

ENDANGERED *Species* BULLETIN

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Having reached the year 2000, we face the sobering fact that the number of species officially listed as endangered or threatened is rapidly approaching the same number. Many other vulnerable plants and animals also await protection. The challenges facing everyone interested in conserving our natural heritage seem to grow greater all the time, but reasons for optimism can still be found. Just recently, for example, biologists documented the first known reproduction of pallid sturgeon in the lower Missouri River in at least 50 years. Meanwhile, on the Pacific island of Guam, local and federal agencies are working with zoos to restore a rare bird, the Guam rail, to its native range. Their stories, and other hopeful news, are found in this edition of the Endangered Species Bulletin.



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On the Cover

Vigorous recovery efforts, including captive propagation and the control of non-native predators, are leading to hope for the recovery of the endangered Guam rail.

Photo by Jessie Cohen/National Zoological Park, Smithsonian Institution

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

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by Ken Burton

New Hope for the Pallid Sturgeon



Adult pallid sturgeon
Photo by Steve Krentz/USFWS

The first known reproduction of the pallid sturgeon (*Scaphirhynchus albus*) in the Lower Missouri River in at least the last 50 years has been confirmed by U.S. Fish and Wildlife Service biologists, who point to the startling discovery as evidence that the fish, whose ancestors date to the days of the dinosaurs, may have a better chance at recovery than many people previously believed.

“This is wonderful,” said Steve Krentz, leader of the Pallid Sturgeon Recovery Team in Bismarck, North Dakota. “Until these tiny sturgeon specimens were found, the only young pallid sturgeon we have seen were products of hatchery spawning operations.”

The pallid sturgeon, which can attain a weight of 100 pounds (45 kilograms), a length of 6 feet (1.8 meters), and a lifespan of 60 years, has been listed as an endangered species since 1990, indicating a concern that the species was headed for extinction.

Aside from the pallid sturgeon’s importance as a natural inhabitant of the Missouri and Mississippi river systems, it also has economic benefits; some anglers consider it one of America’s premier gamefish. Eventual full recovery for the sturgeon would make it available once again to sportfishing enthusiasts.

The sturgeon is also considered an indicator species whose abundance and distribution are directly related to the quantity and quality of suitable habitat and river hydrology. The fact that these specimens were collected at a habitat restoration project on a unit of the Big Muddy National Fish and Wildlife Refuge indicates that efforts to put back some of the 500,000 acres (200,000 hectares) of habitat lost to channelization can produce dramatic results.

Jim Milligan, project leader for our Fisheries Resources Office in Columbia, Missouri, said the specimens were found along a restored sandbar in a side channel of the Lower Missouri River that had been cut by the flood of 1993 and expanded to a chute-island-sandbar complex by more flooding in 1995 and in 1996. It is the first new habitat of its kind the river has been allowed to create in more than 50 years.

“We acquired the land for the refuge and gave the river some freedom to re-create some lost habitat through natural processes of erosion, deposition and succession,” Milligan said. “And the area

became nursery habitat for juvenile pallid sturgeon. The most significant aspect of this find is that it clearly demonstrates that we can use the river's energy to restore habitat for the benefit of threatened, endangered, and declining fish species. More than 40 other Missouri River fish species have also been documented using the restored habitat."

Pallid sturgeon populations began to drop with the advent of dams, and also when their habitat was altered from shallow, silty rivers with sand and gravel bars to deeper clear channels favored by commercial river traffic. The side channel where the sturgeon were found is not a part of the navigation channel.

An adult pallid sturgeon is a rare find today in any segment of the Missouri River system. In the early 1990's, the Service and its state partners began a hatchery reproduction program and stocked the Missouri River with at least 3,000 hatchery sturgeon.

"We know the fish found in Missouri are not the result of our stocking efforts," said Steve Krentz, leader of the Pallid Sturgeon Recovery Team in Bismarck, North Dakota. "The juvenile fish we placed in the river were 8 to 10 inches long and the specimens collected in August were less than an inch long."

Pallid sturgeon historically inhabited rivers and tributaries in Arkansas, Iowa,

Illinois, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North and South Dakota, Nebraska, and Tennessee. Some sturgeon still inhabit some of those areas, Milligan said, but the populations are far below what they were in the 1950's and 1960's.

The Missouri Department of Conservation lists the pallid sturgeon as exceedingly rare and confined to the Missouri and Mississippi Rivers, penetrating only a few miles into the Mississippi upstream from the mouth of the Missouri. The species is somewhat more abundant in the Missouri River upstream of Iowa, but nowhere in its range is it common.

Compared to most other fish species, the pallid sturgeon has an unusual appearance. It is distinguished by pale, bony plates instead of scales, a reptile-like body, a sucker-type mouth, and large whisker-like growths that help it sense its surroundings. It is similar in appearance to the shovelnose sturgeon (*Scaphirhynchus platorhynchus*) but is much lighter in color and has a longer, sharper snout.

Ken Burton is a Public Affairs Specialist in the Service's Washington, D.C. Office.



In addition to efforts aimed at restoring pallid sturgeon habitat, Fish and Wildlife Service biologists have been working to spawn and raise pallid sturgeons in hatcheries such as the Gavins Point National Fish Hatchery in South Dakota.

An adult female pallid sturgeon may produce 170,000 eggs or more, but the hatchlings (shown at left) are tiny, fragile creatures that must fend for themselves. Miniature barbels or "whiskers" on each side of the mouth help the young sturgeon seek out the insect larvae, worms, and other bottom-dwelling organisms on which it feeds, while minuscule bony scutes provide some protection from other small predators. In the wild, few would live to attain the eight-inch length of the individual shown above, and only a handful, if any, would survive the 7-10 years necessary to reach sexual maturity.

By spawning and raising pallids in a protected environment, Gavins Point NFF and others help to increase the number of sturgeon that survive the hazards of early life. Releasing hatchery-raised fish into restored habitat may provide just the boost needed to help put the pallid sturgeon on the road to recovery.

Photo above and left by Gavins Point National Fish Hatchery



The Rail Road To Recovery

by M. Kelly Brock and
Grant M. Beauprez

Image omitted

Photographed on the island of Rota, this is a captive-reared Guam rail released into habitat similar to the limestone forest inside Area 50 on the island of Guam.

Photo © R.N. Reed

The Guam rail (*Gallirallus owstoni*) was once a common bird on the Pacific island of Guam. In the early 1980's, however, this species, along with seven other native forest birds, was extirpated from the wild due to predation by the invasive brown tree snake (*Boiga irregularis*). But now the Guam rail is making a comeback. The Guam Department of Agriculture's Aquatic & Wildlife Resources Division (DAWR) is leading efforts to reduce the threat from non-native predators and reintroduce captive-bred rails back into their native habitat. Numerous researchers and cooperators from a wide range of territorial and federal agencies, universities, zoos, and conservation organizations are providing important assistance.

The road to recovery for the Guam rail began in December 1989 when we initiated attempts to establish an experimental population of rails on Guam's neighboring snake-free island of Rota in the Commonwealth of the Northern Mariana Islands. Between December 1989 and August 1999, we released 267 captive-reared rails while evaluating the success of different release methods. Control of feral cats in the release area enhanced rail survival and we first documented reproduction by captive-reared rails on Rota in 1995. During the summer of 1999, at least three pairs of captive reared Guam rails successfully produced 5 nests with eggs and hatchlings.

Before reintroduction of the rail to its native habitat on the island of Guam could begin, the brown tree snake had to be controlled. The Biological Research Division of the U.S. Geological Survey developed snake barriers, and small-scale perimeter trapping methods developed by the U.S. Department of Agriculture's Wildlife Services agency proved highly effective in reducing and controlling localized snake populations. In September 1997, the DAWR adopted both tools for the first large-scale operation to deplete the snake population in a 60-acre (24-hectare) plot containing mixed native habitats. The plot, known as Area 50, is located in the Guam National Wildlife Refuge overlay on Andersen Air Force Base in northern Guam. The Air Force was instrumental in designating Area 50 as a test site for habitat management, snake control, and species recovery.

Weekly capture rates declined precipitously within the first 9 weeks, from 14.9 to 1.5 snakes per 100 trap

nights, by trapping around the perimeter of Area 50. After achieving a capture rate of 0.6 snakes per 100 trap nights, we maintained it for another 15 weeks. Twenty-six weeks into the control program, we erected a snake barrier around Area 50 and activated a grid of traps evenly spaced throughout the area. The capture rate in the interior of the plot was not significantly higher after activation of the grid, demonstrating that perimeter trapping alone could achieve the desired level of snake control. Eventually the grid was deactivated, while the barrier, and continual trapping of the perimeter, were used to control a re-invasion of snakes.

In November 1998, confident that the brown tree snake population was significantly depleted and controlled, the DAWR released 16 captive-reared Guam rails into Area 50. We monitored the rails by radio telemetry to document movements, survival, and nesting activity. Rails paired off and established territories almost immediately. By late December 1998, we discovered the first nest. Although not all of the released rails survived, no losses could be attributed to predation by snakes or other predators. By October 1999, 9 rails made at least 16 nesting attempts, yielding 46 eggs. Apparently all but six of the eggs hatched.

