the area retains many of the same wild characteristics that greeted the pioneers nearly a century ago. Swan Valley residents recognized the uniqueness of their situation and decided to take action to protect their valley for themselves, for future generations, and for wildlife.

Early in 1993, a Swan Valley citizen's group invited Chris Servheen, the Fish and Wildlife Service (FWS) Grizzly Recovery Coordinator, to speak at a public meeting about an ongoing habitat analysis project. The FWS had been developing a computer-based geographic information system (GIS) to map areas of development and human influence in the Swan Valley. With this information, the FWS identified the remaining opportunities for wildlife movement between zones of human influence. These linkage zones might allow bears and other wildlife to cross the Swan Valley bottom with less danger of conflict with humans. Linkage zones are areas where animals have opportunities to travel, rest, and feed while moving between larger habitat units. The FWS believes that linkage zones merit some level of protection and careful management so that wildlife movement across the valley bottom would not be completely cut off by human development. Maintaining linkage zones in the Swan Valley could

serve as the last link between the small population of grizzlies in the Mission Mountains and those to the east in the Bob Marshall Wilderness.

The people of the Swan Valley became very interested in linkage zones, realizing that continued development could make the area inhospitable to wildlife and eventually degrade their rural way of life. They formed a diverse working group of residents and landowners, along with invited representatives from State, Federal, and corporate entities, to discuss the threats of habitat fragmentation. Invited agency representatives provided technical input, such as data from GIS mapping, but the final management recommendations were made by Swan Valley residents. Citizens in the working group hoped that recommendations coming from neighbors and peers would be more acceptable than those coming from government agencies.

The working group produced a set of land management recommendations for private land owners in the valley on such issues as sanitation, agriculture, subdivisions, road density, full disclosure by area realtors on the needs of native wildlife, and forest management. As a courtesy to the residents, the FWS took the citizen recommendations and compiled them into a comprehensive management document for the 33,000 acres of private land in Swan Valley.

Habitat management in the Swan Valley is complicated by the checkerboard pattern of land ownership. State, Federal, and corporate lands are intermingled with private property. Careful management of the 296,000 acres of public and corporate timber land could have been negated by unplanned development on the non-corporate private land. The Swan Valley Non-corporate Private Lands Management Plan is an effort by local citizens to ensure that vital private lands are included in the overall management process, and will help maintain wildlife linkage zones across the valley.

Local citizens have made all the management recommendations that will affect private lands, their future, and the future of the valley. Cooperative ventures in private land protection are possible when agencies work with local people and these citizens can voice their specific needs and concerns during the process. Using the Swan Valley experience as a model, the FWS plans to offer GIS mapping of wildlife linkage zones and the writing and editing support needed to create locally-generated private land management recommendations to other valleys in the northern Rocky Mountains.

Kristy Pelletier works on special projects in the FWS Grizzly Bear Recovery Office in Missoula, Montana. Christopher Servheen is the FWS Grizzly Bear Recovery Coordinator.

In early 1995, another agreement affecting the Swan Valley was developed between Plum Creek Timber Company, the U.S. Forest Service (Flathead National Forest), the Montana Department of State Lands, and the FWS to resolve complex issues surrounding management of corporate and public forest lands for logging and grizzly bear conservation. This agreement was based on the linkage zones identified by the FWS through the GIS mapping model. All parties agreed to concentrate their timber management practices in certain parts of the valley and to refrain from logging in riparian areas during vital spring feeding periods for bears.

FWS photo

Region 2

Whooping Crane *(Grus americana)* As of early August, the world population of whooping cranes stood at 330. Conditions this year at the species' breeding grounds in Wood Buffalo National Park, Canada, are the worst of the past 5 low-water years. Nevertheless, the latest counts indicate that 47 pairs nested this summer, a great improvement over 1994 when only 28 of a possible 40-46 pairs initiated nesting. The low 1994 numbers may have been the result of poor food conditions on the species' wintering area in Texas.

Twenty-four eggs were transferred from the park this year to captive propagation sites in the United States, and 20 chicks are being reared from these eggs. Forty-two wild chicks were present at Wood Buffalo National Park in June. If the survival rate of wild chicks in 1995 is similar to that of 1994, biologists can expect 20 chicks to arrive at Aransas National Wildlife Refuge in Texas this winter.

Another 25 chicks produced by captive-propagation flocks are being reared at breeding facilities. Most of the chicks will be taken to the Florida reintroduction site this fall or winter to join the 23 birds surviving from previous releases. Although they are only 3-year-olds, one Florida pair constructed a nest this spring. The first egg production may occur next spring.

Kemp's Ridley Sea Turtle *(Lepidochelys kempii)* Less than 50 years ago, the Kemp's ridley sea turtle was abundant in the Gulf of Mexico. Populations were large enough to generate a synchronized reproductive effort (called an *arribada*) of an estimated 40,000 females nesting in one afternoon. This occurred in 1947 on the species' single known nesting beach, located at Rancho Nuevo on the northeastern coast of Mexico. Since that time, the Kemp's ridley has suffered one of the most dramatic declines in population numbers recorded for any animal. In the years 1978 through 1994, a single *arribada* rarely reached 200 females. Two factors were implicated in the massive decline: 1) extremely heavy egg poaching and 2) intensification of the shrimping fishery in the U.S. and Mexico, with consequent turtle drowning in shrimp trawls.

The cooperation between Mexico's Instituto Nacional de Pesca and Region 2 of the FWS over the past 18 years to protect and recover the Kemp's ridley is showing results, and is used as a model for international, multi-agency conservation efforts. From 1978 to the present, under a cooperative beach patrol effort involving both nations, nearly all nests were moved the same day to fenced, guarded corrals to protect them from predation. Adult turtles also are protected on nearly 100 miles of beach when they come ashore to lay eggs. As a result, the number of released hatchlings has been increased to a yearly average of 54,676 individuals.

Over one million hatchlings have been released from the corrals at the nesting beach since protection efforts began, but only recently has recruitment to the adult female portion of the population shown an increase. The numbers of adult females continued to decline (as indexed by numbers of nests) until 1985, but nesting has increased annually since that time. As of late July, 1,804 nests had been saved in 1995. The largest *arribada* this year numbered over 500 turtles and occurred over 2 days.

A definite corner has been turned in recovery of the species, but there is a long way to go before the species is again self-sustaining. Turtle excluder devices are required by U.S. and Mexican regulations for all shrimp trawls used in the Gulf of Mexico. Trawling regulations and enforcement in the U.S. are under the jurisdiction of the National Marine Fisheries Service, an agency of the Department of Commerce.

Whooping cranes
Luther C. Goldman

Kemp's ridley sea turtle
FWS photo

Region 3

Gray Wolf *(Canis lupus)* Cooperative State-Federal monitoring programs in Wisconsin and Michigan's Upper Peninsula have documented continued increases in gray wolf populations. During late winter of 1994-95, there were 85 wolves in Wisconsin and 80 wolves in Michigan, compared with the 1993-1994 estimates of 54 and 57, respectively. These numbers do not include the population on Isle Royale National Park, which supports an estimated 14 to 16 wolves.

Pitcher's Thistle *(Cirsium pitcheri)* This spring, the Fish and Wildlife Service (FWS) Chicago, Illinois, Field Office assisted the Morton Arboretum in planting threatened Pitcher's thistle seeds and seedlings on an Illinois state nature preserve. Over 1,400 seeds and 3 greenhouse- raised seedlings were planted. In 1994, two plants in the preserve flowered for the first time, and seeds collected from those flowers were among those planted this year. Seedlings have emerged from seeds planted in 1994 and six plants are blooming.

Niangua Darter *(Etheostoma nianguae)* The FWS Columbia, Missouri, Field Office and the Missouri Department of Conservation are using the Partners for Wildlife program to assist landowners interested in protecting streams within the critical habitat of a threatened fish, the Niangua darter. One recently proposed restoration project will protect water quality

and a portion of the Niangua River riparian corridor by fencing cattle from the stream.

Bald Eagle *(Haliaeetus leucocephalus)* and **Peregrine Falcon** *(Falco peregrinus anatum)* Some good news about birds of prey in Region 3: five new bald eagle nests have been established in Iowa and one new peregrine falcon nest in Illinois. The eagle nests are in Clinton, Jones, Hamilton, Sac, and Muscatine counties in Iowa, and the falcon nest is on a bridge over the Mississippi River.

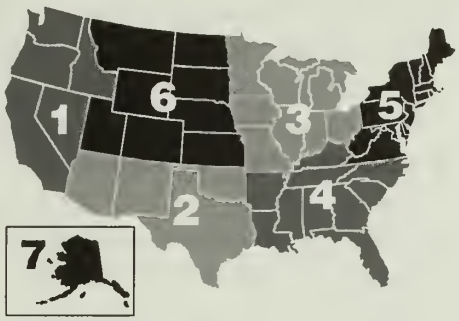
Region 4

Gulf Sturgeon *(Acipenser oxyrinchus desotoi)* When the Gulf sturgeon was listed in 1991 as threatened, the Gulf States Marine Fisheries Commission began work on a management plan. The Commission's Anadromous Fish Subcommittee then offered to expand the effort to include recovery planning. In response, the FWS Panama City, Florida, Field Office formed a partnership with the Subcommittee and coordinated a recovery team that included representatives from the States (Louisiana, Mississippi, Alabama, and Florida), the National Marine Fisheries Service, two conservation organizations, and a commercial fisherman.

The draft recovery/management objectives are to 1) stop additional losses from existing populations, 2) delist the fish once stable populations are reached (by river basins), and 3) open a limited fishery, under State regulation, for recovered stocks. A proposed plan has been approved by the Commission and is under review within the FWS and National Marine Fisheries Service.

Region 5

Karner Blue Butterfly *(Lycaeides melissa samuelis)* The FWS New England Field Office recently took a major step forward in protecting habitat for the endangered Karner blue butterfly in Concord, New Hampshire, by completing a Conservation Management Agreement with the City of Concord, The Nature Conservancy, and the New Hampshire Department of Fish and Game. The agreement call for the cooperative management of more than 300 acres of pine barren habitat at the city airport. It establishes conservation zones where resource agencies will manage habitat to benefit rare species, including the Karner blue, and where no development will occur. In areas where additional airport development is planned, the city has agreed to work with the FWS to minimize impacts on rare species.



Region 2

In July, the Lower Division States/Tribes Endangered Species Steering Committee of the Lower Colorado River Species Program endorsed the development of a habitat conservation plan (HCP) for the Lower Colorado River under section 10 of the ESA. The Steering Committee is composed of representatives from the U.S. Department of the Interior and from agricultural and municipal water, hydroelectric power, and wildlife interests in Arizona, California, and Nevada. As the HCP is developed, Committee members will consider the effects of water and power management on listed species and listing candidates within the mainstem Lower Colorado River and its 100-year floodplain. The goal is to manage wisely the variety of habitats along the Lower Colorado River, develop conservation agreements for listing candidates, and secure a permit for the incidental take of listed species during otherwise lawful activities.

A conservation plan for the Arizona willow *(Salix arizonica)* and its habitat was completed in May 1995. This small, distinctive shrub willow occurs in certain high-elevation riparian ecosystems of the southwest. The commitment of all parties involved—the FWS, Forest Service, National Park Service, White Mountain Apache Tribe, Arizona Game and Fish Department, and Utah Division of Wildlife Resources—resulted in exceptional cooperation. The conservation plan calls for actions to reduce site-specific threats and to improve and protect the species' habitat. The White Mountain Apache Tribe has developed a separate strategy, consistent with the conservation agreement, for management of the Arizona willow on tribal lands.

Spring counts indicate that only three small populations of Attwater's greater prairie chickens *(Tympanuchus cupido attwateri)* survive in the wild, with a total of 68 birds. Historically, an estimated 1 million of the prairie chickens occupied coastal prairie grasslands from southwestern Louisiana to the Nueces River in Texas. The species has been declining in numbers and range since the early 1900's, due primarily to the steady loss of prairie habitat. Literature on greater prairie chickens indicates that when isolated populations fall below 100 males, they will eventually disappear unless habitat is improved.

Efforts to recover Attwater's greater prairie chicken include habitat management (brush removal, modified grazing, prescribed burning), predator control, and captive propagation. FWS grants are funding cooperative management of habitat on private tracts. The Galveston Bay Coastal Prairie Preserve, a 3,000-acre site containing 16 birds, was donated in February to the Texas Nature Conservancy (TNC) by Mobil Exploration and Producing—U.S. The FWS will assist TNC in managing the site. Thirty-five adult birds and 65 young exist at 3 captive propagation sites: the Houston Zoo, Fossil Rim Ranch, and Texas A & M University. The first experimental releases of captive-produced males are expected soon at Attwater's Prairie Chicken National Wildlife Refuge. A fourth facility is expected to join the captive propagation effort later this year.

