

# ENDANGERED SPECIES

## Technical Bulletin

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

### Agriculture, Wetlands, and Endangered Species: The Food Security Act of 1985

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Region 1

Federal, State, and local agencies, working in cooperation with landowners and non-profit organizations, are reaping increasingly significant benefits for agriculture, wetlands, and wildlife, including endangered species. Valuable opportunities for building closer coordination between agricultural and wildlife interests were made possible through the conservation provisions of the Food Security Act of 1985 (also known as "the Farm Bill").

The fate of wetlands and endangered species is closely linked to agriculture. Cropland and pastureland comprise about 60 percent of the Nation's land base, and nearly 45 percent of federally listed Endangered and Threatened species are associated with some form of agriculture. Within Region 1 (see map on BULLETIN page 2) of the Fish and Wildlife Service (Service), almost 30 percent of listed species have been affected by agricultural practices, and about 15 percent have been adversely affected by the filling of wetlands.

Wetlands—including coastal marshes, mangrove swamps, ponds, springs, seeps, and such intermittently wet areas as vernal pools, prairie potholes, playa lakes, and bottomland hardwood forests—are highly productive ecosystems. They provide necessary food, water, and shelter for many species of animals and plants. It is estimated that approximately one-half of the animals and almost one-third of the plants currently listed in the United States as Endangered or Threatened species depend on wetlands for their survival. Wetlands typically are marginal for crop production due to tillage problems and inconsistent yields; however, when conserved, wetlands can benefit landowners by filtering pollutants, increasing groundwater recharge, improving water quantity and quality, reducing downstream flooding, and decreasing soil erosion.

When the Pilgrims landed, there were approximately 215 million acres (87 million hectares) of wetlands in what is now the conterminous United States. By the

mid-1970's, however, only 99 million acres (40 million ha) remained. Losses in some areas have been even more severe, with California having lost over 90 percent of its historical natural wetlands. The Service estimates that about 450,000 additional acres (182,000 ha) are still disappearing each year nationwide. Over 87 percent of wetland losses in recent years can be attributed to agricultural practices.

Over 20 percent of listed species in the United States, including the least Bell's vireo (*Vireo bellii pusillus*), bald eagle (*Haliaeetus leucocephalus*), and Yuma clapper rail (*Rallus longirostris yumanensis*), stand to benefit if wetlands are conserved. The status of Endangered plants, such as salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*) and bunched arrowhead (*Sagittaria fasciculata*), also could improve.

Because of the increasing recognition given to wetlands and the impacts of agriculture on the environment, Congress

included a number of important conservation measures in the Food Security Act. The five main provisions that address wildlife habitat on agricultural lands are known as Swampbuster, Sodbuster, Conservation Reserve Program, Section 1314 conservation easements, and Section 1318 debt restructure easements. (See BULLETIN Vol. XIII, No. 2, for details.) Related programs, such as the Agricultural Credit Act of 1987, Executive Orders 11988 and 11990 for the protection of floodplains and wetlands, and a May 1987 Memorandum of Understanding between the Service and the Farmers Home Administration (Farmers Home), enhance the Service's opportunities for habitat protection.

The Fish and Wildlife Service's primary role in these programs is to serve as a technical consultant to Farmers Home, the Soil Conservation Service, and the Agricultural Stabilization and Conserva-  
(continued on page 6)



This valuable wetland habitat on Farmers Home Administration inventory property in Oregon may be protected under a planned conservation agreement.

photo by Charlie Craig



## Regional News

### Regional endangered species staffers recently reported the following news:

**Region 1** - Representatives of the San Francisco Bay National Wildlife Refuge, Sacramento Endangered Species Office,

and California Department of Fish and Game met to discuss remedies for the recent population crash of the California clapper rail (*Rallus longirostris obsoletus*), an Endangered bird. Red fox (*Vulpes*

*vulpes*) predation is most likely to blame for the rail's 30 percent population decline in the past 3 years. Winter counts at all major marshes throughout the San Francisco Bay area since 1981 indicate that the current population of this subspecies is approximately only 450 birds. Responses to the problem may include intensive rail-predator studies during the breeding season; a public education effort by the California Fish and Game, other interested agencies, and key environmental groups; and a statewide California Fish and Game study of red fox problems.

The Animal Damage Control section of the U. S. Department of Agriculture has begun a concentrated effort to trap and remove red foxes preying on Endangered light-footed clapper rails (*Rallus longirostris levipes*) at Seal Beach National Wildlife Refuge, California. Predation by foxes has contributed to an alarming decline in the population of this highly vulnerable bird. The California Department of Fish and Game has agreed to allocate a portion of its Section 6 (Endangered Species Act) grant-in-aid funds to this effort.