Support for Guam rail recovery efforts by the American Zoo and Aquarium Association (AZA) began in 1984. Participating institutions have bred nearly 800 Guam rails, most of which were produced and maintained in the Guam Department of Agriculture's captive breeding facility. Currently, 14 zoological institutions participate in the Guam Rail Species Survival Plan. The role of the zoos is to implement captive breeding recommendations that aim to preserve the genetic diversity of the Guam rail, as well as to produce young rails for the reintroduction program.

With the successful reproduction of captive-reared rails released into the wild, and the development of efficient, relatively low cost methods to control



localized populations of brown tree snakes, the future is looking brighter for the Guam rail. We are hopeful that a network of controlled areas on Guam can be established to permit the reintroduction and recovery of other native forest birds as well.

M. Kelly Brock & Grant M. Beauprez are Wildlife Biologists with the Guam Department of Agriculture, Aquatic & Wildlife Resources Division, in Mangilao, Guam.

The front gate into Area 50, with the snake barrier (the wire mesh attached to the cyclone fence) and snake traps that are used in and around the area. The habitat edge just beyond the gate is part of a territory set up by two rails that paired and successfully bred.

Guam Department of Agriculture, Aquatic & Wildlife Resources Division photo

Brown tree snake
USFWS photo



by Michelle Reynolds

Rescuing Island Castaways



Laysan ducks are best known for one of their energetic foraging behaviors: a spectacular fly-snapping sprint through the brine fly swarms on Laysan Island's interior mudflats.

Photo by Michelle Reynolds/USGS

*T*he Laysan duck or teal (*Anas layanensis*) has the most restricted range of any duck species and is among the world's most highly threatened birds. Before the arrival of humans to the Hawaiian Islands, this species occurred on most islands in the archipelago, and it apparently was well adapted to harsh environments and variable food resources. Today, however, it is restricted to Laysan Island, a single predator-free coralline island of only 990 acres (400 hectares) northwest of the main islands. Laysan has been protected as part of the Hawaiian Islands National Wildlife Refuge since 1909, and the Laysan duck was among the first species listed in the United States as endangered.

Like many isolated island species from Hawaii and New Zealand, the Laysan duck evolved in the absence of mammalian predators and is ill-suited to life where non-native predators have invaded. For example, when startled, Laysan ducks are more likely to freeze their motion rather than to flush or fly. This strategy is well

suites as a cryptic defense against Hawaii's native flying predators but ineffective against predation by non-native mammals.

Small, isolated populations are extremely vulnerable to extinction from chance events and human related disturbance. The Laysan duck population on nearby Lisianski Island disappeared after successive shipwrecks on the island in the 1840's, probably due to direct human consumption. The species reached the brink of extinction when rabbits were introduced to Laysan Island in the early 1900's, but it recovered from fewer than 10 individuals after the rabbits were removed and the vegetation restored. Although rabbits no longer occur on Laysan, the duck population has gone through several severe bottlenecks. The most recent population crash occurred in 1993 during El Nino drought conditions. The population size (more than 500) was larger than the drought stricken island could support, and a die-off occurred from starvation and parasite infestation. Duck numbers appear to fluctuate with rainfall and population density.

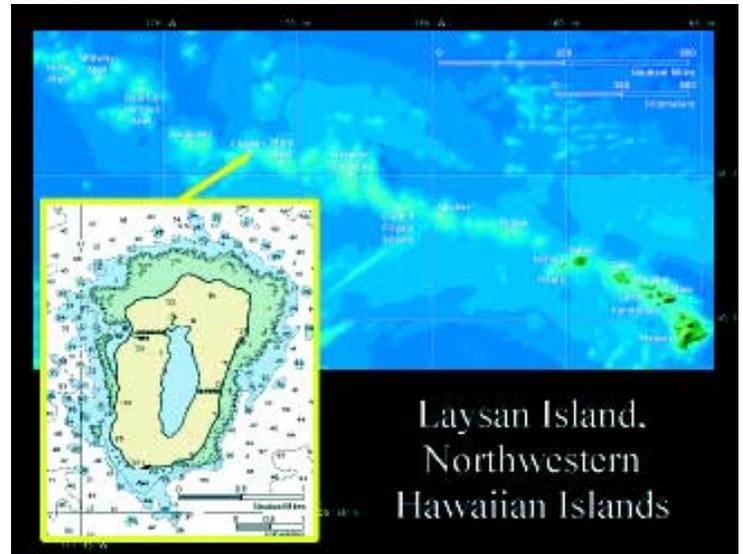
Ecosystem restoration on Laysan Island National Wildlife Refuge and the establishment of additional wild populations on other islands are needed to reduce the risk of extinction. Control of a non-native plant, the sandbur weed (*Cenchrus encinatus*) has been very effective in restoring the duck's nesting habitat, which includes native bunch grass (*Eragrostis variabilis*). Despite the bird's former distribution in forested areas of the main Hawaiian Islands, only remote, predator-free oceanic islands are being considered as sites for establishing new populations. Even the predator-free islands will likely need pest and weed control or reestablishment of freshwater seeps. Many of the Hawaiian Islands are infested with introduced predatory ant species such as the big-headed ant (*Pheidole megacephala*), which could compete with Laysan ducks for invertebrate prey and threaten the endemic arthropods.

The U.S. Fish and Wildlife Service has implemented strict quarantine procedures to prevent additional accidental introductions of harmful non-natives on Hawaii's remote island refuges.

Translocation is a wildlife management tool involving the transfer of animals from one location to another to reestablish extirpated populations or augment depleted populations. The translocated animals can consist of wild and/or captive-propagated individuals.

For the Laysan duck, this tool could reduce the risk of extinction by reintroducing ducks into areas that are free of threats. Research on Laysan is addressing the ecological requirements for any future translocations and the potential effects on the Laysan population from

removing some of its ducks for translocation. Critical features of the ecology and population biology of the Laysan duck in general also are under study. Field research initiated in 1998 has concentrated on foraging ecology and methods to determine population size. The ducks are usually hidden under cover during the day, and become active before sunset and after dark. We have used mark-resight methods to improve population monitoring. Because the duck's behavior varies seasonally, the traditional method of counting unmarked individuals around the lake at sunset consistently underestimated the population for most seasons. Over half of the population was marked during 1998-99, and 1999 population estimates were around 300 adults. The ducks on Laysan had a good breeding year in 1999, and the population for 2000 is estimated at 370 adults.



The important progress being made in understanding the factors limiting the Laysan duck population can translate into practical recovery recommendations. Reestablishing additional populations will reduce the risk of extinction and restore an ecological component now missing from most of the islands. The Service, Ducks Unlimited, National Geographic Society, and U.S. Geological Service (Biological Resources Division) are pooling their resources to ensure that these unique ducks do not become "island castaways." The Laysan duck's "rescue" will arrive in the form of habitat restoration and reintroduction.

Michelle Reynolds is a Biologist with the Biological Resources Division of the U.S.G.S. at the Pacific Island Ecosystems Research Center, Hawaii National Park, Hawaii.

by Ben Ikenson

Ranching for Longhorns *and* Wildlife



Attwater's greater prairie chicken
USFWS photo

Before emptying into the Gulf of Mexico, the San Bernard River, a ribbon of water and hardwood trees in the gulf coast prairie of southeastern Texas, passes through the ranch of John and Taunia Elick. Their ranch is home not only to Texas Longhorn cattle but also a wide variety of wildlife, including bald eagles (*Haliaeetus leucocephalus*), which use the tall cottonwoods lining the river for their winter roost. It's no wonder that John named their 1,800-acre (730-hectare) spread the Eagle Roost Ranch.

If ranches were always named for the birds that populate them, there once was a time the Elick's place could have been called the Attwater's Prairie Chicken Ranch. A grouse species that thrived on the land before Elick's time, Attwater's greater prairie chicken (*Tympanuchus cupido attwateri*), has become North America's most endangered bird. Elick and fellow ranchers in the area have joined an effort to restore this bird, a lost element of the important Gulf Coast prairie ecosystem.

"I want to do something for wildlife," said Elick. "I want to help create and maintain habitat for wildlife because I believe that what is good for the ecology of the land is good for me and my ranch."

Elick is one of eight landowners working to restore a total of over 17,800 acres (7,200 ha) of Texas coastal prairie habitat as part of the Coastal Prairie Conservation Initiative. The initiative is jointly sponsored by the Attwater Prairie Chicken National Wildlife Refuge (NWR), the Sam Houston Resource Conservation and Development Board, and local Soil and Water Conservation Districts. It allows landowners to receive

cost-share incentives for voluntary prairie habitat conservation practices such as brush control, modifications in grazing management, and prescribed burning. These practices are intended to benefit landowners by improving the health of their range land while at the same time enhancing wildlife habitat.

Landowners can also sign a "Safe Harbor" agreement with the Fish and Wildlife Service. These agreements essentially relieve landowners of liability under the Endangered Species Act if management practices attract endangered species. In addition to the Attwater's prairie chicken, other endangered species covered under the Safe Harbor provisions include the Houston toad (*Bufo houstonensis*) and a plant, the Texas prairie dawn-flower (*Hymenoxys texana*).