Attwater's greater prairie chicken
Luther C. Goldman

Items for Recovery Updates and Regional News are provided by regional endangered species contacts.

Listing Proposals June/July 1995

During June and July of 1995, the Fish and Wildlife Service (FWS) proposed listing 24 taxa—21 plants and 3 animals—as endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Nineteen Channel Islands Plants On July 25, the FWS proposed listing 19 plants endemic to the Channel Islands off the coast of southern California:

Hoffmann's rock-cress *(Arabis hoffmannii)*, a slender herbaceous perennial belonging to the mustard family (Brassicaceae);

Santa Rosa Island manzanita *(Arctostaphylos confertiflora)*, a perennial shrub in the heath family (Ericaceae);

island barberry *(Berberis pinnata* ssp. *insularis)*, a shrub in the barberry family (Berberidaceae);

soft-leaved paintbrush *(Castilleja mollis)*, a perennial herb in the snapdragon family (Scrophulariaceae);

Santa Rosa Island dudleya *(Dudleya blochmaniae* ssp. *insularis)*, a small perennial succulent in the stonecrop family (Crassulaceae);

munchkin dudleya *(Dudleya* sp. nov. "East Point"), like the above, a small succulent perennial;

Santa Cruz Island dudleya *(Dudleya nesiotica)*, a succulent perennial;

island bedstraw *(Galium buxifolium)*, a woody shrub in the bedstraw family (Rubiaceae);

Hoffmann's slender-flowered gilia *(Gilia tenuiflora* ssp. *hoffmannii)*, a small annual herb in the phlox family (Polemoniaceae);

island rush-rose *(Helianthemum greenei)*, a small shrub in the rock-rose family (Cistaceae);

island alumroot *(Heuchera maxima)*, a perennial herb in the saxifrage family (Saxifragaceae);

Santa Cruz Island bushmallow *(Malacothamnus fasciculatus* ssp. *nesioticus)*, a small shrub in the mallow family (Malvaceae);

Santa Cruz Island malacothrix *(Malacothrix indecora)*, an annual herb in the aster family (Asteraceae);

island malacothrix *(Malacothrix squalida)*, a small annual herb;

island phacelia *(Phacelia insularis* ssp. *insularis)*, a decumbent (reclining) annual in the waterleaf family (Hydrophyllaceae);

Santa Cruz Island fringepod *(Thysanocarpus conchuliferus)*, a delicate annual herb in the mustard family (Brassicaceae);

Catalina Island mountain-mahogany *(Cercocarpus traskiae)*, an evergreen shrub or small tree in the family Rosaceae;

San Clemente Island woodland-star *(Lithophragma maximum)*, a perennial herb in the saxifrage family; and

Santa Cruz Island rockcress *(Sibara filifolia)*, a slender annual herb in the mustard family.

These plants are restricted to one or more of the following coastal islands: Santa Catalina, San Clemente, Anacapa, Santa Cruz, Santa Rosa, and San Miguel. Most of the current populations are found on Federal property or private land that is managed for conservation purposes. Their vulnerable status is primarily the result of widespread habitat degradation caused by non-native animals. Delicate island soils were eroded by sheep, goat, cattle, donkey, horse, and bison grazing; deer and elk browsing; and rooting by pigs. Much of the damage occurred in the past, but in some cases it continues. Habitat disturbance also has promoted the spread of accidentally or intentionally introduced plant species, which often compete with non-native plants.

Four of the primary land managers for these islands—the U.S. Navy, National Park Service, Santa Catalina Island Conservancy, and The Nature Conservancy—are taking steps to improve protection of the unique habitats.

Two Tidal Marsh Plants On June 12, endangered status was proposed for two plant taxa restricted to salt or brackish tidal marshes within the San Francisco Bay region of northern California:

Suisun thistle *(Cirsium hydrophilum* var. *hydrophilum)*, a perennial in the aster family; and

soft bird's-beak *(Cordylanthus mollis* ssp. *mollis)*, an annual herb in the snapdragon family.

The marshlands inhabited by these species are in Suisun and San Pablo Bays, where past human activities have severely reduced, degraded, and fragmented wetland habitats. Large areas were drained for use in agriculture, industrial development, urbanization, waste disposal, and salt production. Diversion of freshwater inflows is increasing salinity levels in the bays to the point that it may be interfering with growth and reproduction in these plants. Water pollution from oil spills and heavy metals is another continuing threat. Competition from introduced noxious weeds is affecting some populations of both species, and the Suisun thistle may be vulnerable to hybridization with a non-native thistle, *Cirsium vulgare*.

Three Texas Invertebrates Three species of aquatic invertebrates known only from springs in Comal and Hays Counties, Texas, were proposed June 5 for listing as endangered:

Peck's cave amphipod *(Stygobromus pecki)*, a small crustacean living below ground at Comal and Hueco Springs;

Comal Springs dryopid beetle *(Stygoparnus comalensis)*, another subterranean species, found in Comal and Fern Bank Springs; and

Comal Springs riffle beetle *(Heterelmis comalensis)*, a tiny beetle that lives primarily in shallow riffles flowing from Comal and San Marcos Springs.

These species require a reliable supply of clean, relatively well-oxygenated water. The primary threat to their survival is a decrease in water quantity and quality as a result of groundwater withdrawal and other activities throughout the San Antonio segment of the Edwards Aquifer. In 1989, the Texas Water Commission classified this part of the aquifer as critical in terms of its potential for groundwater problems related to overdrafting. After applying its model of the Edwards Aquifer to Comal Springs, the Texas Water Development Board estimated that, by the year 2000, the spring could go dry for an extended time if withdrawals continue at historical levels and the region is struck by drought. Pollution is another threat; chemical spills in the highly urbanized San Antonio segment of the Edwards Aquifer recharge zone could contaminate the species aquatic habitat.

Listing Moratorium

In early April, Congress passed a moratorium on adding animals or plants to the list of threatened or endangered species or designating critical habitat. The moratorium, in effect through September 30, 1995, was attached to a Department of Defense supplementary spending bill signed by the President April 10, 1995. The bill also rescinded $1.5 million from the budget allocated to the FWS listing program.

Because of its increasingly diverse audience, the Bulletin is seeking to diversify and expand its coverage of endangered species issues. To be successful, we need your help.

Material on a wide range of topics relating to endangered species is welcome and may be technical or popular in nature. We are particularly interested in success stories and news about recovery (both the development of recovery plans and their implementation). Material also is needed on interagency consultations; Habitat Conservation Plans; other cooperative ventures with Federal and State agencies, conservation organizations, business, and private landowners; changes in a species' status; and new threats.

Before preparing a manuscript, please contact the *Bulletin* Editor (703/358-2390) to determine the length, focus, and timing of proposed articles. We welcome submissions but 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* 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.

Style

When preparing a manuscript, follow the *GPO Style Manual* if available. 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.

As a general rule, feature articles should be three to five double-spaced pages in length. Shorter items can be sent to the appropriate Regional endangered species specialist for inclusion in the Regional News or Recovery Updates columns. Notices and announcements may be mailed directly to the Editor.

Because *Bulletin* recipients include many scientists and foreign subscribers, please include:

- scientific and common names of all species mentioned (listed and non-listed species).
- Metric equivalents for all measurements.
- Celesius and Fahrenheit equivalents for temperatures.
- Complete names or terms to accompany the first use of all abbrevations and acronyms.

Submissions should always include the author's name, position, duty station, address, and telephone and fax numbers.

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 completion. Please obtain in advance permission for the *Bulletin* to publish the submitted illustrations.

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_DES), or via Internet at R9FWE_DES.B1M@mail.fws.gov. You may also send DOS-formatted diskettes to the *Endangered Species Bulletin,* U.S. Fish and Wildlife Service, 452 ARLSQ, Washington, D.C. 20240. Submissions by FAX can be sent to 703/358-1735 (703/358-2390 to confirm). In all cases, please also mail a double-spaced hard copy.

Printing Schedule

The *Bulletin* is on a bimonthly printing schedule, with six issues per year and an index.

We welcome contributions at any time, but material not received by the "Article Due" date will be held for a future issue.

ISSUE DATE	ARTICLE DUE DATE
January/February 1996	October 30, 1995
March/April 1996	December 22, 1995
May/June 1996	March 26, 1996
July/August 1996	April 22, 1996
September/October 1996	June 24, 1996
November/December 1996	August 30, 1996

BOX SCORE

Listings and Recovery Plans as of August 31, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	19	335	40
BIRDS	75	177	16	6	274	80
REPTILES	14	65	19	14	112	30
AMPHIBIANS	7	8	5	1	21	11
FISHES	68	11	37	0	116	72
SNAILS	15	1	7	0	23	11
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	324	520	111	40	995	315
FLOWERING PLANTS	407	1	90	0	497	193
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	12
PLANT SUBTOTAL	435	1	92	2	530	206
GRAND TOTAL	759	521	203	42	1,525*	521**

TOTAL U.S. ENDANGERED: 759 (324 animals, 435 plants)
TOTAL U.S. THREATENED: 203 (111 animals, 92 plants)
TOTAL U.S. LISTED: 962 (435 animals, 527 plants)***

*Separate populations of a species listed both as Endangered and Threatened, are tallied twice. Those species are the leopard, gray wolf, piping plover, roseate tern, chimpanzee, green sea turtle, and olive ridley 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 411 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.

***Six animals have dual status.

ENDANGERED Species BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR
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FOCUS

Resource managers and the private sector have long faced the challenge of how to reconcile wildlife conservation with society's demand for economic development. In 1982, Congress provided a means in the Endangered Species Act by which both sides can meet this challenge. Known as the Habitat Conservation Plan, or simply the HCP, this approach provides opportunities to explore creative strategies for accommodating the needs of landowners, local communities, and wildlife.

The HCP approach has not evolved without difficulty and controversy, but HCPs are now recognized as an important tool for promoting both long-term habitat protection and compatible land uses. This edition of the Bulletin *looks at the HCP experience from various perspectives.*

U.S. Fish & Wildlife Service

Richard Hannan/FWS

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NDANGERED Species BULLETIN

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On the Cover
Habitat Conservation Plans are increasingly being used to maintain stands of mature forest in the Pacific Northwest that support a variety of species.
cover photo by Philip Carroll
left: FWS photo

dangered Species Bulletin welcomes manuscripts on a wide range of topics related ıngered species. We are particularly interested in news about recovery, interagency ration, habitat conservation plans, and cooperative ventures. Please contact the before preparing a manuscript. We cannot guarantee publication.

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IN THIS ISSUE

The HCP Approach

This edition of the *Bulletin* takes an in-depth look at the HCP process. To gain a diversity of viewpoints, the *Bulletin* staff solicited articles from not only within the Fish and Wildlife Service but also the private sector, State and local governments, and conservation organizations. Articles from authors outside the FWS do not necessarily represent the views of this agency.

Of the various protections granted to species listed under the Endangered Species Act (ESA), the prohibition against "take" is one of the most fundamental. The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any species[1] federally listed as endangered or threatened. This definition includes, in certain cases, destruction or modification of endangered species habitat.

Until 1982, there was no mechanism under the ESA to permit the take of listed species that might occur *inadvertently* during development or other activities by private landowners. In that year, Congress amended section 10(a)(1)(B) of the ESA to allow issuance of "incidental take" permits authorizing take that "is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." This change led to one of the most important and ambitious programs under the ESA—the habitat conservation planning process.

Of course, one cannot simply ask for and receive an incidental take permit. An applicant must first prepare and submit for approval a "conservation plan" detailing, among other things, what the effects of the taking on the species will be and how those effects will be mitigated. Now called Habitat Conservation Plans or simply "HCPs," these plans are central to the entire section 10(a)(1)(B) process. Indeed, HCPs have come to symbolize a fundamental approach to resolving endangered species issues on non-Federal lands.

One of the keys to the HCP process is its flexibility. HCPs vary enormously in size and scope. To date, most of the completed HCPs have been for relatively small projects, but the number of regional-scale planning efforts is growing. Another key is creativity. The ESA and its regulations establish basic biological and procedural standards for the program but otherwise allow the creative potential of willing HCP participants to flourish.

The HCP process is far from perfect, but the benefits of a successful HCP effort far outweigh the costs, and the Fish and Wildlife Service is attempting to improve and streamline permit processing requirements. Non-Federal agencies and the private sector throughout the country are turning increasingly to the HCP process as a means of conserving endangered species habitat in their areas while meeting their growing social and economic needs.

Editor's note: The above was adapted from "Reconciling Conflicts Through Habitat Conservation Planning," a longer feature article by William Lehman in the Endangered Species Bulletin, Vol. XX, No. 1.

[1]For the purposes of this article, the term "species" will apply only to animals. The prohibitions in section 9 of the ESA applying to listed plants are limited to (1) the collection or malicious destruction of endangered plants on Federal land and (2) removal or damage to listed plants on private or State lands in knowing violation of State law, or in the course of violating a State criminal trespass law.

