September/October 1994 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,*

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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.

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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.

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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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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

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.

photo by Denver Bryan

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.

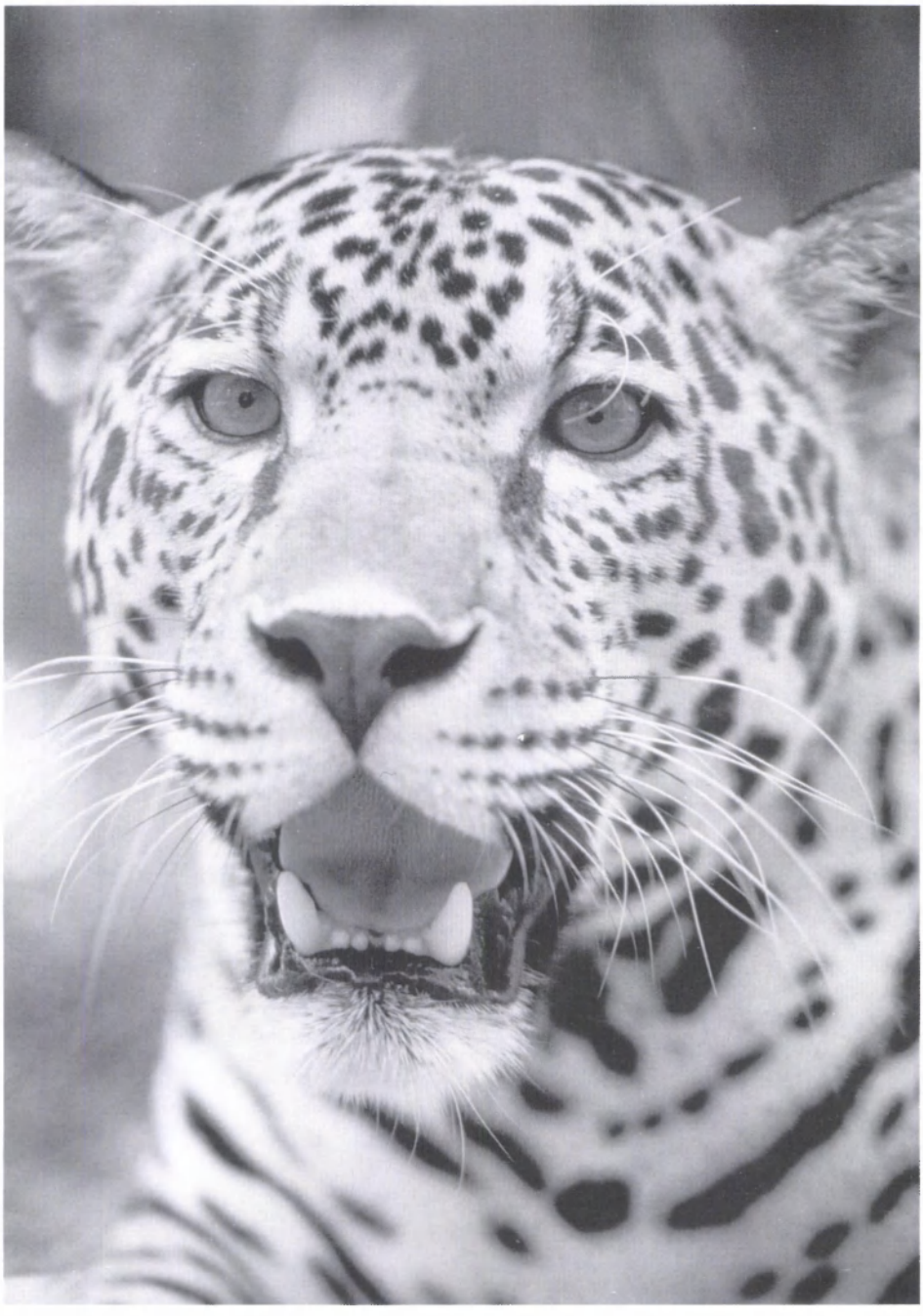

photo by Denver Bryan

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 shell marked by green, broken rays;

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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 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.

FWS photo

The Steller's eider has disappeared from most of its Alaskan breeding grounds in recent years.

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.