Before Elick was involved in the Safe Harbor program, he was concerned that the Federal government would infringe on his property rights if it was discovered that his property attracted such endangered species as the prairie chicken and bald eagle. But after hearing about the Safe Harbor agreements, Elick approached program representatives within the Service and the local Resource Conservation and Development Board.

"Basically," said Elick, "I learned that the Safe Harbor was designed to protect the ranch owner's property rights on his land, and yet provide the government special use ranchland for endangered species habitat without the price tag of acquiring the land. Both the government and private landowner benefit without any negative drawbacks to either party."

“It’s a win-win situation for everyone involved,” said Terry Rossignol, manager of Attwater Prairie Chicken NWR. “The rancher improves his habitat for his cattle operation and the Attwater’s prairie chicken benefits from the improved habitat as well.”

If participating landowners carry out the agreed upon cost-shared habitat improvements, they may develop, farm, or ranch without fear of being stopped. They are required only to notify the Service and give it an opportunity to relocate any endangered species expected to be adversely affected by changes in land management.

“This program has mushroomed in popularity and, because Texas is more than 97 percent privately owned, it now holds the key to successful recovery of the Attwater’s prairie chicken,” said Rossignol. “Without the help of private landowners, the bird is doomed to extinction.”

Since 1996, releases of captive-reared prairie chickens have been conducted at the refuge and Galveston Bay Coastal Prairie Preserve. However, these release sites can support only a limited number of birds. Success of the recovery and captive propagation/release program really depends on the cooperative efforts of private landowners.

Recent landowner participation may just prove that cattle grazing and endangered species recovery can go hand in hand. Before long, things might start looking brighter for the bird thanks to people like John Elick. In his own words, he uses the “holistic approach to managing the ranch for cattle grazing, wildlife habitat, and recreational enjoyment of the land.” His cattle roundups, chuckwagon trail rides, and quail hunts are extremely popular with his friends who want to experience the “early Texas landscape and lifestyle.”

At sunset on his ranch, Elick often sits atop a horse on the forested banks of the San Bernard, letting several of his Texas Longhorns take a drink from the river. Quail call to each other in the brush. A bald eagle glides by en route



*John Elick at his Eagle Roost Ranch
USFWS photo*

to its evening roost on the branch of a cottonwood tree. Some might say it doesn’t get any better than this. But Elick believes it can. With the help of the new partnership program, he hopes to welcome home the Attwater’s prairie chicken—a piece of nature and of the past that has been missing from his ranch for too long.

Ben Ikenson is a Public Affairs Specialist with the Service’s Albuquerque Regional Office.

History of the Eagle Roost Ranch
Legend holds that divisions of Santa Ana’s Mexican army crossed the San Bernard River on the ranch in 1836 in pursuit of Sam Houston’s army. The first owner of the ranch, Henry Freisin, was awarded the ranch by the Republic of Texas for his service in the Battle of San Jacinto, when Santa Ana’s army was defeated. In later years, historically famous cattle barons of the 1880’s—Shanghai Pierce and Robert Stafford—gathered cattle ranging over the area during the Chisholm Trail drive days. Local tradition contends that “Parker’s Hole” on the San Bernard river is the place where horse rustlers were hanged from the cottonwood trees. The ranch is still the original tract patented to Henry Freisen in 1836 and has been ranched continuously ever since that time.

Lower Cañon Creek Restoration

by Paula Golightly



Steelhead trout

Illustration by Duane Raver/USFWS

Since 1995, the Jobs-in-the-Woods Watershed Restoration Program in northern California and Klamath County, Oregon, has received approximately \$3.5 million, funded 50 projects in 42 watersheds within 9 counties, and employed 550 people. Other accomplishments include:

- **269 miles (432 km) of roads decommissioned or upgraded;**
- **46 miles (74 km) of riparian and streambank fenced to exclude livestock;**
- **23 miles (37 km) of stream opened to fish by removing manmade barriers;**
- **55 miles (88 km) of instream habitat improvements;**
- **1,575 acres (637 hectares) of upland, riparian, and wetland habitat restoration and enhancement; and**
- **\$ 3.2 million in additional funding has been leveraged, including cost share and in-kind contributions.**

Since 1995, the Fish and Wildlife Service's Jobs-in-the-Woods Watershed Restoration Program (JITW) has provided funds for watershed restoration and enhancement projects on private, State, and tribal lands within the range of the northern spotted owl (*Strix occidentalis caurina*) in northern California and the upper Klamath River Basin in Oregon. Part of the Northwest Forest Plan, the JITW program is intended not only to promote ecological recovery but also to aid local economies by providing training and jobs.

One JITW effort, the Lower Cañon Creek Habitat Restoration Project, began in 1996. It involved the cooperation of a private landowner and the participation of the Redwood Community Action Agency, a non-profit organization. Cañon Creek is a tributary of the Mad River in Humboldt County, California, and is approximately 7 miles (11 kilometers) long with a drainage basin area of 16 square miles (41 square km). Land in the watershed is managed primarily for timber production. Among the fish native to Cañon Creek are coho salmon (*Oncorhynchus kisutch*), chinook salmon (*Oncorhynchus tshawytscha*), and steelhead trout (*Oncorhynchus mykiss*), all of which are protected or are candidates for protection under the Endangered Species Act.

The California Department of Fish and Game (CDFG) has used Cañon Creek since 1984 as an index stream to assess the health of anadromous fish populations in northern California. Stream surveys and watershed assessments conducted over the years by various agencies have noted a number

of problems: unstable stream banks contributing sediment to the creek, a lack of instream structure and habitat complexity, a lack of large conifers in the riparian zone to provide large woody debris (an important component of fish habitat), and severely aggraded conditions (the deposit of sediment) in the lower portion of the creek, resulting in a braided channel and subsurface flow in the late summer and early fall. Subsurface flow prevents the passage of fish to and from the Mad River, causing the fish to become stranded and vulnerable to predation.

An additional impact on the creek resulted from the removal of Sweasy Dam in 1971, located on the Mad River approximately 1.5 miles (2.4 km) upstream from Cañon Creek. The dam once provided water for the local municipal water district. Its subsequent removal released stored sediment and altered the floodplain structure, forming an expansive depositional terrace near the mouth of Cañon Creek, further restricting fish movement from the creek into the Mad River.

The objective of the Lower Cañon Creek Restoration Project was to improve access to Cañon Creek for early fall spawning fish. This would be accomplished by increasing the confinement of the channel along 1,000 feet (305 m) of sediment filled stream so that high flows could scour and deepen the active channel. We hoped that a single deeper channel would enhance the chances for a continuous year-round flow though lower Cañon Creek. An additional objective was to employ displaced workers as part of a job retraining program, providing them with field experience in stream restoration.

The project design focused on creating channel confinement using several thousand willow cuttings to construct baffles (bundles of branches and cuttings placed into trenches in the stream channel) and to plant along the creek. The baffles and streamside plantings then take root and build up the stream banks by trapping silt. In addition, a limited amount of riprap

mixed with willow was placed along the most upstream portion of the project reach to prevent high flows from cutting into and washing out willow baffles. A rock and log structure was placed within the riprap and willow structures to improve instream habitat for fish.

The workers used heavy equipment to place the riprap and willow in the bank and dig trenches for placement of willow materials along the stream. The JITW Training Crew collected willow materials by hand and placed them in designated areas along the stream. Stream cross sections were measured at six sites immediately following the construction work. This information was used as benchmarks against which to monitor channel changes over time.

After two winters, Cañon Creek has downcut approximately 3 feet (1 m) and has a deeper, more defined channel. Between 1997 and 1998, a small landslide released two redwood trees from the bank into the channel. The water flow has scoured deep pools

underneath the trees, creating excellent cover habitat for fish. Using a procedure called Photopoint Monitoring, a series of photographs were taken at exact locations periodically to assess project effectiveness. Photopoint and cross section monitoring will continue.

This restoration project employed approximately 18 people. Partners in the project included the Redwood Community Action Agency, the Simpson Timber Company, McBain and Trush (a consultant to Simpson Timber Company), the CDFG, and the Service.

Paula Golightly, a Fish and Wildlife Biologist in the Service's Arcata, California, Field Office, is the State Coordinator for the JITW Program.