Richard Hannan/FWS

Multi-Species Plan for Forest Habitat

by Craig Hansen

A multi-species HCP is a plan developed to minimize, and mitigate to the maximum extent practical, incidental take of all listed species that may occur in the plan area. The needs of all other species for which an applicant desires coverage—such as a State or Federal species of concern—also must be addressed as if they were listed. This can best be accomplished by ensuring that adequate amounts of all habitat types within the HCP area are maintained.

On June 26, 1995, the Murray Pacific Corporation, a timber company based in Tacoma, Washington, signed a Habitat Conservation Plan (HCP) that may set a precedent for future large-scale species conservation agreements. This plan, the first multi-species HCP for a forested landscape, applies to all listed species that may occur on the company's land now and in the future. It is designed to protect vital habitat for these species while allowing continued timber harvest.

Under the terms of the HCP and its implementation agreement, Murray Pacific received an incidental take permit for currently listed species that may occur on its ownership for the next 100 years. The permit allows Murray Pacific to take listed species incidental to carrying out otherwise legal timber harvest activities. Additionally, the scope of the HCP is wide enough that, should any species occurring on Murray Pacific timberlands become listed in the future, the incidental take permit would be amended (at the company's request) to include the newly listed species. Thus, Murray Pacific has certainty that it can conduct timber harvest activities—as described in the HCP and the legally binding implementation agreement—for the next century without violating the ESA. This was the first such permit issued jointly by the Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) under section 10 of the Endangered Species Act (ESA).

The new HCP is actually an amendment to an HCP Murray Pacific completed in September 1993 to obtain an incidental take permit for the northern spotted owl *(Strix occidentalis caurina)*. In order to conduct timber harvest activities around sites occupied by the owl, Murray Pacific created an HCP that, among other provisions, is designed to develop and maintain owl dispersal habitat across 43 percent of the 53,000-acre tree farm. This conservation strategy was consistent with the Northern Spotted Owl Draft Recovery Plan, which stressed the importance of dispersal habitat in this area to support owl nesting, roosting, and foraging habitat on adjacent National Forests.

As Murray Pacific completed action on the spotted owl HCP, the company learned that another bird dependent on mature forests, the marbled murrelet *(Brachyramphus marmoratus)*, had been listed as threatened. Although subsequent surveys revealed no murrelets on company lands, Toby Murray, the company's vice-president, became concerned about the potential need for additional HCPs if other species on Murray Pacific lands were to

photos by Craig A. Hansen

lurray Pacific has agreed to manage its holdings to provide habitat for juvenile and "floater" adult potted owls. The company will use such silvicultural techniques as pre-commercial thinning and runing to accelerate the growth of habitat characteristics needed by dispersing owls.

Vashington State's Forest Practices Rules and Regulations require companies engaged in timber harvest o leave an average of two green recruitment trees and two snags per acre. When no snags are available, reen trees will be substituted. Such trees may be left adjacent to riparian reserves, helping to create ome interior forest.

become listed in the future. His solution was to develop a multi-species HCP covering all listed species, and species that may be listed in the future, that occur on Murray Pacific timberlands. With this strategy, Murray Pacific could plan for the future and be assured of being able to continue its timber harvest activities without being unduly affected by the ESA.

Murray Pacific's HCP uses a multi-species habitat-based approach. The company anticipated that by retaining and enhancing the habitat types that occur in the HCP area, it can provide for some needs of all the species that occur or are likely to occur on its lands. In addition to the conditions of the original spotted owl HCP, which are still in place, Murray Pacific's multi-species HCP provides for leaving at least 10 percent of its tree farm in non-harvest reserves for the next 100 years. The reserves will take the form of riparian buffers averaging at least 100 feet on each side of all fish-bearing streams. Murray Pacific's commitment to perform watershed analysis on over 98 percent of the HCP area is an important part of the plan. Management prescriptions resulting from this process will reduce erosion into fish streams and improve long-term conditions of riparian areas. This ensures that riparian ecosystems, which are areas that support the greatest species diversity and abundance, will be protected on Murray Pacific lands. Other provisions of the HCP ensure that all forest habitat types and age classes currently on the tree farm, as well as special habitat types such as talus slopes, caves, nest trees, and den sites, will be protected or enhanced. Murray Pacific will leave more snags and double the number of "green recruitment trees" (live trees left in place to provide seed and an uneven-growth forest structure in the future) per acre required by Washington Forest Practices Regulations.

In addition to the broad approach, Murray Pacific has addressed the specific habitat needs of species of concern. Some of these measures include protection of talus slopes and green recruitment trees to maintain environmental conditions required by the Larch Mountain salamander *(Plethodon larselli)*, a species of concern; protecting snags occupied by

The currently listed species that are covered by Murray Pacific's HCP and incidental take permit include four threatened animals—the owl, murrelet, bald eagle, and grizzly bear—and the endangered gray wolf. Many of the conservation measures specified in the agreement are predicated on the chance that these species may occur on Murray Pacific ownership at some time in the future. Although the parties involved in negotiating the HCP acknowledge that it could not be all things to all species, they agree that the plan and its implementation agreement provide the best conservation attainable given the habitat resources present and the fact that these forest lands are expected to realize some economic return.

Larch Mountain salamander
Bill Leonard

aux's swift *(Chaetura vauxi)*, a State andidate species, and leaving green ecruitment trees around the snags here practical; protecting up to 5 cave penings occupied by indigenous bat pecies by retaining trees around each ntrance; protection of bald eagle *Haliaeetus leucocephalus)*, osprey *Pandion haliaetus)*, and goshawk *Accipiter gentilis)* nest trees; and easonal protection of grizzly bear *Ursus arctos)*, gray wolf *(Canis lupus)*, alifornia wolverine *(Gulo gulo luteus)*, nd Pacific fisher *(Martes pennanti acifica)* den sites, should they be ound on Murray Pacific's ownership. oreover, to minimize disturbance to all ildlife, the company limits access to e tree farm.

Murray Pacific's decision to engage in multi-species HCP was voluntary, and as influenced by Interior Secretary ruce Babbitt's "No Surprises" policy. his policy, issued in August 1994, ates that once an HCP has been pproved and is functioning as in-nded, the FWS (or NMFS) will not equire the landowner to provide dditional land or financial compensa-on in the future to mitigate unforeseen circumstances. If mitigation measures beyond those specified in the HCP subsequently are deemed necessary, the primary obligation for such measures would rest with the agency, not the HCP permittee.

This certainty, also known as the "A Deal is a Deal" policy, is what makes HCPs inviting to landowners. They can conduct their normal activities according to the provisions of the HCP without having to be concerned about violating the ESA. At the same time, the landowners make a commitment to continue their conservation efforts throughout the life of the HCP, thereby contributing to the viability of ecosystems at the landscape level. As Toby Murray put it, "There is no doubt in my mind that we have done the right thing—the right thing for the Murray Pacific Corporation and the right thing for fish and wildlife."

Craig Hansen, a wildlife biologist with the FWS Olympia, Washington, Field Office, was the lead FWS representative on this HCP project.

ed-legged frog
ll Leonard

Amphibian surveys conducted in the Murray Pacific HCP area revealed the presence of the northern red-legged frog *(Rana aurora aurora)*—a candidate for listing under the Endangered Species Act—in several drainages. The habitat used by this frog is protected by the riparian and wetland buffers provided in the Murray Pacific HCP. Adult red-legged frogs are highly terrestrial and frequently are found in damp woodlands adjacent to streams. Breeding habitat includes marshes, ponds, and slow-moving streams.

by John Wilkinson

Good News for Owls and Jobs

*I*n early 1995, Weyerhaeuser Company and the U.S. Fish and Wildlife Service (FWS) agreed to a Habitat Conservation Plan (HCP) to protect the threatened northern spotted owl *(Strix occidentalis caurina)* on the company's land near Coos Bay, Oregon. The HCP is a classic "win-win" situation for both owls and jobs by providing dispersal habitat for spotted owls while offering increased certainty for operations on the company's timberlands.

photo courtesy of Weyerhaeuser Company

Below:
Weyerhaeuser's Habitat Conservation Plan provides dispersal habitat for northern spotted owls on its managed forestland, such as this section in southwest Oregon.

Timber harvest operations on Weyerhaeuser's 209,000-acre (84,450-hectare) Millicoma Tree Farm provide 300 forest and sawmill jobs, plus additional jobs for local contractors, chips for papermaking operations, and logs for other local mills. Weyerhaeuser and other private landowners make long-term investments in each acre of timberland. The HCP not only reduces risks to these investments and the jobs associated with them, but also protects owls by providing dispersal habitat on Weyerhaeuser land located between two Federal Late Successional Reserve areas and a large block of State-owned forest located in southwest Oregon. Dispersal habitat allows for the movement of spotted owls between these areas and increases survival prospects for young birds by providing areas for foraging and protection from predators.

The HCP agreed upon by Weyerhaeuser and FWS is legally binding for a period of 50 years. After that, the government can renew the

plan in 10-year increments up to a total of 80 years. The Millicoma Tree Farm now contains portions of 35 owl site centers. Weyerhaeuser will protect all existing habitat around some of the most viable site centers, protect 70 acres (28 ha) around *all* owl site centers, and manage the entire tree farm to maintain suitable habitat for dispersal of spotted owls. Under the terms of the agreement, Weyerhaeuser will use three methods to maintain dispersal habitat for owls:

- Keep 40 percent or more of the tree farm in dispersal habitat, including roosting and foraging areas. Weyerhaeuser will develop this habitat by careful harvest planning and forestry techniques, such as thinning and fertilization.

- Limit the size of gaps between stands of dispersal habitat. Smaller gaps make it easier for owls to disperse safely. Weyerhaeuser will ensure that gaps on 80 percent of the tree farm will be one-half mile (0.8 km) or less in width. Ninety percent will have gaps of one mile (1.6 km) or less, and virtually all, or 99 percent, will have gaps of less than 3 miles (4.8 km).

- Retain some mature timber for at least 20 years and until dispersal habitat conditions are achieved. Weyerhaeuser will retain 1,592 acres (645 ha) of mature timber on the east and west sides of the tree farm, land that is now suitable for dispersal and roosting habitat. An additional 371 acres (150 ha) close to the boundary of the tree farm will assist four known nesting owl sites on neighboring Federal land.

While a win-win agreement was developed that benefits both species and jobs, Weyerhaeuser believes the permit process could be streamlined and improved as private landowners and the FWS complete additional plans in order to reduce the amount of time and money required to complete HCPs.

Weyerhaeuser is taking the HCP a step further by developing multi-species conservation and management plans in southwest Washington and the Willamette area of western Oregon. These HCPs will address many wildlife species on Weyerhaeuser land in addition to the northern spotted owl. Weyerhaeuser's HCP for its Millicoma Tree Farm built a strong foundation for the development of additional, comprehensive conservation plans on the company's land and can serve as an example for other private landowners entering this process.

John Wilkinson is the Vice President, Oregon Timberlands for the Weyerhaeuser Company.

John & Karen Hollingsworth©

northern spotted owl

Placing a Bet on the Desert Tortoise

by Martha K. Collins

Southern Nevada's Clark County is a land of stark contrasts. Part of the hot, dry Mojave Desert, it accommodates nearly 65 percent of Nevada's human population and is one of the fastest-growing counties in the United States. Between 1980 and 2020, the population is expected to triple, reaching 1.5 million. Urban development is concentrated in the Las Vegas Valley, which encompasses only 20 percent of the county but

Martha K. Collins

96 percent of the population. Las Vegas, Nevada's largest city, is known as an artificial oasis of casino gambling, neon lights, lavish landscaping, and extravagant floor shows. But the area is also the home of the desert tortoise, a reptile that has survived in the desert for millennia.

The slow-moving world of the desert tortoise *(Gopherus agassizii)* and the fast-paced world of Las Vegas headed for conflict in the 1980's as bulldozers and backhoes steadily extended suburbia into the scrubby habitat of the desert's original dwellers. This loss of habitat, combined with habitat damage from livestock overgrazing and off-highway vehicle (OHV) use, predation of juvenile tortoises by common ravens *(Corvus corax)*, drought, the spread of an upper respiratory tract disease in tortoises, and illegal collection contributed to the toll on tortoise populations, which declined by as much as 90 percent in some areas. In response, the Fish and Wildlife Service (FWS) took emergency action in 1989 to give Endangered Species Act (ESA) protection to the Mojave population of the desert tortoise (a designation for tortoises west and north of the Colorado River). This temporary measure was replaced with long-term protection when the Mojave population was listed as threatened.