The U. S. Geological Survey has begun long-term studies of water quality and nutrient levels in Upper Klamath Lake, Oregon. Rapidly deteriorating water quality in the lake is responsible for die-offs of two Endangered fishes, the Lost River sucker (*Deltistes luxatus*) and short-nose sucker (*Chasmistes brevirostris*). Massive blue-green algae blooms have driven dissolved oxygen levels below those acceptable for maintaining the species during certain summer months. In addition to the Geological Survey, agencies contributing funds to the study include the Klamath Indian Tribe, U. S. Bureau of Reclamation, Klamath County, City of Klamath Falls, Pacific Power & Light, and Klamath County Farm Bureau. The study will examine changes in land uses around the lake and regulation of water levels.

A meeting was held with personnel of the Burns, Oregon, District of the Bureau of Land Management (BLM) to negotiate implementation of Malheur wire-lettuce (*Stephanomeria malheurensis*) recovery activities for 1989. The BLM will fund this season's work on census studies, seed over-wintering, competition with non-native cheat grass, and experimental out-plantings of *S. malheurensis* nursery stock. Cooperation from Boise State College and Portland's Berry Botanic Garden will again be crucial to the success of these efforts.

The Fish and Wildlife Service, California Department of Fish and Game, National Park Service, and U. S. Forest Service have agreed upon 1989 recovery activities for the Little Kern golden trout (*Salmo aquabonita whitei*). The recovery

(continued on page 9)

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#### U.S. Fish and Wildlife Service Regions

**Region 1:** California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska. **Region 8:** Research and Development nationwide. **Region 9:** Washington, D.C., Office.

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

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# Protection Recommended for Rare Mussel and Plant

During April 1989, the Fish and Wildlife Service proposed giving Endangered Species Act protection to two rare and vulnerable taxa:

## Dwarf Wedge Mussel (*Alasmidonta heterodon*)

A small freshwater mollusk, the dwarf wedge mussel rarely exceeds 1.5 inches (3.8 centimeters) in shell length. It lives in clean, free-flowing streams of various sizes on a muddy sand, sand, or gravel substrate. The host fish, to which the mussel attaches in its larval stage, is not known for this species.

The dwarf wedge mussel once was widely distributed in river systems along North America's Atlantic coast from New Brunswick, Canada, south to the Neuse River in North Carolina. It has been recorded historically from 70 locations within 15 drainages. Today, however, it is known to survive at only 10 small sites within 5 river drainages, and as few as 4 populations may be viable. Each of these 4 populations, which occupy very limited areas in the Ashuelot River, Connecticut River, Tar River, and Tuckahoe Creek drainages, faces an uncertain future. Evidence of the species' decline was provided by The Nature Conservancy's status report and other studies.

The disappearance of the dwarf wedge mussel from most of its historical sites can best be explained by water pollution from agricultural, urban, and industrial sources. Even where water quality has improved, as in the lower Connecticut River, chemicals and other substances trapped in the sediments inhabited by mussels can inhibit the recovery of sensitive species. Acid precipitation may be adding to the water quality problem by leaching toxic metals into streams and by lowering stream pH levels. Increased acidity appears to have contributed to the decline of the dwarf wedge mussel in the Fort River of Massachusetts.

One of the largest remaining populations occurs where the Ashuelot River meanders through a golf course. The continuing decline of the dwarf wedge mussel at this site, particularly downstream of the golf course, may be attributable to run-off of chemicals and fertilizers applied to the golf course and to adjacent agricultural lands. If this is true, and if current plans to expand the golf course are carried out, more of the population's habitat could be subject to run-off impacts.

Damming and channelization of rivers throughout the species' range have also altered much of the species' former habitat. For example, waters upstream of dams have lower dissolved oxygen levels and increased silt deposition; downstream, daily fluctuations in reservoir discharges lead to rapid changes in water levels and temperatures. Dams may also

have an indirect but more serious impact on the dwarf wedge mussel. A population of this species vanished from one site, which still supports other mussel species, after the construction of a downstream causeway created a barrier to anadromous fish. This suggests that the host fish for dwarf wedge mussel larvae (glochidia) may need access to the ocean to complete its life cycle. If this is the case, then one of the 10 remaining populations of the mussel is threatened by the proposed construction of a dam at Sumner Falls in New Hampshire.

The Service has proposed to list the dwarf wedge mussel as an Endangered species (F.R. 4/17/89).

## *Cassia mirabilis*

This plant, a shrub that grows to about 30 inches (1 meter) in height, is endemic to an area of silica sands on the north coast of Puerto Rico. It has small leaves arranged alternately on the stems and produces solitary yellow flowers approximately 0.75 inches (2 cm) wide.

Data from early herbarium collections indicate that *C. mirabilis* once was common throughout the island's northern silica sands. However, extensive destruction of native habitat apparently has reduced its distribution to three sites on privately owned land. Only 150-200 plants are known to remain, and all are vulnerable to continued habitat loss. Accordingly, the Service has proposed to list *C. mirabilis* as Endangered (F.R. 4/14/89).