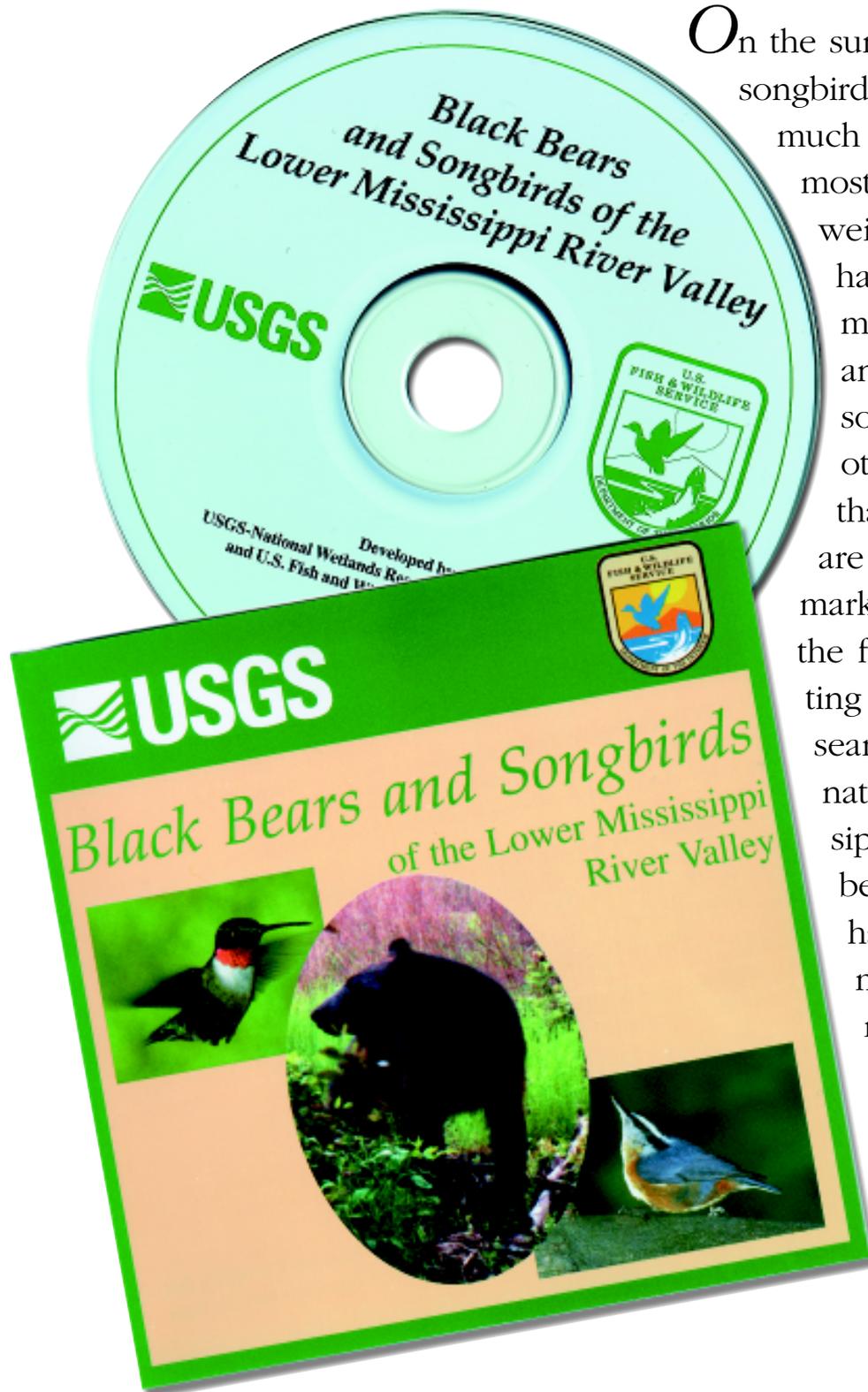
Cañon Creek, looking downstream after the first winter since project implementation. The channel has begun to deepen and willows are growing on the left bank.

USFWS photo by Paula Golightly



Black Bears and Songbirds “on Disk”

by Terry Rabot,
Virginia Rettig, and
Scott Wilson



On the surface, black bears and songbirds don't appear to have much in common. After all, most songbirds probably weigh less than a pound, have wings, come in as many colors as the rainbow, and can fill any forest with song. Black bears, on the other hand, can weigh more than 200 pounds as adults, are usually black with some markings, and shuffle through the forest, occasionally emitting a grunt or squeal in their search for food. Unfortunately, in the Lower Mississippi River Valley, black bears and songbirds do have something in common: both are declining in numbers. The reason is simple; black bears and forest interior songbirds need large tracts of forested land, and most of that habitat in the region has disappeared.

In 1992, the Louisiana black bear (*Ursus americanus luteolus*) was listed by the Fish and Wildlife Service as threatened, the first species dependent on the bottomland hardwood forests of the Lower Mississippi River Valley to receive Endangered Species Act protection. Over 80 percent of the historic bottomland hardwood forest in its historical range has been converted to agricultural lands, and much of what remains is fragmented. This loss of habitat is also reflected in the declining numbers of songbirds that reside in the forest interior. To prevent further habitat fragmentation, biologists and land managers are working to identify high priority areas for reforestation in proximity to existing forested lands.

A key element in any recovery program is education. Anyone with a television and an hour or so to spare can learn about bears and birds, but there has not been a lot of information about habitat loss and fragmentation. In 1995, the Service began to change this by working with the National Wetland Research Center (NWRC) of the U.S. Geological Survey to use “warm and fuzzy” species such as bears and songbirds to illustrate the problems of habitat loss and fragmentation. The result of those efforts was an interactive CD-ROM, “Black bears and Songbirds of the Lower Mississippi River Valley.” The CD is made up of three modules: one on the biology and ecology of bears, another on the biology and ecology of declining species of forest interior birds in the southeast, and another on habitat loss and what is being done about it.

All of us involved in developing the CD were determined to make it available to as many school children as possible. Over 600 CDs were initially mailed out to every middle school in Louisiana, with each school getting two copies, one for the science coordinator and another for the library. In addition, the NWRC distributed CDs at over 25 training sessions held Statewide for elementary school teachers. Over 200 copies of the CD were provided to



The female ruby-throated hummingbird lacks the male's colorful throat. This songbird is not in danger of extinction, and biologists managing habitat in the Lower Mississippi River Valley hope to keep it that way.

Corel Corp. photo

educators in Mississippi, and another 200 were sent to zoos affiliated with the American Zoo and Aquarium Association. The CD is still available to educators through the Black Bear Conservation Committee's website (<http://www.bbcc.org>). The Committee is a diverse group that includes representatives of government wildlife agencies, educators, and industry, all of whom are dedicated to the restoration of the Louisiana black bear. It has developed an extensive outreach program, working locally to promote the restoration of the Louisiana black bear through education, research, and habitat management. The CD is an important part of the outreach effort.

Based on the response from teachers and the general public, the CD has been a useful tool that presents the interrelationships of wildlife biology, endangered species recovery, and landscape ecology as a unified concept.

Terry Rabot, a Wildlife Biologist in the Service's Arlington, Virginia, headquarters office, helped to develop the CD in her former position with the Service's Lafayette, Louisiana, Office. Virginia Rettig, Refuge Manager of the Big Branch National Wildlife Refuge in Louisiana and Scott Wilson, Electrical Engineer with the National Wetlands Research Center in Lafayette, also worked on development of the CD.

Opposite page: The CD won Second Place for Special Communications in the 1999 National Association of Government Communications "Blue Panel Awards" competition.

by Robert S. Butler,
Hilary A. Vinson, and
Richard G. Biggins

Imperilled Streams Exhibit at Tennessee Aquarium



Photos courtesy of Wilderness Graphics, Inc.

A banded water snake (*Natrix sipedon*) slithers upstream defying the strong current. A huge wrinkled hellbender (*Cryptobranchus alleganiensis*) peeks from behind a boulder. The stilt-like legs of a great blue heron (*Ardea herodias*) step gingerly across the rocky bottom. Rooted submergent plants bend to the force of rushing water. Thrusting out its hand-like jaws, a dragonfly larva snatches an unsuspecting juvenile fish. Various freshwater mussels attempt to lure a host fish for their temporarily parasitic larvae.

These and numerous other aquatic creatures and plants comprise a composite underwater stream ecosystem of the southeastern United States. The rarely seen ecosystem is depicted larger than life in a mural that is the centerpiece of a newly created exhibit at the Tennessee Aquarium. This facility, located on the bank of the Tennessee River in Chattanooga, is the world's first major aquarium dedicated to freshwater ecosystems. The exhibit features streams and their imperilled biota, with a focus on freshwater mussels—the most endangered large group of organisms in North America.

The idea of several U.S. Fish and Wildlife Service and U.S. Geological Survey (USGS) biologists, the imperilled streams exhibit was designed by Wilderness Graphics, Inc., of Tallahassee, Florida. Funding was provided by three of the Service's field offices (Asheville, North Carolina; Jackson, Mississippi; and Jacksonville, Florida), the USGS, U.S. Forest Service, and

National Park Service. Technical assistance from various personnel of the Tennessee Aquarium, federal agencies, and Wilderness Graphics contributed to this major undertaking.

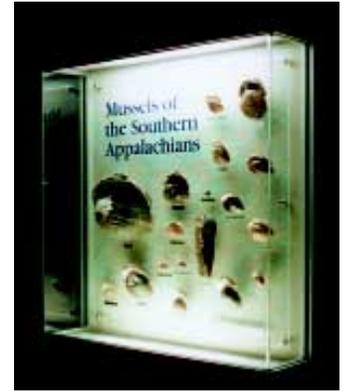
Throughout the exhibit, visitors learn about the diversity of life in our southeastern streams and ways they can make a difference in maintaining the quality of that life. The exhibit includes state-of-the-art touch-screen computer programs, laser light maps, and other alluring displays. It includes an array of our region's fancifully named mussels, featuring their staggering range of sizes and shapes, superimposed over a drainage map. The "Mosaic of Life" array of crayfish photographs shows the brilliant color patterns seldom seen in this otherwise inconspicuous aquatic group. Computer video segments illustrate mussel ecology and economic uses, aquatic biodiversity, threats to healthy streams, and the importance of clean water and quality habitat to the stream ecosystem—and to us.