Listing the tortoise under the ESA slowed the rapid commercial and residential development that had come to characterize the Las Vegas area. After developers failed to overturn the listing action in court, the Southern Nevada Homebuilders Association agreed to negotiate a solution. A steering committee comprised of representatives from Clark County; the cities of Mesquite, Las Vegas, North Las Vegas, Henderson, and Boulder City; rural Clark County communities; Nevada Department of Transportation; various Federal agencies; OHV user groups; the mining industry; desert tortoise biologists; The Nature Conservancy; and numerous interested individuals began working on a compromise.

Their efforts were successful, culminating in the approval of a 30-year habitat conservation plan (HCP) by the FWS and the Clark County, Nevada, Commissioners on July 18, 1995. The Clark County Desert Conservation Plan replaces a short-term HCP, issued in 1991 as an interim measure and amended in 1994, that allowed development of up to 30,352 acres (12,283 hectares) and the incidental take of 3,710 desert tortoises (see BULLETIN Vol. XVI, Nos. 9-12). The Clark County Desert Conservation Plan is not expected to have any significant negative economic impacts on Clark County, and

it ensures that development can continue while allowing the desert tortoise to recover.

Under the plan, Clark County and the cities of Las Vegas, North Las Vegas, Henderson, Boulder City, and Mesquite will be allowed to "take," incidental to otherwise legal development activities, desert tortoises that occur on 111,000 acres (44,920 ha) of non-Federal land in Clark County. In addition, the Nevada Department of Transportation will be allowed to take desert tortoises on up to 2,900 acres (1,170 ha) in Clark, Lincoln, Nye, Esmeralda, and Mineral Counties over the next 30 years. In return, recipients of incidental take permits will carry out measures designed to minimize, monitor, and mitigate the effects of this take and the associated loss of tortoise habitat. Recovery of the tortoise will occur mainly on federally-administered lands.

At least $1.35 million per year, and up to $1.65 million per year during the first 10 years, will be provided to fund these measures, which are intended to carry out tasks identified in the Desert Tortoise (Mojave Population) Recovery Plan for areas within Clark County. Funds will come from a mitigation fee of $550 per acre (0.4 ha) assessed on development projects within the area covered by the new plan. Any funds provided to State and Federal resource agencies will augment, not replace, existing funds.

Activities to be carried out under the HCP include: (1) strengthening law enforcement; (2) constructing and maintaining tortoise barriers along roadways; (3) designating closed roads; (4) rehabilitating habitat; (5) conserving 85,000 acres (34,4000 ha) of tortoise habitat on non-Federal land in Clark County; (6) maintaining grazing privileges acquired for conservation purposes in "non-use" status; (7) conducting research; (8) providing a free county-wide pick up and collection service for desert tortoises found in harm's way; and (9) implementing a public information program.

Although the Clark County Desert Conservation Plan replaces the short-term HCP, certain measures initiated under the previous plan will proceed. Primary among these is establishment of the 540,000-acre (218,540 ha) Piute-Eldorado Desert Wildlife Management Area for habitat conservation. Measures designed to benefit the tortoise include: (1) maintenance of grazing allotments in "non-use" status; (2) restrictions on competitive and commercial OHV events; (3) road closures where appropriate and rehabilitation of previously-disturbed habitat; (4) limitations on intensive recreational uses; (5) review of mining claims and operations under section 7 of the ESA; (6) limitations on landfills to existing sites; and (7) restrictions on existing uses that adversely impact tortoises. The area remains open to uses that do not jeopardize the tortoise.

Desert tortoises generally are active in the spring, early summer, and autumn months, when the annual plants upon which they feed are most common. At other times, tortoises usually take refuge in shelter sites or burrows to escape the harsh desert weather, regulate body temperature, conserve water, and escape predators.

B. "Moose" Peterson/WRP

Clark County has proposed to contract with the National Biological Service to develop a translocation and sanctuary program for displaced tortoises. Such tortoises cannot be released at random because of the risk that they would infect resident, healthy tortoises with upper respiratory tract disease.

Martha Collins is a wildlife biologist in the FWS Las Vegas Field Office.

A State Perspective

by Ron Rempel

The Metropolitan Bakersfield HCP broke new ground by providing assurances about a variety of listed and non-listed plants and animals occurring in several distinct habitat types. The species covered by the HCP include the federally-listed San Joaquin kit fox *(Vulpes macrotis mutica)*, blunt-nosed leopard lizard *(Gambelia sila)*, Tipton kangaroo rat (*Dipodomys nitratoides nitratoides)*, Bakersfield cactus *(Opuntia treleasi)*, and giant kangaroo rat (*Dipodomys ingens)*, along with other rare species like Tulare pseudobahia (*Pseudobahia peirsonii)*, striped adobe lily *(Fritillaria striata)*, Bakersfield saltbush *(Atriplex tularensis)*, California jewel flower *(Caulanthus californicus)*, and San Joaquin antelope ground squirrel *(Ammospermophilus nelsoni)*.

Right
San Joaquin antelope ground squirrel
Page 3
California jewel flower

In California, urban development pressures were at extreme levels in the 1980's and early 1990's, and proposed new development collided head on with new listings under the State and Federal Endangered Species Acts (ESA). Out of this conflict came the first Habitat Conservation Plan (HCP). The San Bruno Mountain HCP was designed to conserve a portion of the remaining range for several endangered butterfly taxa while allowing development on parts of San Bruno Mountain in San Mateo County, California. Following the enactment of the 1982 Federal ESA amendments, which authorized incidental take permits under section 10(a)(1)(B), the FWS issued the San Bruno Mountain permit, the first incidental take permit ever issued. The San Bruno Mountain HCP soon became the template handed out to anyone proposing to develop an HCP. Beginning with the San Bruno Mountain HCP, the California Department of Fish and Game (CDFG) has been a strong supporter of the HCP process, and has worked with the U.S. Fish and Wildlife Service (FWS) to encourage and facilitate the development of increasingly complex HCPs. Stimulated by the success of the San Bruno Mountain HCP process, HCP efforts were started by private landowners, cities, and counties at numerous locations in California. State and Federal permits for the incidental take of listed species were soon issued after completion of the Delano Prison, Texaco Cogeneration, Riverside County, Coachella Valley, and other California HCPs. Like the San Bruno Mountain prototype, all of these HCPs focused on single species or a small suite of closely associated species.

With additional species listings on the horizon, landowners, cities, and counties who were preparing HCPs began demanding greater assurances that new listings would not halt development and require additional mitigation after the 10(a) permit was issued. The concern about possible effects of future listings resulted in the development of a multiple-species, multiple-habitats HCP for a 408 square mile (157 square kilometer) area around the City of Bakersfield in the southern San Joaquin Valley of California. The key elements of this first multiple-species HCP are:

- collection of developer fees to help pay for plan implementation;

B. "Moose" Peterson/WRP©

- acquisition of 1 acre (0.4 ha) of natural land for each acre developed;
- providing an endowment for management of the conserved land;
- funding for enhancement of conserved lands;
- elimination of project-by-project review by CDFG and FWS; and
- conservation of the Kern River corridor to provide the only remaining habitat linkage across the San Joaquin Valley.

Over the life of the Metropolitan Bakersfield 10(a) permit, it is anticipated that 45,000 acres (18,183 ha) of habitat will be permanently protected.

In 1991, California took the HCP concept one step further and initiated the Natural Community Conservation Planning (NCCP) program. The coastal sage scrub vegetation community in southern California was selected as the pilot program area. CDFG and the FWS work with the cities and counties in the 6,000 square mile (15,544 square km) planning area to develop Natural Community Conservation Plans which meet both the State NCCP and ESA 10(a) permit standards. Developing dual-purpose plans reinforces the partnership between the CDFG and FWS to conserve listed and non-listed species within the planning area, and it clearly demonstrates to the public, local agencies, and landowners that State and Federal agencies can work together to find solutions to natural resource issues.

The wide variety of HCPs and NCCPs now under development in California has challenged CDFG and FWS abilities to deal with an ever-changing social, political, and economic environment, and has resulted in new perspectives on the role of State and Federal agencies in conservation planning. One lesson is that developing a successful HCP must be a collaborative process that results in a plan that is 1) biologically defensible, 2) economically feasible, and 3) politically acceptable.

Only when all three factors are correctly balanced will an HCP or NCCP be adopted by a city or county, funded by the public, and supported by the environmental community. Making the HCP process work in California has required that CDFG and FWS:

- actively encourage development of regional, multiple-habitat HCPs;
- work to get all potential stakeholders involved in the process;
- acknowledge that ESA 10(a) permit holders need long-term assurance about their obligations and protections under the permit;
- leave hidden agendas at home; and
- expedite review and decision-making processes.

The HCP concept has greatly expanded from its origin with the San Bruno Mountain HCP. With innovative participants representing a wide variety of interests, collaborative HCPs will continue to evolve to meet future conservation challenges.

Ron Rempel currently serves as Program Manager for Natural Community Conservation Planning efforts with the California Department of Fish and Game.

County Shares HCP Experiences

by Brian Loew

The Habitat Conservation Plan (HCP) has been hailed as an optimal mechanism for reconciling conflicts between economic development and the preservation of wildlife habitat. It has been shown that through the development of HCPs, property owners, local governments, farmers, builders, environmental organizations, and the U.S. Fish and Wildlife Service (FWS) can work cooperatively to satisfy both the requirements of the Endangered Species Act (ESA) and the needs of local residents.

Through its development and implementation of one single-species and two multi-species Habitat Conservation Plans (HCPs), Riverside County, California, has demonstrated the problem-solving capabilities and potential successes of these conservation plans. It has also, however, implemented another single-species HCP that illustrates some of the difficulties confronting the HCP process.

Coachella Valley Fringe-Toed Lizard HCP

The Riverside County experience with regional HCPs began in 1984 following the listing of the Coachella Valley fringe-toed lizard *(Uma inornata)* as a threatened species. In an effort to address resulting restrictions on development and agriculture in the Coachella Valley region, a steering committee was formed to develop one of the nation's first HCPs. That committee included representatives of the FWS, U.S. Bureau of Land Management (BLM), California Department of Fish and Game, County of Riverside, Coachella Valley Association of Governments, The Nature Conservancy (TNC), Agua Caliente Tribe, Coachella Valley Water District, and others. At the beginning of 1986, the HCP covering a 70,000-acre (28,285-hectare) area was

B. "Moose" Peterson/WRP

approved by the FWS, and an incidental take permit was issued to the County of Riverside and nine cities pursuant to section 10(a) of the ESA. The Fringe-Toed Lizard HCP is intended to conserve not only the sandy habitat used by this species, but also the essential sources of that wind blown sand. Using guidance provided in the species' recovery plan, three areas encompassing approximately 16,730 acres (6,760 ha) were designated as reserves. The $10 million in local funding for implementing the plan came from mitigation fees assessed on private development in the HCP area.

Southwestern Riverside County Multi-Species HCP

In 1992, the Metropolitan Water District of Southern California (MWD) and the Riverside County Habitat Conservation Agency (HCA) received State and Federal approval for their joint Southwestern Riverside County Multiple Species Habitat Conservation Plan. The Riverside County HCA is a public agency comprised of the County of Riverside and the Cities of Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Perris, Riverside, and Temecula. It was formed for the purpose of developing and implementing HCPs for the Stephens' kangaroo rat and other endangered, threatened, and candidate species in western Riverside County.

This 20,000-acre (8,081-ha) conservation plan covers 31 listed and sensitive species and numerous habitat types. Management activities are directed by a committee comprised of representatives of the Metropolitan Water District, Riverside County HCA, FWS, California Department of Fish and Game, and the Riverside County Regional Park and Open Space District.

Although only 3 years old, the Multiple Species HCP has proven to be a model approach for resolving potential conflicts between multiple species habitat conservation and the construction of the Domenigoni Reservoir, one of the largest public works projects ever initiated in Southern California. Implementation of the HCP also has demonstrated that habitat management can be successfully accomplished through the mutual cooperation of local, regional, State, and Federal agencies.

Lake Mathews Multi-Species HCP

The Metropolitan Water District and Riverside County HCA have completed a multiple species HCP covering 35 listed and sensitive species located on over 12,000 acres (4,848 ha) in western Riverside County. The Lake Mathews Multiple Species HCP seeks issuance of incidental take permits for listed species and pre-listing agreements for species not yet protected under the ESA. Additionally, it provides for the establishment of a multi-species mitigation bank and includes a highly innovative fire management plan developed in consultation with the California Department of Forestry and Fire Protection.

No land acquisition expenses will be incurred under this HCP due to the fact that included Metropolitan Water District, BLM, and State of California properties were already owned by those entities, while Riverside County HCA lands were acquired under the Stephens' Kangaroo Rat HCP (see below). The Riverside County HCA will provide a $5 million endowment to finance ongoing management, monitoring, and biological research expenses. Habitat management will be provided by a non-profit organization acting under the direction of a committee comprised of county, State, and Federal representatives. Riverside County hopes to have State and Federal approval of the Lake Mathews Multiple Species HCP in the near future.