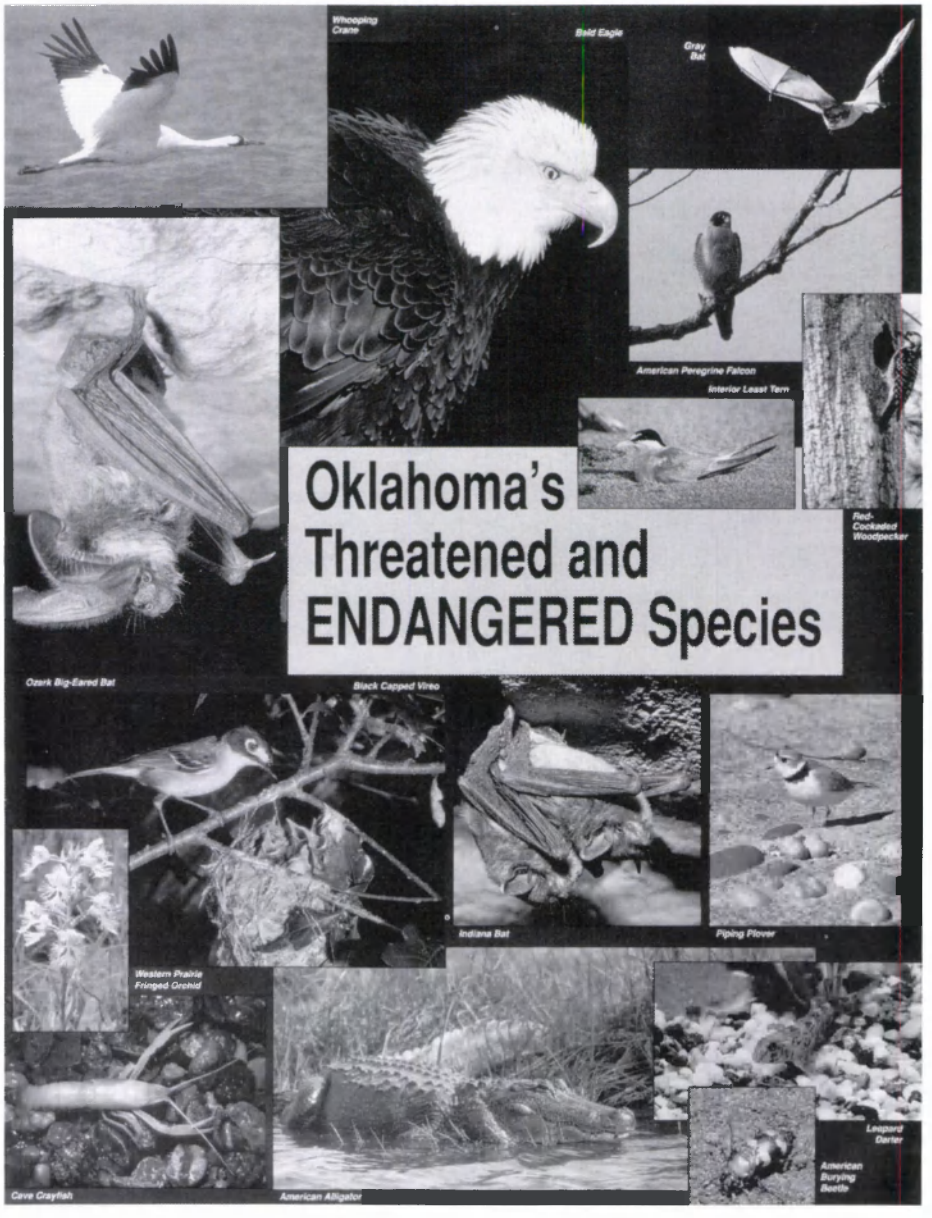
The colorful poster shows most of Oklahoma's 22 federally-listed species, including the whooping crane *(Grus americana),* bald eagle *(Haliaeetus leucocephalus*), American peregrine falcon *(Falco peregrinus anatum),* red-cockaded woodpecker *(Picoides borealis),* black-capped vireo *(Vireo atricapillus),* 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.

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.

photo by Irene Stuckey

small whorled pogonia

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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Recovery Updates

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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 Departmentof 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

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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.

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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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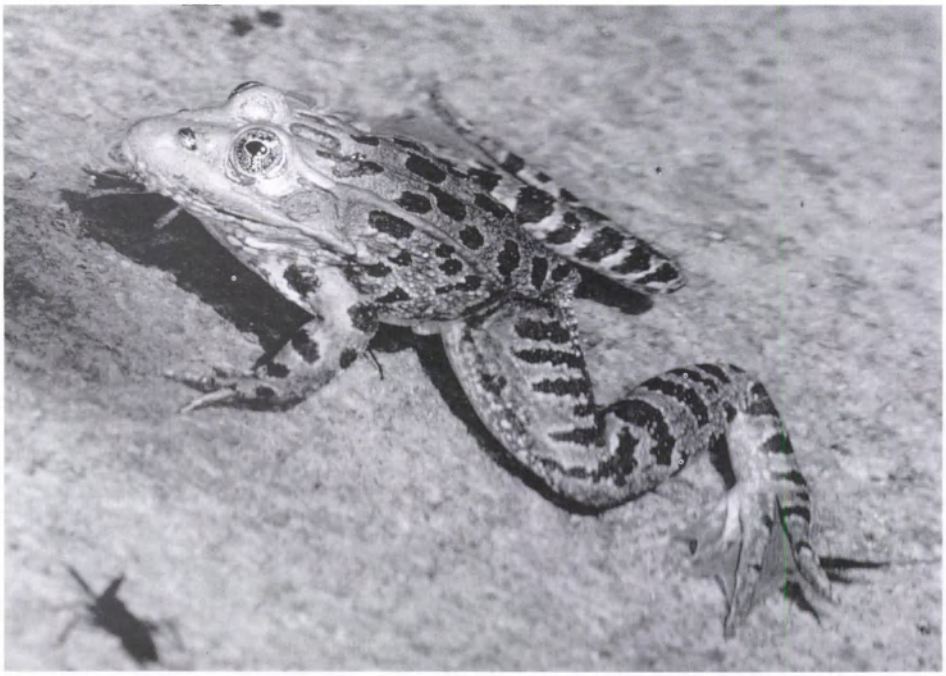

photo by Tom Woods

The Ramsey Canyon leopard frog, first described in 1993, is known to breed at only two sites in the Huachuca Mountains of southeastern Arizona.

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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