Many parts of the exhibit require hands-on participation. A back-lit map of the Tennessee River lights up on with the push of a button. The exhibit also features “touchable” specimens (models), compares growth rings of trees and mussel shells, and tells of aquatic diversity. Interpretive computers show how a fish finds food, explain the natural history of organisms in the mural, relate examples of the colorful common names of mussels, explain how geology has influenced biodiversity, examine the importance of insects, and stress why we all need clean water to survive. Rounding out the exhibit is a diagram representing various human threats to streams, with a panel telling citizens how they can help protect streams.

The Tennessee Aquarium’s imperilled streams exhibit is a stellar example of how partnering with other federal agencies and private organizations

resulted in a project the Service could not have accomplished alone. With the Aquarium’s annual visitation rate of approximately 1.2 million people, including a significant percentage of young students, our message will be broadcast widely. Upon leaving the exhibit, visitors will certainly take a little more knowledge, and hopefully more pride in their streams, home with them.

Robert S. Butler, Riparian Lands Restoration Biologist; Hilary A. Vinson, Education and Outreach Coordinator; and Richard G. Biggins, Fish and Mollusk Recovery Coordinator, work in the Service’s Asheville, North Carolina, Field Office.



The exhibit won a National Association for Interpretation 1998 Media Award (Third Place, Interior Exhibit category)



Monitoring Contaminants in Alaskan Peregrines



Peregrine falcon chicks
Photo by Skip Ambrose/USFWS

Arctic and American peregrine falcons (*Falco peregrinus tundrius* and *F. p. anatum*, respectively) were listed as endangered in 1970. At the time, some local populations of American peregrine falcons in the eastern United States had disappeared, and populations in western and northern North America had been reduced by 80 percent or more. Organochlorine pesticides such as DDT and its breakdown product DDE were identified as the main cause of the decline. The peregrines accumulated these chemicals in their tissues by feeding on birds that had eaten DDT-contaminated insects or seeds. These chemicals prevented normal calcium deposition during eggshell formation, and caused females to lay thin-shelled eggs that often broke before hatching. The use of DDT was restricted in the United States and Canada in the early 1970's, and populations of peregrine falcons in North America began to recover by the late 1970's.

After Arctic and American peregrine falcons were listed, the Fish and Wildlife Service prepared recovery plans for four different geographic areas. For Alaska populations, the recovery plan identified specific "index" areas (areas representative of interior and northern Alaska) to survey and specific recovery criteria for reclassification. These criteria included the number of pairs occupying territories, number of young produced, reductions in DDE residue in eggs, and minimum eggshell thickness.

In the early 1980's, biologists in the Service's Region 7 Endangered Species and Environmental Contaminant programs began a contaminant monitoring program for peregrine falcons in Alaska. This program continued

throughout the 1990's. The monitoring plan focused on DDE and eggshell thinning, and called for collecting and analyzing at least 10 eggs from each subspecies every 5 years. Unhatched eggs were also collected when visiting nests to band falcons for mortality and movement studies. We began the program in 1984 and repeated it in 1989 and 1995. During this time, we collected 153 eggs, 87 from American peregrines and 66 from Arctic peregrines.

Our analyses showed a clear downward trend of DDE concentrations in eggs. In the late 1960's, DDE residues in the range of 20-40 parts per million (ppm) and eggshell thinning in excess of 20 percent were observed for peregrine falcons in Alaska (Peakall et al 1975). Peakall (1976) reported that DDE residues in eggs in the range of 15 to 20 ppm would likely result in a declining peregrine falcon population. By 1995, DDE levels had declined to 2 to 3 ppm. Eggshell thickness also increased following the 1972 restrictions on DDT, although this increase appears to have leveled off at about 10 to 12 percent thinner than pre-DDT levels. Although shells are still thinner than in pre-DDT years, reproductive success has been good. We are unsure why eggshell thickness has not continued to improve with continuing declines in DDE. We will continue to investigate other possible causes, including other environmental contaminants.

During this monitoring effort, we were able to learn more about other aspects of contaminants. Four banded females were sampled twice during the study period, which provided insight on how residue levels in specific individuals change over time. Another 15 adult



females, whose age was known because they were color-banded as young, were sampled once. Additionally, in the early 1990's, a migration study using satellite telemetry was undertaken and some of these tagged birds (four females), with known wintering locations, were sampled for contaminants. While DDE residues varied among peregrines from various winter locations, none of the residue levels of eggs from these four females were particularly high.

The contaminant monitoring program in Region 7 has been one of the most thorough ever, even for a species as well studied as the peregrine falcon. With data collected during this program, we were able to provide detailed and scientifically credible data upon which to base the decisions to delist the Arctic and American peregrine falcons. As the FWS considers implementing post-

delisting monitoring plans, we will be developing a contaminant monitoring program similar to the one we conducted in Alaska for peregrine populations in the lower 48 States.

Skip Ambrose is a Wildlife Biologist with the FWS Northern Alaska Ecological Services Office in Fairbanks, Alaska.

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The peregrine falcon is one of nature's swiftest and most beautiful birds of prey. Its name comes from the Latin word peregrinus, meaning "foreigner" or "traveler." This impressive bird has long been noted for its speed, grace, and aerial skills. Now, it is also a symbol of America's recovering threatened and endangered species.

Photo by Ted Swem/USFWS

by Julie Lyke

The Medicinal Plant Working Group



Ginseng root

Illustration by Regina O. Hughes/U.S. Department of Agriculture

The market for medicinal herbs in the United States is worth over \$3 billion and is growing at a rate of about 20 percent per year (*Nutrition Business Journal* 1998). At least 175 species of plants native to North America are offered for sale in the non-prescription medicinal market in the United States. More than 140 medicinal herbs native to North America have been documented in herbal products and phytomedicines in foreign countries, and dozens and possibly hundreds of these are collected in large quantities from the wild in the United States (Robbins 1999).



Recognizing that commercial demands may pose threats to native plants in the United States, representatives from industry, government, academia, tribes, and environmental organizations joined together to form the Medicinal Plant Working Group (PCA-MPWG) under the umbrella of the Plant Conservation Alliance (PCA). The PCA is a consortium of 10 Federal agency members and over 145 non-Federal cooperators representing various disciplines in the field of plant conservation. The PCA serves as the North American Plant Specialist Group of the IUCN Species Survival Commission.

The PCA-MPWG's primary focus is to facilitate action on behalf of medicinal plants native to the United States that are of particular conservation concern in order to balance biological and commercial needs and, in the long term, minimize regulatory intervention. To this end, the objectives of the group include:

- generating and sharing information regarding species of medicinal and economic importance and conservation concern;
- promoting appropriate conservation measures for native medicinal plants;
- promoting sustainable production of native medicinal plants;
- increasing participation in native medicinal plant conservation;
- encouraging active participation by tribes and other holders of traditional ecological knowledge pertaining to native medicinal plants; and
- generating financial support for native medicinal plant projects.

The PCA-MPWG's strategic plan is available on the Internet at <http://www.nps.gov/plants/medicinal/strategy.htm>.

Since its inception in June 1999, membership in the PCA-MPWG has grown to over 179 individuals from at least 39 States and tribes and eight foreign countries. Participants have established committees to address each of the six main areas of emphasis identified above. Committee Chairs include representatives from Paracelsian (a biotech company), the U.S. Forest

Service, the U.S. Department of Defense, the U.S. Botanic Gardens, the University of Maryland, Wilcox Natural Products, Ticonderoga Farms, and TRAFFIC North America. A "core group" of members, including the Committee Chairs and interested others, meets regularly by conference call to discuss progress. The PCA-MPWG is completing its strategic plan and each committee is beginning to take steps to achieve its objectives. For example, the Conservation Committee is selecting specific "species of concern" for each region of the country and will plan appropriate conservation measures. The Participation Committee is developing a list of things the public can do to help conserve medicinal plants, such as to buy products derived from cultivated sources. The entire PCA-MPWG shares information and keeps in touch on significant issues via a listserver.

Julie Lyke is the PCA-MPWG Chair. If you would like to participate in this effort, contact her at: U.S. Fish and Wildlife Service, Office of Scientific Authority, 4401 N. Fairfax Drive, Arlington, VA 22203; 703/358-1708; julie_lyke@fws.gov. For further information, visit the PCA-MPWG web site at <http://www.nps.gov/plants/medicinal>.

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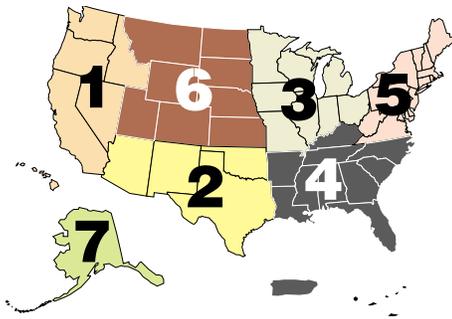
Ginseng (*Panax quinquefolius*) is one of the world's top selling medicinal herbs. About 125 million plants were taken from the wild in the U.S. for export to Southeast Asia in 1996.

USFWS photo

Opposite page, top: In recent years, wild ginseng roots have sold for over \$500 per pound. The oldest roots are the ones most highly prized and can be several decades old.

Opposite page, bottom: Poaching of ginseng and other medicinal plants is such a problem that high-tech systems have been developed to track plants stolen from public lands.