Stephens' Kangaroo Rat HCP

The most significant and controversial HCP effort undertaken in Riverside County occurred as a result of the 1988 listing of the Stephens' kangaroo rat *(Dipodomys stephensi)* as an endan-

Opposite page

This small lizard is found only within Coachella Valley in Riverside County, California. Named for its home and the tiny projections on its toes that enable it to run easily over sand, the Coachella Valley fringe-toed lizard evades predators by "swimming" beneath the loose surface. The presence of wind-blown sand is essential to the lizard's survival.

photos courtesy of B. "Moose" Peterson/WRP

gered species. At the time of the listing, Riverside was the fastest growing county in California, with residential and commercial development accounting for a significant proportion of the total economic activity in the western part of the county. Since that area also contains most of the species' remaining range, habitat protection came into conflict with public and private development in the region.

In August of 1990, the Riverside County HCA received State and Federal approval for a Short-Term HCP. That 565,000-acre (228,300-ha) conservation plan was intended to allow limited incidental take of the species during otherwise legal development activities and afford interim protection to the most valuable remaining habitat while sufficient data could be collected to design a permanent preserve system. However, because of continuing regulations on development within preserve study areas, a lack of Federal funding for implementation of the plan, and the absence of a recovery plan, there was considerable opposition from property owners.

The Riverside County HCA developed a Long-Term Stephens' Kangaroo Rat HCP intended to replace the Short-Term plan and submitted it for State and Federal approval in February 1995. Salient features of the Long-Term HCP include the following:

- Seven core preserves permanently dedicated to conservation of the Stephens' kangaroo rat and other species would be established throughout western Riverside County, by purchase and BLM land trades.

- Management of the core reserves would be coordinated by a committee consisting of the FWS, California Department of Fish and Game, BLM, Riverside County HCA, University of California at Riverside, Riverside County Regional Open Space and Parks District, TNC, Metropolitan Water District, and others.

- Within the HCP area, incidental take of the Stephens' Kangaroo rat may occur anywhere outside of core reserves with payment of the applicable mitigation fee ($1,950 per acre). Incidental take in core reserves may occur for purposes related to public health, safety, and welfare (e.g., fire prevention, emergency response, and operation and maintenance of public facilities) with FWS approval.

The Riverside County HCA and the FWS recently completed public hearings on the joint environmental impact studies for the Long-Term HCP. Given the degree of public opposition expressed at those hearings, the future of this conservation effort is uncertain.

Conclusion

Having developed and implemented a number of large-scale HCPs, Riverside County has drawn conclusions about factors necessary for their success:

- In most cases, multiple-species HCPs are preferable to single-species HCPs. In areas such as Riverside County with 58 species currently listed or proposed for listing under the ESA, single-species HCPs only address a fraction of the total habitat issue.

- In areas having any significant amount of private property, landowners must be involved from the beginning of the HCP development process.

- Active participation by the FWS, BLM, and other Federal and State agencies is essential to the success of large-scale HCPs.

- Funding of HCPs must be shared by Federal, State, and local sources and should not be funded solely by new development or any other single portion of the population.

Brian Loew is Executive Director of the Riverside County Habitat Conservation Agency.

Photos clockwise from top of opposite page
San Diego horned lizard, San Diego black-tailed jackrabbit, loggerhead shrike, and southwestern pond turtle. These animals are among the 31 listed and sensitive species covered in the Southwestern Riverside County Multiple Species HCP. All but the turtle also are addressed in the Lake Mathews Multiple Species Habitat Conservation Plan.

by Linda LaClaire

Red Hills Salamander HCP

Red Hills salamanders live within small burrows in sandy loam over and around siltstone outcrops on steep, shady ravines and bluffsides that are dominated by mixed pine and hardwood trees. The forest floor is moist and relatively cool, with an abundance of the small invertebrates that make up the salamander's diet. Its burrow invariably extends into siltstone, a soft rock that absorbs and retains moisture. The siltstone maintains a relatively stable, humid environment that probably allows the Red Hills salamander to survive periods of drought. This species spends so little time above ground that most researchers who have worked with the elusive salamander have never found one outside of its burrow.

In 1960, a biologist walking along a steep, moist ravine shaded by beeches, tulip trees, oaks, big-leaf magnolias, and flowering dogwoods discovered a salamander new to science. Surveys for this species, designated the Red Hills salamander *(Phaeognathus hubrichti)*, have demonstrated that it is unique to Alabama, where it is confined to a small area of the Red Hills Physiographic Province within the Tallahatta and Hatchetigbee geologic formations. In 1976, after the salamander's already limited habitat was reduced by intensive logging and the replacement of hardwood forests with pine plantations, the species was listed as threatened. Today, recovery of the Red Hills salamander is being promoted through a Habitat Conservation Plan (HCP) developed by International Paper Timberlands Operating Company, Ltd. (International Paper) and the Fish and Wildlife Service (FWS). Under this plan, about 6,400 acres (2,590 hectares) that include the best salamander habitat on International Paper lands will be conserved.

The Red Hills Salamander HCP provides for long-term conservation of the salamander on International Paper lands while permitting limited take of the species during otherwise legal activities. The incidental take permit, issued for a period of 30 years, applies to International Paper lands in Conecuh and Monroe Counties of south-central Alabama, where the company owns 29,463 acres (11,924 ha) within the Red Hills salamander's historic range. Of this acreage, only around 6,400 acres (2,590 ha) are currently occupied by the salamander, but this represents 12 percent of the species' total range.

The two best habitat classifications ("optimal" and "suitable but suboptimal") apply to 4,514 acres (1,827 ha), or about 92 percent of the occupied Red Hills salamander sites observed on International Paper lands. To minimize and mitigate the take of Red Hills salamanders, these high quality habitats

are designated as refugia under the HCP. They are surrounded by 50-foot (15.2-meter) forested buffers, which total an additional 1,900 acres (769 ha). Limited timber practices can continue in the buffers, but at least 50 percent canopy cover will be retained. The buffers should reduce soil disturbance and desiccation, and protect the habitat quality of the refugia. In addition, International Paper will train employees to identify salamander habitat, establish buffers, and conduct timber activities within buffer zones in compliance with the terms of the HCP. Normal forest management practices can proceed in the marginally suitable habitat, which represents the balance (8 percent) of occupied range on International Paper land. Incidental take of the salamander is permitted only in the marginally suitable habitat.

The success of the Red Hills salamander HCP has led International Paper to begin development of an HCP to promote the recovery of the gopher tortoise *(Gopherus polyphemus)*, which is listed as threatened west of the Mobile and Tombigbee Rivers. Such a plan has the potential to be wide in scope, covering parts of Mississippi, Louisiana, and Alabama. It could provide the lead for additional HCPs covering the tortoise on other private lands.

In the South, 90 percent of timber land is privately owned. Fortunately, in developing this HCP, International Paper had the foresight to appreciate that the survival of many species depends on the stewardship of these private lands. "We view these projects as examples of private industry and government agencies developing creative solutions to natural resource issues," said Mark Suwyn, International Paper's Executive Vice-President, as he announced the plan. Other timber companies in the region now are following International Paper's lead, conducting surveys for the salamander on their lands and initiating discussions with the FWS on development of their own HCPs.

Linda LaClaire is a biologist in the FWS Jackson, Mississippi, Field Office.

C. Kenneth Dodd, Jr.

The Red Hills salamander is a dark brown, fairly large salamander, approximately 10 inches (25 centimeters) in length with an elongate body, short limbs, and a prehensile tail. The sole member of its genus, this salamander has no close biological relatives.

Negotiating for Conservation

by Charles Raines

*H*abitat conservation plans (HCPs) can be an effective tool for implementing the Endangered Species Act (ESA). Properly designed HCPs contribute to the conservation of wildlife while providing private landowners with reasonable use of their property. However, without a solid scientific foundation, long-term monitoring, and responsiveness to changing conditions, they provide only a false sense of security.

Two agencies, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), are responsible for negotiating HCPs on behalf of the public. Threatened and endangered species are public resources. It is incumbent upon the FWS and NMFS to assure that species identified in an HCP are protected sufficiently, and that such a determination is supported by sound scientific analysis. Furthermore, long-term monitoring and enforcement are necessary to assure that objectives of the plan are being met.

Ecosystem Approach

Some multi-species HCPs have attempted to be ecosystem-based, protecting habitat across broad areas rather than limiting protection to known occupied sites. Although individual plants or animals might be lost under this approach, it avoids the problem of habitat slowly being whittled to nothing as development occurs on temporarily unoccupied habitat. A successful ecosystem approach to an HCP requires cooperation with private landowners whose holdings lie within the ecosystem. In the Pacific northwest, for example, recovery of several late-successional forest species, such as the threatened northern spotted owl *(Strix occidentalis caurina)*, cannot be achieved on national forest lands alone. Adequate reserves on intermingled non-Federal lands are necessary. These can be located along riparian zones where they also benefit salmon and other aquatic species.

Certainty and Flexibility

As with any contract, a certain level of certainty and risk are inherent in the HCP process. Parties must realize that a degree of flexibility will be necessary to meet unanticipated situations. For instance, the HCP should anticipate significant habitat or population changes due to major storms, fires, or epidemics. This is especially true for multi-species HCPs that apply to nonlisted species, poorly understood invertebrates, or other less "charismatic" fauna.

A dollar paid today is worth far more than a promise to pay a dollar in 50 years. For wildlife, an acre of habitat

today is worth far more than the promise of an acre of habitat in 50 years. If the objectives of a plan are based significantly on the promise of future habitat development, perhaps a larger "down payment" of habitat preservation should be required. Under several HCPs, for example, late-successional forests will be logged during early years of the plan, resulting in a loss of important habitat. The results of mitigation actions (regrowth of other forest) might not be fully effective for nearly a century. The possibility that a population decline for the species in the early decades of the HCP might not be reversible in the later decades should be considered.

Most HCPs have no specific financial penalties, short of court action, for non-compliance. Since the recovery of damaged habitat may take decades or centuries, additional provisions for rectifying this are needed. For instance, a bond could be used to acquire replacement habitat.

Public Involvement

The National Environmental Policy Act (NEPA) is a part of the decisionmaking process, requiring preparation and public review of an environmental impact statement (EIS) for any action likely to affect the environment. While eliminating duplication between the EIS and HCP processes would benefit the reviewer and reduce costs, these are two separate processes with different purposes. Considering alternative habitat conservation approaches, assessing cumulative effects, and soliciting public input via an EIS are essential to achieving a sound HCP. While landowners may feel the process is complete with the agreement on a draft plan, the public review process—integral to agency decisionmaking—has just begun.

While an HCP is usually better than no plan, the real test is whether it complies with the ESA and ultimately whether it contributes to the conservation of wildlife resources. We must exercise caution when entering into these long-term commitments.

A biologist, Mr. Raines has been active in forest issues for 25 years. He currently directs the Sierra Club's Cascade Checkerboard Project in Washington State.

USDA Forest Service

This late successional forest is an example of habitats covered by recent HCPs in the Pacific Northwest.

by William E. Lehman

Keystone Dialogue on Private Lands

The pace of the Endangered Species Act (ESA) reauthorization process has accelerated in recent months, with Congressional hearings underway, a range of reauthorization bills being introduced in the House and Senate, and debate continuing on how best to protect endangered species. Nothing in this debate seems to generate as much passion as the issue of private property rights and effects of the ESA on private landowners. At the same time, the contributions that private landowners make to conserving threatened and endangered species are receiving increased attention.

In the midst of all this, a quiet revolution of sorts took place last June and July when an unlikely group of individuals gathered in Washington, D.C., to discuss this critical issue of private lands and succeeded in an impressive achievement.

Increasingly, thoughtful people on all sides of the endangered species debate recognize that the ESA can generate considerable disincentives for private landowners to accept endangered species living on their lands. Landowners may enjoy endangered species and want them protected, but also fear that Federal regulations protecting imperiled species may limit use of their lands and may reduce property values.

This was the problem confronted by the group convened by the Keystone Center, a non-profit organization based in Keystone, Colorado, specializing in conflict resolution and facilitation of solutions to public policy issues. The subject of this "Dialogue" was as practical as it was potentially divisive: how to increase incentives under the ESA for private landowners to protect endangered species.

What made the Keystone Dialogue so remarkable was that it brought together all the partisans in the endangered species debate, sat them down in a room, and told them, in essence, "We're going to develop conceptual solutions to this problem, we're going to try to reach consensus, and we're going to do it all in 4 days." One might well have asked whether someone had taken leave of their senses!

Thirty-two representatives from the Georgia-Pacific Corporation; Defenders of Wildlife; National Woodland Owners Association; Environmental Defense Fund; National Endangered Species Act Reform Coalition; National Wildlife Federation; International Paper; mining, farm, and real estate interests; Congressional staff; the Departments of Interior and Agriculture; State conservation

agencies; the U.S. Fish and Wildlife Service; and other organizations participated in both of the 2-day Dialogue sessions.