Corel Corp. photo



Fish and Wildlife Service regional endangered species staffers have reported the following news:

Region 1

Antioch Dunes National Wildlife Refuge (NWR) The Service initiated a dune restoration project at Antioch Dunes NWR in California's bay area prior to the start of the winter rains. Heavy equipment helped us to recreate three large dunes in an area that was leveled in the mid-1800's for planting as a vineyard. The vineyard existed here until shortly after the Service acquired the refuge in 1980. In June 1999, we burned the site to control yellow star-thistle (*Centaurea solstitialis*), a non-native species. Future management plans include 2 more years of burning to reduce star-thistle density, followed by planting the dunes with two native endangered plants, the Antioch Dunes

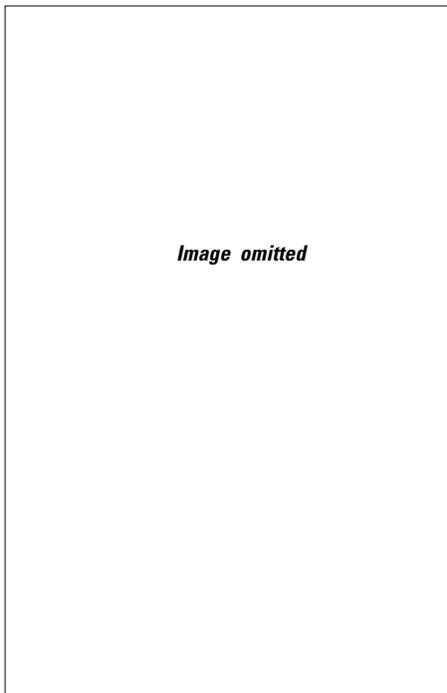


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Contra Costa wallflower

Photo by Paul Opler

evening primrose (*Oenothera deltooides* ssp. *howellii*) and Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*), as well as naked-stemmed buckwheat (*Eriogonum* ssp.), the host plant for the endangered Lange's metalmark butterfly (*Apodemia mormo langei*). Dune restoration at Antioch Dunes NWR was funded in part by a donation from Chevron.

On December 11, Service biologist Ivette Loredo, along with several refuge interns and volunteers, had a "planting party" at the refuge. They planted 425 Antioch Dunes evening primrose seedlings that were propagated at the Don Edwards San Francisco Bay NWR Native Plant Nursery. The plants were moved onto a refuge unit that had been burned 3 consecutive years to control star-thistle. The plants were individually marked and will be monitored for survival and regeneration.

Habitat Acquisition The Service has signed an agreement with the Catellus Development Corporation (formerly the realty branch of Santa Fe Pacific) that will add more than 450 acres (180 hectares) of vernal pool/tidal marsh ecotone environments to the Don Edwards San Francisco Bay NWR Complex. The process started when Catellus



California tiger salamander

Photo by Kelly Geer

proposed an 800-acre (325-ha) high-tech development adjacent to the refuge's Warm Springs Seasonal Wetlands Unit in Fremont, Alameda County. The property turned out to support more than 100 acres (40 ha) of seasonal wetlands, including habitat of such endangered species as the Contra Costa goldfields (*Lasthenia conjugens*), vernal pool tadpole shrimp (*Lepidurus packardii*), and California tiger salamander (*Ambystoma californiense*). All three of these species also occur on the adjacent refuge unit.

After a joint examination of the project and related issues by the Service, Environmental Protection Agency, Army Corps of Engineers, California Department of Fish and Game, California State Water Resources Control Board, and City of Fremont, the Catellus Corporation offered to donate

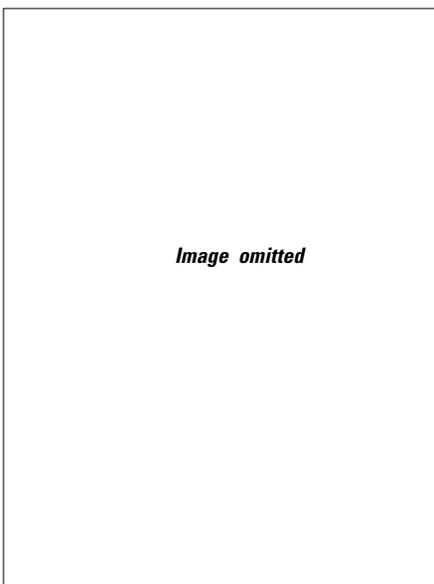


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Antioch Dunes evening-primrose

Photo by Joe Dowhan

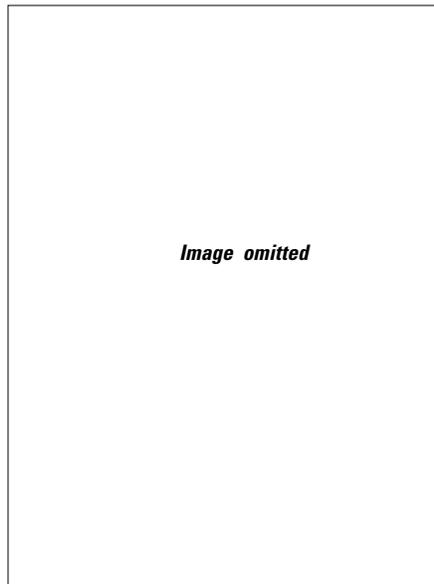


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Lange's metalmark butterfly

Photo by Jerry Powell

the wettest and most biologically valuable portions of the property and two smaller off-site parcels to the refuge. The larger additions will enhance the viability of the unique goldfields, tadpole shrimp, and tiger salamander populations on the refuge, as well as provide important resting, wintering, and breeding habitat for migratory waterfowl and shorebirds. The Catellus Corporation also agreed to provide for a perpetual endowment to fund ongoing management of the donated lands by the Service.

Pearl Harbor NWR The Nature Conservancy of Hawaii (TNC) extended many helping hands in an effort to enhance habitat for endangered waterbird species on Pearl Harbor NWR's Honolulu Unit. As part of TNC's Staff Development Day, 45 employees from all over Hawaii donated a full day of hard work to help a Service crew protect and restore habitat, remove invasive plants, and improve the perimeter fence. Two Hawaiian chanters very beautifully blessed the day's activities. Without TNC's efforts, our limited maintenance crew would have been hard pressed to accomplish these worthy tasks in such a timely manner. *Mahalo* to TNC for their partnership helping to restore lands "from the mountains to the sea."

Lahontan Cutthroat Trout (*Oncorhynchus clarki benshawi*) This threatened fish has been successfully reared at the Lahontan National Fish Hatchery in Nevada since 1967 as a part of coordinated efforts involving the hatchery, Pyramid Lake Paiute Tribe, and Nevada Division of Wildlife. This past winter, an outbreak of Furunculosis disease (caused by the bacterium *Aeromonas salmonicida*) struck the hatchery, causing the first major setback in meeting reintroduction goals since the program's inception. The hatchery discovered the outbreak in late November and experimented with several medications, with assistance from the Service's California/Nevada Fish Health Center, to control or kill the bacteria. According to Hatchery Manager Larry Marchant, the fish did not respond well initially to medication because water limits force the hatchery to re-use about 65 percent of its water. As a result, the Service and the Pyramid Lake Paiute Tribe determined that the best course of action was to euthanize 300,000 production fish that had been targeted for release into Pyramid



Lahontan cutthroat trout
USFWS photo

Lake. The remaining 200,000 fish were placed on single pass fresh water and treated with antibiotics. Most of these fish responded well and were subsequently released into Walker Lake.

Complete station disinfection has since taken place since this incident occurred and 600,000 new production fish are awaiting release next year. However, there has still been no positive determination as to how the disease was introduced into the hatchery, and work to answer this question continues. The most probable cause is that birds swimming in the East Fork of the Carson River, which flows behind the hatchery, carried dirt or water into the fish raceways.

The hatchery releases approximately half a million Lahontan cutthroat trout into the Walker and Pyramid lake systems each year. This year marks the first time that the hatchery has been unable to meet its release goals. Recovery plans for the Lahontan cutthroat trout include hatchery propagation of genetically appropriate fish to maintain lacustrine populations until dams are removed or fish passages have been installed on the Truckee and Walker rivers, at which time this threatened species can become self-sustaining once again.

Salmon The Service released more than 30,000 endangered winter-run chinook salmon (*Oncorhynchus tshawytscha*) young from Livingston Stone into the Sacramento River on January 27. Approximately 26,500 of the fish resulted from 23 matings of natural-origin adults (9 females and 14 males), and the rest resulted from the matings of 20 captive broodstock females with 14 natural-origin males. An additional 1,204 juveniles have been retained for rearing in the winter-run chinook salmon captive broodstock program at Bodega Marine Laboratory, Steinhart Aquarium, and Livingston Stone NFH.

We continue to improve the Fish and Wildlife Service's Endangered Species Program web page. Some of the new features and changes we've made so far this year are summarized below. Please let us know what you think by responding to our web team at julia_bumbaca@fws.gov.

We get many requests for counts of threatened and endangered species, so we created a web page just for species statistics:

<http://endangered.fws.gov/stats/index.html>

Since many federally listed species occur on private lands, we now have a web page called "Tools for Private Landowners":

<http://endangered.fws.gov/landowner/index.html>

Our fact sheets, publications, and brochures have been consolidated at

<http://endangered.fws.gov/education/index.html>

We've improved access to our species lists with the "Wildlife and Plants" page, where you can retrieve species state lists, state maps and more:

<http://endangered.fws.gov/wildlife.html>

The past 10 years of recovery plans are now available online. For a recovery plan finished between 1989 to 1999, you can go to

<http://endangered.fws.gov/recovery/recplans/index.htm>

We've begun to include a regular "Creature Feature" on our home page. Access our current Creature Feature at our home page and our archive of features at

<http://endangered.fws.gov/wildlife.html#features>

There is now a 'questions' web page to help answer our frequently asked questions at

<http://endangered.fws.gov/questions.html>

We've also improved our search page at

<http://endangered.fws.gov/search.html>

Watch for more in the months to come as we work to make our site more informative and easier to use.

Prepared by Julia Bumbaca of the Division of Endangered Species in Arlington, Virginia.

From October 1999 through January 2000, the Fish and Wildlife Service and National Marine Fisheries Service (NMFS) published the following Endangered Species Act listing actions in the *Federal Register*. The full text of each proposed and final rule can be accessed through our website:

<http://endangered.fws.gov>.

Proposed Rules

California Tiger Salamander (*Ambystoma californiense*) An emergency rule to give immediate temporary protection to the Santa Barbara County population of the California tiger salamander was published by the Service in the January 19 *Federal Register*. The Service took this unusual step because of imminent threats to the population's survival. Concurrently, the Service published a proposal to give the population long-term protection as an endangered species.



California tiger salamander

Photo by Kelly Geer

The California tiger salamander is a large, stocky, terrestrial amphibian with a broad, rounded snout. An adult male can reach a total length of up to about 8 inches (20 centimeters). These animals are marked with white or pale yellow spots or bars on a black background. They inhabit low-elevation vernal pools and ephemeral ponds, and are associated with coastal scrub, grassland, and oak savanna plant communities. California tiger salamanders also use burrows created by small mammals, especially ground squirrels and pocket gophers. The population in Santa Barbara County is separated from other populations by the La Panza and Sierra Madre mountain ranges.

Santa Barbara County is experiencing rapid changes in land use. Of the salamander's 14 documented breeding sites and associated uplands in the county, half have been destroyed or degraded severely in the past 18 months. Many of the other sites where the California tiger salamander still survives are being converted from cattle pastures to intensive agricultural uses, such as vineyards and row crop production. Other lands are rapidly being developed for urbanization and other uses. The emergency rule protects the Santa Barbara County population of the California tiger salamander for 240 days, during which the Service will proceed with its proposal to list the population as endangered. In the meantime, the Service is looking at ways to work with landowners to conserve the species while allowing economic activities to continue. The County of Santa Barbara supports the Service's action and is working with our agency to preserve existing habitat.

San Diego Ambrosia (*Ambrosia pumila*)

A herbaceous perennial in the buttercup family (Asteraceae), this plant is native to San Diego and Riverside counties in southern California and parts of Baja California, Mexico. Of the 34 populations historically known in California, only 13 remain, and most of those are vulnerable to further habitat loss and fragmentation. The species is also rare and threatened by habitat loss in Mexico. On December 29, the Service proposed to list the San Diego ambrosia as endangered.

The short, fuzzy-stemmed plant arises from a branched system of rhizome-like roots and produces small clusters of yellowish flowers. It is primarily restricted to flat or sloping grasslands, often along valley bottoms or areas adjacent to vernal pools. The threats to its survival include urban and recreational development, road construction and maintenance, competition from non-native plants, trampling by humans and horses, and off-road vehicle use. Some populations of the San Diego ambrosia receive protection under existing habitat conservation plans drawn up for southern California's many other endangered plants and animals, but not enough to ensure the ambrosia's survival.

Mountain Yellow-legged Frog (*Rana muscosa*) Fewer than 100 individuals of the mountain yellow-legged frog are known to survive in the mountains of southern California, and on December 22 the Service proposed to list this population as endangered.

Prior to the 1960's, mountain yellow-legged frogs were abundant in the southern California mountains, where they spend their entire life cycle in and around cool springs and snow-fed streams. Since then, however, they have disappeared from almost 99 percent of their southern range for reasons that are not fully understood. One factor may be predation by rainbow trout (*Oncorhynchus mykiss*) that were introduced for sport fishing. Biologists also are investigating the possible role of airborne contaminants in what otherwise appears to be pristine frog habitat in the Sierra Nevada. The remaining mountain yellow-legged frogs in southern California occur only on land managed by the U.S. Forest Service in three general areas: the San Gabriel Mountains, the San Bernardino Mountains, and Mount Jacinto. The frog habitats are now protected from development and other uses.

The listing proposal does not apply to the northern population of mountain yellow-legged frogs, which extends in the Sierra Nevada from Plumas County to southern Tulare County, California, and a small part of Nevada near Lake Tahoe.

Spalding's Catchfly (*Silene spaldingii*)

A long-lived perennial herb in the pink or carnation family (Caryophyllaceae), Spalding's catchfly has small greenish-white flowers and foliage covered with sticky hairs (which accounts for the "catchfly" name). This species is native to Palouse prairie habitats in parts of west-central Idaho, northeastern Oregon, western Montana, eastern Washington, and an adjacent area in British Columbia, Canada. Almost all of its former habitat has been lost, and most of the remaining populations are isolated and extremely small. On November 17, the Service proposed to list Spalding's catchfly as a threatened species.

The once abundant native grasslands in this region have been reduced by over 95 percent during

the past century. Most have been destroyed or altered by conversion to agricultural use, grazing and trampling by livestock, herbicide treatments, and competition from non-native plants. Fire suppression, which allows the encroachment of woody vegetation into grasslands, also changes the open habitat this plant needs. The Service has already begun working with landowners and the appropriate Federal and State agencies to identify and reduce threats to the species.



Atlantic salmon

USFWS photo by William Hartley

Atlantic Salmon (*Salmo salar*) On November 17, the Service and NMFS jointly proposed to list the wild stocks of this species in the Gulf of Maine as endangered, based on evidence that the Gulf of Maine Atlantic salmon (a distinct population segment) is in danger of extinction. These stocks, the last known naturally reproducing populations of Atlantic salmon in the U.S., remain at very low levels and face continuing threats.

Native Atlantic salmon stocks in “Down East” Maine were originally proposed in 1995 for listing as threatened. In 1997, before the listing was made final, the State of Maine submitted an Atlantic Salmon Conservation Plan to the Service and NMFS. Both agencies concluded that implementation of the plan would preclude the need to list, and they withdrew the proposal on December 18, 1997.

In July 1999, the Service and NMFS updated the status review of the Atlantic salmon and concluded that the Gulf of Maine population is in danger of extinction. This conclusion is based on the following findings:

- documented returns of adult salmon have remained low,
- the survival of presmolt salmon has been lower than expected,
- the detection of a new disease led to the de-

struction of the Pleasant River broodstock,

- a disease from European fish imported for aquaculture has struck the Canadian aquaculture industry and spread toward the U.S. border,
- the use of non-North American strains of Atlantic salmon in the U.S. aquaculture industry has increased,
- aquaculture escapees continue to be detected in the wild, where they interbreed and compete with native salmon, and
- salmon habitat quality continues to be threatened by water withdrawals and sedimentation.

Although the State of Maine’s conservation plan would not by itself ensure against the extinction of wild Atlantic salmon stocks, implementing the plan is expected to be vital to the species’ recovery.

Critical Habitat In the December 10 *Federal Register*, the Service proposed a formal designation of Critical Habitat for two threatened fish species native to Arizona and New Mexico, the spikedace (*Meda fulgida*) and loach minnow (*Tiaroga cobitis*). Critical Habitat refers to specific geographic areas that contain environmental qualities essential for the conservation of threatened or endangered species.

The proposed Critical Habitat for the spikedace and loach minnow totals approximately 894 miles (1,443 kilometers). It includes portions of the Gila, San Francisco, Blue, Black, Verde, and San Pedro rivers, and some of their tributaries, in Apache, Cochise, Gila, Graham, Greenlee, Pinal, Pima, and Yavapai counties in Arizona and Catron, Grant, and Hildago counties in New Mexico.



Proposed critical habitat on the Verde River

USFWS photo

Critical Habitat designations have no impact on landowners taking actions on their property that do not involve Federal funding or permits. Such designations apply only to Federal agencies, which are required to avoid funding, authorizing, or carrying out any actions that would adversely modify the Critical Habitat. Economic activities such as grazing can be compatible with conservation of the spikedace and loach minnow provided that their habitat is maintained in good condition. Detailed descriptions and maps of the proposed Critical Habitat areas are available in the December 10 *Federal Register*.

Final Rules

Newcomb’s Snail (*Erinna newcombi*) A small freshwater mollusk, Newcomb’s snail is found only in remote waterfalls, seeps, and springs of six stream systems on the Hawaiian island of Kaua’i. The Service listed Newcomb’s snail on January 26 as a threatened species primarily because of predation by a variety of non-native species, including fish, snails, frogs, and flies. Other threats include water development projects that could affect the spring habitats upon which this species depends.