Three ground rules were established by Keystone at the outset of the Dialogue: (1) members of the group participated as individuals, not as formal representatives of their organizations; (2) all conversations were off-the-record and not for attribution; and (3) the final product would have the consensus of the *entire* group.

These rules laid the groundwork for a frank and productive discussion. Each participant had the power to veto any particular proposal, yet there was little stone-walling or political posturing. Each side could concede legitimate complaints by the other without losing respect among its constituency. All sides were highly motivated—not only by the desire to defend the interests of their constituencies, but by the understanding that to do so would require balancing the interests of each constituency. Another crucial reason for the Dialogue's success was the professional management of the group by the Keystone Center's staff.

Happily, the ambitious goals of the Keystone Dialogue were achieved. The resulting July 25, 1995, report—"The Keystone Dialogue on Incentives for Private Landowners to Protect Endangered Species"—was forwarded immediately to Congress for its consideration during ESA reauthorization proceedings. It contains recommendations arranged in three chapters.

Chapter 1 addresses ways to increase voluntary participation in endangered species programs, including codification of the "Safe Harbor" policy (see *Endangered Species Bulletin*, Vol. XX, No. 3) into law; development of conservation agreements that would give landowners long-term regulatory certainty; and a Conservation Reserve Program, based on an existing program for farmlands, that would pay landowners a per-acre fee for protecting endangered species habitat. Chapter 2, which is devoted to Habitat Conservation Plans, recommends reforms to encourage and streamline HCP development. Such recommendations include allowing "short-form" HCPs for small projects, development of "seed money" funds to help communities begin HCP efforts, and codifying Secretary Babbitt's August 11, 1995, "No Surprises" policy for HCPs (ensuring landowners that no additional money-based or land-based mitigation will be required of any approved and functioning HCP). Chapter 3 deals with financial incentives, including estate tax reform, Federal tax credits, and other tax-based incentives that would reward landowners who manage their lands in a manner that benefits endangered species.

Since its release, the Keystone report has received a lot of favorable attention. Members of Congress have declared themselves impressed and are studying its recommendations. Newspapers and magazines have published reports of the Dialogue, and its no-nonsense conclusions are proving a welcome addition to the ESA reauthorization debate. Yet there were equally important, if somewhat intangible, benefits—lessons, call them—that emerged from this 4-day exercise. This participant learned, for example, that the gulf between private property owners and endangered species advocates is *not* unbridgeable, that it is difficult to demonize the opposition when they're sitting next to you munching a croissant, and that political and ideological rhetoric occasionally does give way to productive discourse.

William Lehman is a wildlife biologist in the FWS Division of Endangered Species, Washington, D.C.

For a copy of the report summarized in this article, write the Keystone Center, P.O. Box 8606, Keystone, Colorado 80435-7998, or call 303/468-5822.

Region 2

Santa Cruz River Species The Cottonwood Springs Partners for Wildlife project, located in southern Arizona on Sonoita Creek (a major tributary of the Santa Cruz River), continues to serve as an excellent opportunity for biodiversity restoration. This effort has improved habitat for an endangered fish, the Gila topminnow *(Poeciliopsis occidentalis)*, and the Huachuca water umbel *(Lilaeopsis schaffneriana* var. *recurva)*, a plant proposed in 1995 for listing as endangered. Both species are found in cienegas, unique wetland ecosystems in the arid southwest.

Of additional and perhaps greater significance for biodiversity restoration, this partnership with a willing landowner has led to significant increases in the growth of willows, cottonwoods, and other species. The growth of these native trees, when combined with recovery of other cienega and riparian plants, has increased the area's diversity of neotropical migratory bird species, such as flycatchers, vireos, warblers, and grosbeaks.

The Fish and Wildlife Service's (FWS) Arizona Ecological Services State Office hopes to use this Partners for Wildlife partnership and others nearby as examples to promote similar restoration efforts along the Santa Cruz River in Mexico.

Region 3

Running Buffalo Clover *(Trifolium stoloniferum)* In early June, a new site for this endangered plant was confirmed in Lawrence County, Ohio. Botanists from the Ohio Department of Transportation, the Ohio Division of Natural Areas and Preserves, and the U.S. Forest Service verified the clover find.

Dakota Skipper *(Hesperia dacotae)* Federal agriculture and natural resource agencies, species experts, and private agriculture interests met in late June to launch a prelisting recovery effort for the Dakota skipper, a butterfly of tall and midgrass prairies. The group is united in its desire to keep the skipper's status healthy enough that it will not need Endangered Species Act (ESA) protection.

Piping Plover *(Charadrius melodus)* Cooperative efforts to protect this small shorebird, which is classified in the Great Lakes region as endangered, are paying off this year, with more plover young sighted in this region since the population was listed in 1985. Preliminary reports from the 1995 nesting season indicate that at least 21 pairs nested this year and produced approximately 40 fledglings.

Eastern Prairie Fringed Orchid *(Platanthera leucophaea)* As part of the artificial pollination project for this threatened wildflower, which is being coordinated by The Nature Conservancy and the FWS Chicago, Illinois, Field Office, over 60 volunteers from TNC's Volunteer Steward Network censused orchid populations, hand-pollinated orchids, and collected and dispersed seeds for the third year in a row. It may be several years before results from the seed dispersal are apparent, but this year we were rewarded with dramatic population increases at sites that were managed as grasslands through prescribed burning and clearing of invasive, non-native brush. Land managers with the Lake County Forest Preserve District were particularly delighted to see over 100 flowering plants at one site where no more than 5 plants have been seen annually for 8 years.

The much-needed habitat management was accomplished through ESA section 6 funding and the cooperation of the Illinois Department of Natural Resources, three County Forest Preserve Districts, private landowners, volunteer, the TNC, and the FWS Chicago Office.

Eastern prairie fringed orchid
FWS photo

Region 4

Clasping warea (*Warea amplexifolia*) At Lake Griffin State Recreation Area in Leesburg, Florida, park managers, aided by a grant from the FWS, are continuing recovery efforts for this endangered, summer-flowering annual. Encroaching evergreen oaks are being removed from the species' pineland habitat and protective fences have been built. In addition, the Florida Division of Forestry has been producing wiregrass *(Aristida stricta)* plants from seed collected from another State park. Over 2,000 wiregrass plants are being transplanted into warea habitat to restore the habitat's understory.

Mussels The FWS Jacksonville, Florida, Field Office is sponsoring several surveys and recovery efforts by the National Biological Service (NBS) for the conservation of freshwater mussels. An on-going status survey on mussels of the Altamaha River system of central Georgia is focusing on seven species restricted to that drainage, including the Altamaha spinymussel (*Elliptio spinosa*). Recent recovery projects include NBS research on which fish species host the larvae of four mussels that are proposed for listing, and a study to determine the effects of sedimentation on mussels and fish communities within several Apalachicola River system tributaries.

In addition, the FWS Jacksonville and Asheville, North Carolina, Field Offices are cooperating to fund research projects and outreach activities. One study at the NBS Virginia cooperative research unit involves experiments on how best to feed and raise juvenile mussels in tanks for eventual placement into native habitat. The other project, which is being conducted by the NBS Tennessee co-op unit, will investigate the potential of using fish hatchery raceways to propagate mussels for reintroduction. Both research projects are using non-endangered mussels as surrogates for listed species. The outreach activities, initiated by the Asheville office in cooperation with the FWS Jacksonville and Jackson, Mississippi, Field Offices, include an exhibit at the Tennessee Aquarium in Chattanooga on the conservation of freshwater aquatic biodiversity and a travelling interactive display on mussels. Also, the Asheville office has developed a freshwater ecosystem "trunk" or container that provides educators with a variety of educational material on lesser known aquatic species.

Region 5

Indiana Bat ***(Myotis sodalis)*** Sightings of the Indiana bat in New Jersey are on the rise. This endangered mammal was first documented in the State in 1993, when a colony was found hibernating in an abandoned mine. Two additional Indiana bat hibernacula were discovered in 1994, also within abandoned mines. In July 1995, biologists captured a post-lactating female Indiana bat, confirming summer breeding activity in New Jersey.

Indiana bats
Merlin D. Tuttle/Bat Conservation International©

Northeastern Tiger Beetle ***(Cicindela dorsalis dorsalis)*** Historically found in "great swarms" along New Jersey's undeveloped beaches from Sandy Hook to Holgate, the northeastern tiger beetle had disappeared from the State by the 1970's. Recently, the FWS began to restore this threatened insect to portions of its former range. In October 1994, biologists with the FWS New Jersey Field Office and tiger beetle researcher C. Barry Knisley of Randolph-Macon College (Ashland, Virginia), in cooperation with the National Park Service, reintroduced approximately 600 beetle larvae at 2 sites on the Sandy Hook unit of the Gateway National Recreation Area. The larvae were collected from Virginia populations along the Chesapeake Bay.

During a July 1995 survey of the reintroduction sites, biologists found about 50 adult beetles. The predatory insects displayed normal feeding and mating behavior. In addition, the presence of active larvae confirmed that beetles were reproducing. The success of the first year's reintroduction exceeded expectations, and another release of larvae is scheduled to take place shortly.

Dwarf Wedge Mussel ***(Alismidonta heterodon)*** Volunteers from the New England Aquarium Dive Club, Vermont Field Office of The Nature Conservancy (TNC), and FWS New England Field Office spent a day diving in the Connecticut River to search for this endangered mollusk. FWS biologists and Chris Fichtel of TNC trained the volunteers in identifying freshwater mussels and their habitats, and provided back-up support (e.g., food, equipment).

The 9 volunteer divers found 11 dwarf wedge mussels, all in depths of 8 to 13 feet. Because the day was so successful, a number of the divers asked to assist in future explorations of the Connecticut River. This was the second time the New England Aquarium Dive Club has volunteered to help search for mussels and, we hope, not the last.

Atlantic Salmon ***(Salmo salar)*** Wild stocks of Atlantic salmon from seven Maine rivers constitute a distinct population that was proposed September 29 for listing as threatened under the ESA. The FWS and State of Maine are working closely to produce fry for augmenting the reduced wild salmon populations, using captured wild fish as broodstock. Thousands of hatchery-produced salmon fry were released recently into three of the seven rivers. Each river received only fry from stock native to that river.

The Craig Brook National Fish Hatchery has been converted to a river-specific facility capable of holding and isolating fish from five of the seven rivers. The FWS plans to stock all five rivers next year.

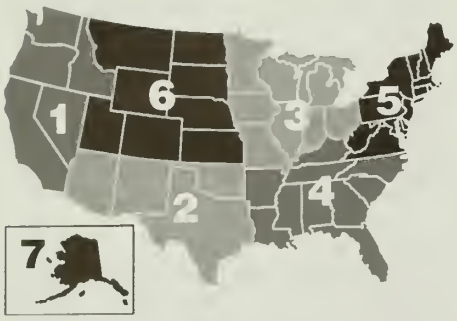
Region 7

Aleutian Canada Goose ***(Branta canadensis leucopareia)*** The Aleutian Canada goose continues to make progress toward recovery. In August, a total of 173 geese were translocated to Yunaska and Skagul Islands in the Aleutian Chain. Improvements in handling the wild-caught geese resulted in no losses despite the 48-hour holding time between capture and release. Fifty percent (86 geese) of the translocated birds were female goslings, which will improve the chances for successful reestablishment of a nesting population. The first long-distance (500 miles) translocation in 1994 proved successful when 35 percent of the geese released on Yunaska Island were observed on the wintering grounds in California last winter.

The Aleutian Canada goose breeding pair survey of Alaid/Nizki Islands in summer 1995 produced an estimate of 124 nests, a four-fold increase from the 1992 estimate, indicating that the islands' nesting population is self-sustaining.

Aleutian Shield Fern ***(Polystichum aleuticum)*** Recovery efforts in the summer of 1995 involved the collection of fronds from wild populations for cultivation by the New York Botanical Garden and the Royal Botanical Garden (Kew) Gardens in Kew, England. Living material transferred to these facilities last year from a previous experiment are contaminated with algae, so an attempt will be made to cultivate this species directly from spores. Spores will also be supplied to the Cincinnati Zoo Plant Conservation Program, where they will be placed into a germplasm repository.