Two California Plants Two plant species native to coastal habitats in Sonoma and Marin counties, California, were listed on January 26 as endangered. Baker’s larkspur (*Delphinium bakeri*) and the yellow larkspur (*Delphinium luteum*), perennial herbs in the buttercup family (Ranunculaceae), are threatened by habitat loss and degradation, domestic sheep grazing, and overcollection.

Three Oregon Species Three rare species (an insect and two plants) restricted primarily to native prairie habitat in the Willamette Valley of Oregon received Endangered Species Act protection on January 25. The Willamette daisy (*Erigeron decumbens* var. *decumbens*) and Fender’s blue butterfly (*Icaricia icarioides fenderi*) were listed as endangered, while Kinkaid’s lupine (*Lupinus sulphureus* ssp. *kinkaidii*) received the somewhat less critical classification of threatened. The widespread loss of the region’s once abundant prairie habitat to commercial and residential develop-

Image omitted

Kinkaid's lupine

Photo by Paul Hammond

ment, agriculture, and silviculture, along with impacts from herbicide use and overcollection, led to the decline of all three species.

Rough Popcornflower (*Plagiobothrys birtus*)

The Service listed another Oregon plant, the rough popcornflower, as endangered on January 25. This herb in the borage family (Boraginaceae) grows only in seasonal wetlands in the Umpqua Valley of Douglas County, Oregon. It is threatened by habitat loss or degradation (e.g., development, draining or filling of wetland habitats), livestock grazing, and competition from native and non-native plant species.



Rough popcornflower

USFWS photo

Two Cave Animals

Two cave-dwelling invertebrates found only on the Hawaiian island of Kaua'i were listed January 14 as endangered. The Kaua'i cave wolf spider (*Adelocosa anops*) and Kaua'i cave isopod (*Spelaeorchestia koloana*) are small, blind creatures adapted to life in moist lava tubes and adjacent crevices. They are threatened by surface activities such as vegetation removal, grading, filling, paving, and agricultural develop-

Image omitted

Kaua'i cave wolf spider

Photo by William Mull

ment that alter cave environments. Both of these animals are also susceptible to the use of chemical and biological pest controls that are employed to control invasive non-native insects such as ants and cockroaches.

California Bighorn Sheep (*Ovis canadensis californiana*)

A distinct population of California bighorn sheep in the Sierra Nevada, first given emergency protection in April 1999, received long-term protection as an endangered species on January 3, 2000. The greatest danger to this population is predation by mountain lions (*Puma concolor*) and, to a lesser extent, coyotes (*Canis latrans*). Diseases spread by domestic sheep that



Bighorn sheep

Corel Corp. photo

graze in nearby areas also are a chronic threat to bighorns. A recovery plan for this endangered population of California bighorns will likely address potential changes in the grazing of domestic in adjacent areas, captive breeding, and localized predator control.

Wenatchee Mountains Checker-mallow (*Sidalcea oregana* var. *calva*)

A perennial in the mallow family (Malvaceae), this rare plant grows in moist meadows in the Wenatchee Mountains of Chelan County, Washington. The primary threats to its survival are habitat loss or degradation due to agriculture and rural residential development, other land uses that change habitat hydrology, livestock grazing, competition from native and non-native plants, recreational activities, and fire suppression. On December 22, the Service listed the Wenatchee Mountains checker-mallow as endangered.



Wenatchee Mountains checker-mallow

USFWS photo by Ted Thomas

Chinook Salmon (*Oncorhynchus tshawytscha*)

Two "evolutionary significant units" or ESUs (a designation used by NMFS in classifying Pacific salmonids) of chinook salmon in California were listed December 29 as threatened. The Central Valley and California Coastal ESUs, like many other runs of Pacific salmon, have been reduced to a vulnerable status by widespread habitat changes and other factors.

Gentner's Fritillary (*Fritillaria gentneri*)

Another Oregon plant, and one of the State's rarest, is Gentner's fritillary, a member of the lily family

(Liliaceae) with showy red and yellow flowers. It grows in dry, open woodlands at scattered sites in the Rogue and Illinois River drainages in Josephine and Jackson counties. Gentner's fritillary is threatened by residential development, agricultural activities, logging, off-road vehicle use, collection for wildflower gardens, and road and trail construction. On December 10, the Service listed this species as endangered.

Zapata Bladderpod (*Lesquerella thamnophila*) This herbaceous perennial in the mustard family (Brassicaceae) is currently known from only four locations in Starr and Zapata counties, Texas. Zapata's bladderpod is threatened by increased urban development, roadway construction, invasions of exotic plants, increased oil and gas development, conversion of native plant communities to pastures, and overgrazing. On November 22, the Service listed it as endangered.

Bull Trout (*Salvelinus confluentus*) Two more populations of bull trout were listed November 1 as threatened, completing the listing of all bull trout populations in the conterminous U.S. under the Endangered Species Act. The new listings will protect bull trout populations in the Coastal-Puget Sound area of northwestern Washington and the St. Mary-Belly River area of northwestern Montana, east of the Continental Divide. This decision will not lead to additional restrictions on fishing in either area because the Service included a special rule to allow sport fishing when done in compliance with existing state, tribal, and national park regulations.

Bull trout are threatened by the combined effects of 1) habitat degradation and fragmentation associated with water diversion, road construction, mining, and grazing; 2) the blockage of migratory corridors by dams and other diversion structures; 3) reduced water quality; 4) entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; 5) incidental catch by anglers; and 6) non-native species. The previously listed bull trout populations inhabit the Klamath, Columbia, and Jarbidge River systems.



Deseret milk-vetch

Photo by M. A. Franklin

Deseret Milk-vetch (*Astragalus desereticus*) The single known population of this plant, a slow-growing herbaceous perennial in the bean family (Fabaceae), is found in Utah County, Utah, near the town of Birdseye. It is vulnerable to residential development, highway widening, and livestock grazing and trampling. On October 20, the Service listed the Deseret milk-vetch as a threatened species.

Pecos Sunflower (*Helianthus paradoxus*) Another plant listed on October 20 as threatened is the Pecos sunflower, a large, showy plant in the family Asteraceae. It grows in desert wetlands of



Pecos sunflower

USFWS photo

New Mexico (Cibola, Valencia, Guadalupe, and Chaves counties) and west Texas (Pecos and Reeves counties). The Pecos sunflower is threatened by

the loss of wetland habitats due to groundwater depletion, water diversions, wetland filling, and the growth of a non-native shrub, the tamarisk or salt-cedar (*Tamarix* sp.).

Devils River Minnow (*Dionda diaboli*) This small fish currently is known to exist at only three locations in Val Verde and Kinney counties, Texas, and one drainage in the state of Coahuila, Mexico. It has gone from one of the most abundant fish species in the Devils River system of Texas to one of the river's least abundant species. The Devils River minnow has declined because of habitat loss to dam construction, dewatering of springs, other stream modifications, and, possibly, predation by introduced smallmouth bass (*Micropterus lomieu*). The Service listed this species on October 20 as threatened.



Virgin River chub

Photo by Coleen Clemmer

Critical Habitats About 87.5 miles (140 km) of the Virgin River and its floodplain in Arizona, Nevada, and Utah were designated as Critical Habitat for two endangered fish, the woundfin (*Plagopterus argentissimus*) and the Virgin River chub (*Gila seminuda*), on January 26. As listed species, both fish already have Endangered Species Act protection; the Critical Habitat designation will apply only to the actions of federal agencies.

The Service published another Critical Habitat designation on December 7 for the Pacific Coast population of the western snowy plover (*Charadrius alexandrinus nivosus*), which is listed as threatened. These birds breed primarily on coastal beaches from southern Washington to southern Baja California, Mexico. The 28 segments designated as Critical Habitat total about 180 miles (290 km).

BOX SCORE

Listings and Recovery Plans as of April 30, 2000

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	U.S. SPECIES W/ PLANS**
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	63	251	9	16	339	47
 BIRDS	77	176	15	6	274	76
 REPTILES	14	65	22	14	115	30
 AMPHIBIANS	10	8	8	1	27	12
 FISHES	68	11	44	0	123	90
 SNAILS	20	1	11	0	32	20
 CLAMS	61	2	8	0	71	45
 CRUSTACEANS	18	0	3	0	21	12
 INSECTS	30	4	8	0	42	27
 ARACHNIDS	6	0	0	0	6	5
ANIMAL SUBTOTAL	367	518	128	37	1,050	364
 FLOWERING PLANTS	565	1	139	0	705	528
 CONIFERS	2	0	1	2	5	2
 FERNS AND OTHERS	26	0	2	0	28	28
PLANT SUBTOTAL	593	1	142	2	738	558
GRAND TOTAL	960	519	270	39	1,788*	922

TOTAL U.S. ENDANGERED: 960 (367 animals, 593 plants)

TOTAL U.S. THREATENED: 270 (128 animals, 142 plants)

TOTAL U.S. LISTED: 1,230 (495 animals***, 735 plants)

*Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, chimpanzee, leopard, Stellar sea lion, gray wolf, piping plover, roseate tern, green sea turtle, saltwater crocodile, 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 530 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.

***Nine animal species have dual status in the U.S.

ENDANGERED Species BULLETIN

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

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