Aleutian shield fern
Brian Anderson/FWS



Region 2

The U.S. Fish and Wildlife Service's (FWS) New Mexico Ecological Services State Office has been working with Bitter Lake National Wildlife Refuge, the FWS Albuquerque Regional Office (Division of Water Resources), New Mexico Department of Game and Fish, USDA Natural Resources Conservation Service (formerly the Soil Conservation Service), The Nature Conservancy, and the New Mexico Natural Heritage Inventory to develop conservation agreements for three springsnail species that are candidates for listing under the Endangered Species Act (ESA). The Chupadera springsnail *(Pyrgulopsis (="Fontelicella") chupadae)*, Roswell springsnail *(Pyrgulopsis (="Fontelicella") roswellensis)*, and Koster's tryonia *(Tryonia kosteri)* are all endemic to New Mexico. The Chupadera springsnail is found only on private land, while the other two species are known from springs on Bitter Lake NWR and on private land. FWS biologists are participating in efforts to determine the current status of these species and are working with private landowners to protect springs that support the snails.

The U.S. Department of State has agreed to prepare a Programmatic Environmental Impact Statement (PEIS) to address the cumulative impacts of bridges over the Rio Grande between Texas and Mexico. The FWS, along with other Federal agencies (General Services Administration, Army Corps of Engineers, Border Patrol, Customs Bureau), is participating in the effort. Currently, 15 bridges span the Rio Grande in the stretch from Del Rio to Brownsville alone, and another 9 are proposed for construction. At least 20 listed species of plants and animals, and hundreds of rare or peripheral species, occur in the Lower Rio Grande Valley.

Since the turn of the century, approximately 95 percent of the native Tamaulipan thornbrush habitat once found in this area has been cleared for agriculture and urban development. The remaining 5 percent of the Lower Rio Grande area of Texas still supports many unique and rare species. Because of the need to protect the remaining native habitats, three national wildlife refuges are located in this area. In fact, the Lower Rio Grande Valley National Wildlife Refuge was established specifically to preserve habitats along the lower Rio Grande and to establish a "wildlife corridor" to connect larger "islands" of habitat in the United States. Unfortunately, additional bridges or other development proposed for construction along the Rio Grande in this area may inhibit the movement of wildlife along the narrow corridor of habitat between the U.S. and Mexico. Secondary and indirect impacts associated with construction of an international bridge (increased highway construction and other development) are often as detrimental to wildlife resources as the direct impacts of the bridge itself.

Representatives of the FWS Lower Rio Grande Ecosystem Team attended an interagency scoping meeting for the PEIS last spring in Austin, Texas, along with about 20 other State and Federal agencies. Three public scoping meetings were held in May 1995 in Harlingen, Laredo, and El Paso, Texas. The FWS provided written comments to the State Department on June 12, 1995. The final PEIS on the bridge construction projects is expected by March 1996.

Region 3

In late June, the Emergency Response Office of the Environmental Protection Agency (EPA) became concerned that the Indiana bat *(Myotis sodalis)* might be harmed by emergency action to remove barrels of toxic waste from a Superfund Site along the Stillwater River northwest of Dayton, Ohio. This portion of the river has scenic river status and contains mature trees that show potential as roosting habitat for Indiana bats. After a field review of the clean-up sites and proposed remedial actions, a biologist from the FWS Reynoldsburg, Ohio, Field Office identified activities that could proceed immediately without affecting the Indiana bat or its habitat. Other sites will be evaluated further as the clean-up effort proceeds.

In July 1995, The Nature Conservancy (TNC) and the FWS Bloomington, Indiana, Field Office initiated much needed conservation efforts for the endangered Mitchell's satyr butterfly *(Neonympha mitchellii mitchellii)*. Only five apparently viable populations remain rangewide (Indiana and Michigan). At the time of its listing, two populations existed in Indiana. Unfortunately, recent surveys failed to locate the butterfly at one of the two previously occupied sites. In an attempt to strengthen the Indiana population, efforts to reintroduce the butterfly to a nearby TNC-owned property were completed this year. Biologists will monitor the site next year to determine if the project was successful.

In an effort to determine the movements of lake sturgeon *(Acipenser fulvescens)* in Wisconsin's Wolf River, large sturgeon were collected and implanted with radio tags for tracking over a 3-year period. The fish were released upstream of the Shawano Hydroelectric Dam. If they are found to migrate downstream through the Shawano Dam and the next downstream dam (Shawano Paper Mills Dam), then the installation of fish ladders at these dams will likely be required to allow lake sturgeon and other fish species to move back upstream to Menominee Indian Tribal waters on the Wolf River. The Menominee Reservation was a historic spawning area for the lake sturgeon before fish passage was blocked by the two dams.

Approximately 11,000 visitors learned about endangered species recently during a "Conservation Fest" at the Kansas City, Missouri, Zoo. The FWS Columbia, Missouri, Field Office hosted an endangered species booth during this 2-day event.

Region 5

In August 1995, the FWS New Jersey Field Office concluded informal consultation with the EPA regarding changes in plans for the clean-up of the Gloucester Environmental Management Service's (GEMS) Superfund site in Camden County, New Jersey. The EPA's original design for removal of contaminated groundwater at the GEMS landfill could have damaged adjacent wetlands supporting over 25,000 clumps of the swamp pink *(Helonias bullata)*, a threatened wildflower. Working with FWS biologists, EPA modified the project by reducing the number of groundwater extraction wells to avoid draining the critical wetlands while

The lake sturgeon is a large fish that is not listed under the ESA but is considered a species of concern.
Michigan Technological University Photo Services

allowing capture of the contaminant plume. Long-term hydrological and vegetative monitoring will be conducted to ensure that the redesigned clean-up plan does not adversely affect swamp pink habitat.

The Freshwater Mussels of Vermont, a new publication resulting from years of joint effort by the FWS, Vermont Department of Fish and Wildlife, and private groups and individuals, is now available. It describes the distribution and status of all freshwater mussels known to occur in Vermont, and includes distribution maps and photos (in both color and black-and-white) of each species. Introductory sections discuss ecology and life history, threats, and historical and current mussel surveys. The price is $6.00 (postpaid). To order, contact The Nature Conservancy, 27 State Street, Montpelier, Vermont 05602 (ATTN: Chris Fichtel).

Region 7

Work during the summer of 1995 focused on pinpointing the cause(s) of the spectacled eider's *(Somateria fischeri)* precipitous population decline in Alaska. Twenty adult male eiders were collected from St. Lawrence Island in early May during migration to their wintering areas. Satellite transmitters were implanted in 9 males from Russia, 10 females from the Yukon Delta, and 10 females from Prudhoe Bay. Tissue samples were collected to screen for contaminants, and prey items collected from these birds are being identified.

Research conducted by the National Biological Service has included tissue analysis of lead levels in spectacled eiders from the Yukon Delta National Wildlife Refuge and North Slope in Alaska, as well as eiders from Russia. Blood samples and x-ray images were collected from females at hatching time and again 30 days later, and from ducklings at 30 days of age. The X-rays indicated that some females and ducklings had ingested lead shot.

Items for Recovery Updates and Regional News are provided by endangered species contacts in FWS regional and field offices.

Listing Proposals August/October 1995

In April 1995, Congress placed a moratorium on final rules adding plants or animals to the list of threatened and endangered species or designating critical habitat while it considers various bills to amend and reauthorize the Endangered Species Act. As of fiscal year 1996, that moratorium has been extended to the preparation and publication of listing proposals.

From August 1, 1995, until the moratorium on listing proposals took effect, the Fish and Wildlife Service (FWS) proposed listing 109 species—105 plants and 4 animals—as endangered or threatened. If the proposals are approved, Endangered Species Act protection will be extended to the following:

Seventy-four Hawaiian Plants During this time, the FWS published 5 separate proposals to list 74 plant taxa endemic to the Hawaiian Islands. These plants have declined significantly in population and distribution, and some now number fewer than 10 surviving individuals. They face a multitude of threats, including competition from introduced plant species; habitat destruction by feral or domestic non-native animals; predation by rats, insects, and other introduced animals; and agricultural, military, and urban development. The Hawaiian names, if any, follow the scientific names as listed below.

One package, published in the September 25 *Federal Register*, proposed the classification of endangered for 13 plant species endemic to the island of Hawai'i:

Clermontia drepanomorpha, or 'oha wai, a tree in the bellflower family (Campanulaceae);

Cyanea platyphylla, or haha, a palm-like shrub in the bellflower family;

Hibiscadelphus giffardianus, or hau kuahiwi, a tree in the mallow family (Malvaceae) that exists in cultivation but is extinct in the wild;

Hibiscadelphus hualalaiensis, or hau kuahiwi, a tree in the mallow family that is also extinct in the wild;

Melicope zahlbruckneri, or alani, a tree in the citrus family (Rutaceae);

Neraudia ovata, a shrub in the nettle family (Urticaceae);

Phyllostegia racemosa, or kiponapona, a climbing vine in the mint family (Lamiaceae);

Phyllostegia velutina, a vine in the mint family;

Phyllostegia warshaueri, a vine in the mint family;

Pleomele hawaiiensis, or hala pepe, a tree in the agave family (Agavaceae);

Pritchardia schattaueri, or loulu, a large palm in the family Arecaceae;

Sicyos alba, or 'anunu, a vine in the gourd family (Cucurbitaceae); and

Zanthoxylum dipetalum var. *tomentosum*, or a'e, a tree in the citrus family.

A separate September 25 *Federal Register* publication proposed to list 19 plant species endemic to the island of Kaua'i for ESA protection. Seventeen were recommended for listing as endangered:

Alsinidendron lychnoides, or kawawaenohu, a subshrub in the pink family (Caryophyllaceae);

Alsinidendron viscosum, a subshrub in the pink family;

Cyanea remyi, or haha, a shrub in the bellflower family;

Cyrtandra cyaneoides, or mapele, a shrub in the African violet family (Gesneriaceae);

Delissea rivularis, or 'oha, a shrub in the bellflower family;

Hisbiscadelphus woodii, or hau kuahiwi, a small tree in the mallow family;

Hibiscus waimeae ssp. *hannerae*, or koki'o ke'oke'o, a tree in the mallow family;

Kokia kauaiensis, or koki'o, a tree in the mallow family;

Labordia tinifolia var. *wahiawaensis*, or kamakahala, a shrub or small tree in the family Loganiaceae;

Phyllostegia knudsenii, a recently discovered perennial herb or vine in the mint family;

Phyllostegia waurana, a perennial vine in the mint family;

Pritchardia napaliensis, or loulu, a small palm;

Pritchardia viscosa, or loulu, a taller species of palm;

Schiedea helleri, a vine in the pink family;

Schiedea membranacea, a perennial herb in the pink family;

Schiedea stellarioides, or laulihilihi, a subshrub in the pink family; and

Viola kauaensis var. *wahiawaensis*, a perennial herb in the violet family (Violaceae).

Because the other two Kaua'i plants in the listing proposal are believed to be vulnerable but not in imminent danger of extinction, they were proposed for classification under the less critical status of threatened:

Cyanea recta, or haha, an unbranched shrub in the bellflower family; and

Myrsine linearifolia, or kolea, a shrub in the family Myrsinaceae.

One of 3 listing packages for Hawaiian plants published on October 2 proposed the endangered classification for 25 plant species endemic to the island of O'ahu:

Neraudia ovata
Loyal A. Mehrhoff/FWS

Chamaesyce herbstii, or 'akoko, a small tree in the spurge family (Euphorbiaceae);
Chamaesyce rockii, 'akoko, a compact shrub or small tree in the spurge family;
Cyanea acuminata, or haha, an unbranched shrub in the bellflower family;
Cyanea humboldtiana, or haha, a shrub in the bellflower family;
Cyanea koolauensis, or haha, a shrub found only in the Ko'olau Mountains;
Cyanea longiflora, or haha, a shrub in the bellflower family;
Cyanea st.-johnii, or haha, a shrub named for the late botanist Harold St. John;
Cyrtandra dentata, or ha'iwale, a sparingly-branched shrub in the African violet family;
Cyrtandra subumbellata, or ha'iwale, a shrub in the African violet family;
Cyrtandra viridiflora, or ha'iwale, a small shrub with fleshy, heart-shaped leaves;
Delissea subcordata, or 'oha, a shrub in the bellflower family;
Eragrostis fosbergii, a recently discovered perennial in the grass family (Poaceae);
Gardenia mannii, or nanu, a tree in the coffee family (Rubiaceae);
Labordia cyrtandrae, or kamakahala, a shrub in the family Loganiaceae;
Lepidium arbuscula, or 'anaunau, a gnarled shrub in the mustard family (Brassicaceae);
Lobelia gaudichaudii ssp. *koolauensis*, an unbranched shrub in the bellflower family;
Lobelia monostachya, a recently discovered prostrate, woody shrub in the bellflower family;
Melicope saint-johnii, or alani, a slender tree in the family Rutaceae;
Myrsine juddii, or kolea, a highly-branched shrub in the family Myrsinaceae;
Phyllostegia hirsuta, an erect subshrub or vine in the mint family with stems densely covered by stiff hairs;
Phyllostegia kaalaensis, an herb in the mint family;
Pritchardia kaalae, or loulu, a member of the palm family;
Schiedea kealiae, a subshrub in the pink family;
Trematolobelia singularis, an unbranched shrub in the bellflower family; and
Viola oahuensis, a subshrub in the violet family.

Another listing package published October 2 proposes endangered status for three plant species endemic to the island of Moloka'i:
Cyanea dunbarii, or haha, an unbranched shrub in the bellflower family;
Lysimachia maxima, a sprawling shrub in the primrose family (Primulaceae); and
Schiedea sarmentosa, a highly-branched shrub in the pink family.

Pleomele hawaiiensis
Loyal A. Mehrhoff/FWS

The final October 2 proposal for Hawaiian plants addresses 14 species from throughout the archipelago. All but one were proposed for listing as endangered:
Achyranthes mutica, a recently discovered shrub in the amaranth family (Amaranthaceae);
Cenchrus agrimonioides, or kamanomano, a perennial in the grass family;

Cyanea st.-johnii
Loyal A. Mehrhoff/FWS

Cyanea humboldtiana
Loyal A. Mehrhoff/FWS

Cyanea grimesiana ssp. *grimesiana*, or haha, a shrub in the bellflower family;

Cyperus trachysanthos, or pu'uka'a, a perennial, grass-like plant in the sedge family (Cyperaceae);

Euphorbia haeleeleana, a dioecious (male and female flowers on separate plants) tree in the spurge family;

Isodendrion laurifolium, or aupaka, a slender shrub in the violet family;

Panicum niihauense, or lau 'ehu, a perennial bunchgrass;

Phyllostegia parviflora, a perennial herb in the mint family;

Platanthera holochila, an erect herb in the orchid family (Orchidaceae);

Sanicula purpurea, a perennial herb in the parsley family (Apiaceae);

Schiedea hookeri, a sprawling or clumped perennial herb in the pink family;

Schiedea kauaiensis, an erect subshrub in the pink family; and

Schiedea nuttallii, a subshrub in the pink family.

One species that is not in as precarious a condition was proposed for listing as threatened:

Isodendrion longifolium, or aupaka, a slender shrub in the violet family.

Thirty California Plants The FWS published 6 proposals to list 29 plant taxa and one lizard native to California as threatened or endangered. These species are vulnerable to such threats as: habitat damage and direct predation by grazing animals; competition from, and hybridization with, introduced plant species; urbanization; recreational development; off-road vehicle use; highway widening; vegetational succession due to alteration of natural fire cycles; wetland modification; overcollection; military activities; and herbicides.

One of four listing proposals published in the August 2 *Federal Register* would classify nine plants from California's central coast as endangered:

Alopecurus aequalis var. *sonomensis*, or Sonoma alopecurus, a tufted perennial in the grass family;

Astragalus clarianus, or Clara Hunt's milkvetch, a low-growing annual herb in the pea family (Fabaceae);

Carex albida, or white sedge, a perennial herb in the sedge family;

Clarkia imbricata, or Vine Hill clarkia, an annual herb in the evening-primrose family (Onagraceae);

Lilium pardalinum ssp. *pitkinense*, or Pitkin Marsh lily, an herbaceous perennial in the family Liliaceae;

Plagiobothrys strictus, or Calistoga allocarya, a small annual herb in the family Boraginaceae;

Poa napensis, or Napa bluegrass, a tufted perennial bunchgrass;

Sidalcea oregana ssp. *valida*, or Kenwood marsh checkermallow, a perennial herb in the mallow family; and

Trifolium amoenum, or showy Indian clover, an annual in the pea family.

A second August 2 proposal would list a plant endemic to the northern Diablo Range in Alameda and Contra Costa Counties as threatened:

Arctostaphylos pallida, or pallid manzanita, a shrub in the heath family (Ericaceae).

Trematolabelia singularis
Loyal A. Mehrhoff/FWS

One August 2 proposal called for listing four plants and one lizard found primarily along the coast in Monterey County. The classification of endangered was proposed for:

Astragalus tener var. *titi*, or coastal dunes milk-vetch, a small annual herb in the pea family;

Piperia yadonii, or Yadon's piperia, a perennial herb in the orchid family;

Potentilla hickmanii, or Hickman's potentilla, a small perennial herb in the rose family;

Trifolium trichocalyx, or Monterey clover, a prostrate annual herb in the pea family; and

Anniella pulchra nigra, or black legless lizard, a burrowing, limbless species with a diameter about the size of a pencil and a maximum length of about 9 inches (23 centimeters).

The remaining plant was proposed for listing as threatened;

Cupressus goveniana ssp. *goveniana*, or Gowen cypress, a coniferous shrub or small tree in the family Cupressaceae.

The fourth August 2 proposal recommended protection for seven plants from the mountains of southern California. Two of these plants were proposed for listing as endangered:

Poa atropurpurea, or San Bernardino bluegrass, a perennial; and

Taraxacum californicum, or California dandelion, a perennial in the sunflower family (Asteraceae).

The other five were proposed as threatened:

Arabis johnstonii, or Johnston's rock-cress, an herbaceous perennial in the mustard family;

Arenaria ursina, or Bear Valley sandwort, a low-lying perennial herb in the pink family;

Castilleja cinerea, or ash-grey Indian paintbrush, a perennial in the snapdragon family (Scrophulariaceae);

Eriogonum kennedyi var. *austromontanum*, or southern mountain wild buckwheat, a perennial in the family Polygonaceae; and

Trichostema austromontanum ssp. *compactum*, or Hidden Lake bluecurls, a compact annual in the mint family with long, shaggy hairs.

On August 9, four plant taxa native to southwestern California and northern Baja California, Mexico, were proposed for listing as endangered:

Acanthomintha ilicifolia, or San Diego thornmint, an aromatic annual herb in the mint family;

Dudleya stolonifera, or Laguna Beach dudleya, a succulent perennial in the stonecrop family (Crassulaceae);

Hemizonia conjugens, or Otay tarweed, an aromatic annual in the sunflower family; and

Monardella linoides ssp. *viminea*, or willowy monardella, a perennial herb in the mint family.

Finally, on October 2, the FWS proposed Endangered Species Act protection for four plant species associated with chaparral plant communities in southwestern California and northwestern Baja California, Mexico. The proposal called for classifying two species as endangered:

Berberis nevinii, or Nevin's barberry, an evergreen shrub in the family Berberidaceae; and

Fremontodendron mexicanum, or Mexican flannelbush, an evergreen shrub or small tree in the cacao family (Sterculiaceae).

The other two plants were proposed for listing as threatened:

Ceanothus ophiochilus, or Vail Lake ceanothus, a rounded shrub in the buckthorn family (Rhamnaceae); and

Nolina interrata, or Dehesa beargrass, a yucca-like plant in the lily family.

Eleutherodactylus cooki
Jerry D. Hardy, Jr.

***Eleutherodactylus cooki* in its native habitat.**
George Drewry/FWS

Three Puerto Rican Species On September 28, the FWS proposed to list two plants from Puerto Rico as endangered:

Cordia bellonis, a shrub in the family Boraginaceae; and

Juglans jamaicensis, known also as nogal or the West Indian walnut. This large tree in the family Juglandaceae also is found on the islands of Hispaniola and Cuba.

On October 2, the rock frog or *Eleutherodactylus cooki*, a species endemic to Puerto Rico, was proposed for listing as threatened. With its large, white-rimmed eyes and low, peculiar call, this frog strikes some people as a specter- or phantom-like animal.

Atlantic Salmon The FWS proposed in the September 29 *Federal Register* to list a distinct population segment of anadromous Atlantic salmon *(Salmo salar)*, consisting of native stocks in seven Maine rivers, as threatened.

Least Chub Also on September 29, the least chub *(Iotichthys phlegethontis)*, a small fish now found only within a small number of springs and creeks in the Snake Valley of western Utah, was proposed for listing as endangered. A proposed designation of critical habitat is outlined in the *Federal Register*.

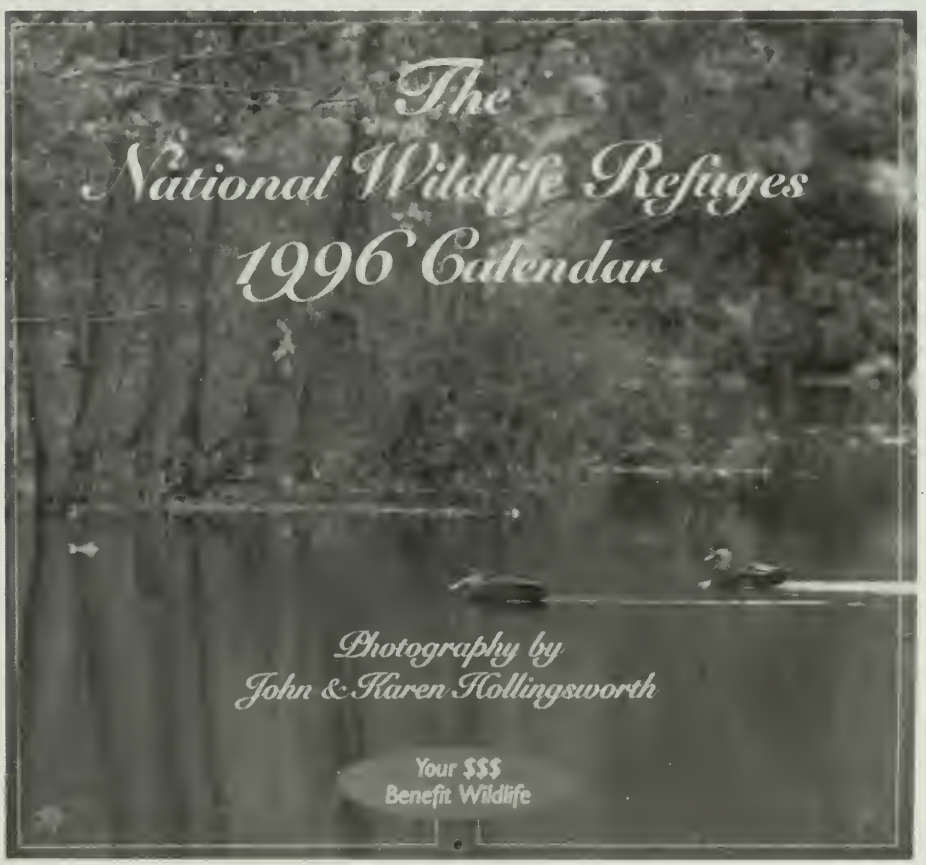
1996 Refuge Calendar Available

*H*ighlighting the diversity of the National Wildlife Refuge System, this calendar gives an intimate look at habitats from the arctic tundra to the gulf coast and species from gray seals to desert fish. Photographed by natural history photographers John and Karen Hollingsworth, it includes an expanded events section ("Come Discover and Learn"), encouraging the public to discover and explore the resources of the refuge system.

For every calendar purchased, 50 cents will be donated to the National Fish and Wildlife Foundation, which will match these donations. The funds will be used for conservation and restoration of wildlife habitat, endangered species recovery activities, habitat acquisition for the refuge system, and youth education programs.

Also available is the Hollingsworths' book, *Seasons of the Wild—A Journey Through Our National Wildlife Refuges*. With more than 70 photographs and an evocative text, the book features 47 national wildlife refuges. A portion of the proceeds from the book also go to the Foundation.

To order the calendar, send $11.95 to Worm Press, P.O. Box 235, Bellvue, Colorado 80512-0235, or call 1-800-493-2713 (VISA and Mastercard orders accepted). The price for the book is $19.95. Please include $3.00 for shipping and handling with each order.



Editor's note: We are sad to report that John Hollingsworth passed away this year. Through their photography and publications, the Hollingsworths have made lasting contributions to the conservation of the Nation's wildlife resources.

BOX SCORE

Listings and Recovery Plans as of October 31, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	19	335	39
BIRDS	74	178	16	6	275	72
REPTILES	14	65	19	14	112	31
AMPHIBIANS	7	8	5	1	21	11
FISHES	65	11	40	0	116	71
SNAILS	15	1	7	0	23	12
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	320	521	114	40	995	306
FLOWERING PLANTS	406	1	90	0	497	195
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	12
PLANT SUBTOTAL	434	1	92	2	529	208
GRAND TOTAL	754	522	206	42	1,524*	514**

TOTAL U.S. ENDANGERED: 754 (320 animals, 434 plants)
TOTAL U.S. THREATENED: 206 (114 animals, 92 plants)
TOTAL U.S. LISTED: 960 (434 animals, 526 plants)***

*Separate populations of a species listed both as Endangered and Threatened, are tallied twice. Those species are the argali, leopard, gray wolf, piping plover, roseate tern, chimpanzee, green sea turtle, and olive ridley 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 418 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.
***Four animals have dual status.

ENDANGERED Species BULLETIN

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

ENDANGERED Species BULLETIN

U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

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ENDANGERED Species BULLETIN

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

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