The largest *C. mirabilis* concentration, located on the southern shore of Tortuguero Lagoon, is threatened by sand mining, occupation of the area by squatters, and trash dumping. One of two sites in the Dorado area is being used for livestock grazing, which does not appear to harm *C. mirabilis*, but it has been proposed as the location for a large office building complex. The other Dorado population is destined to be eliminated by road construction unless the plants can be relocated successfully.

\* \* \*

## Conservation Measures

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement of the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State and Commonwealth conservation departments that have Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encour-

ages further conservation efforts by State and local agencies, independent organizations, and concerned individuals.

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

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal trespass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants and animals.

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## New Publications

The North Carolina Biological Survey and North Carolina State Museum of Natural Sciences have published *Endangered, Threatened, and Rare Fauna of North Carolina, Part II: A Re-evaluation of the Marine and Estuarine Fishes*, by Steve W. Ross, Fred C. Rohde, and David G. Lindquist. This 20-page report updates the evaluations in the 1977 report, *Endangered and Threatened Plants and Animals of North Carolina*. A brief description of physical characteristics, life history and ecology, special significance, Federal status, current protection, and management recommendations for North Carolina's endangered fishes are provided. The report is available for \$3, postpaid, from the North Carolina State Museum of Natural Sciences, P.O. Box 27647, Raleigh, North Carolina 27611. Checks should be made payable to the NCUA Museum Extension Fund. Part I of this report, *A Re-evaluation of the Mammals*, was published in 1987 and is still available for \$5, postpaid.

# A Forum for the Exchange of Information & Ideas on Endangered Species Issues

Published by the School of Natural Resources at The University of Michigan, the Endangered Species Update is a bulletin providing current news and information on endangered species protection. The Update includes a reprint of the latest Endangered Species Technical Bulletin, a U.S. Fish and Wildlife Service publication which is publicly available only through the Update. Additionally, the School of Natural Resources supplements each reprint with articles and information covering a variety of issues relating to species conservation.

The Update was first developed in 1983 to reprint the U.S. Fish and Wildlife Service bulletin after budget cuts forced the Office of Endangered Species to limit its distribution. Since 1981, however, distribution has been limited to federal and state agencies and official contacts of the federal Endangered Species Program. The Update keeps this unique source of information available to the public.

In the years since its inception, the Update (formerly known as the Endangered Species Technical Bulletin Reprint) has established itself as an important forum for the exchange of ideas and information on endangered species conservation issues. Along with the recent name change, the amount of information supplementing the Fish and Wildlife Service bulletin has been increased. The newly designed Update includes:

### *A Reprint of the Latest U.S. Fish & Wildlife Service Endangered Species Technical Bulletin*

This reprint provides the most current information on the federal endangered species program.

### *A Feature Article*

Article topics have included wetland protection, maintaining biotic diversity in national forests, and wolf recovery in the Yellowstone Ecosystem.

### *A Book Review*

This section covers publications in the field of conservation.

### *Opinion*

This guest column provides a forum for the quick exchange of ideas concerning endangered species.

### *Bulletin Board*

This portion lists upcoming meetings, new publications, and current announcements.

## Endangered Species UPDATE

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February 1986 Vol. 2 No. 4

THE UNIVERSITY OF MICHIGAN School of Natural Resources



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# Coal Mining and the Decline of Freshwater Mussels

Dick Biggins

Asheville, North Carolina, Field Office

Fourteen of the 18 mussel species of the Cumberland and Tennessee Rivers now on the Federal list of Endangered wildlife declined at least in part because of past habitat deterioration associated with coal mining. Environmental impacts related to coal mining are suspected in the continuing decline of more than a dozen other mussel species that are candidates for possible Endangered Species Act protection.

Coal mining particularly affected many rivers and streams in the southern Appalachian Mountains, where certain mining activities continue to have serious impacts on some stream reaches. If left untreated, water runoff from coal mines and processing sites can contain high levels of silt and coal fines (small particles of coal mixed with silt) that settle from the water and blanket riverbeds. These deposits can destroy delicate stream ecosystems and smother many aquatic animals and plants that have evolved to exist in clean, relatively silt-free environments. Chemical pollutants associated with coal mining also can cause significant problems. Acidic drainage from mines has affected the aquatic habitat in many streams in the southern Appalachians and organisms may be killed directly by the drop in pH. Other toxic chemicals also can be present in coal waste.

The Fish and Wildlife Service is funding three studies to address coal-related pollution and its impacts on mussel communities. One of these studies addresses the Powell River, which has a diverse mussel fauna containing 35 species (including 5 that are listed federally as Endangered). In Virginia, and to a lesser extent in Tennessee, the Powell River watershed has been seriously degraded by coal-related pollution. Coal waste, primarily fine particles of coal, is now a significant component of the river bottom. In a study being conducted by the Service's Virginia Cooperative Fish and Wildlife Research Unit, biologists are attempting to assess 1) the amount of coal waste that has been incorporated into the substrate, 2) the magnitude of the decline in mussel diversity and abundance, and 3) how and to what extent the coal waste affects the mussels.

A study by the Service's Tennessee Cooperative Fisheries Research Unit, funded in part by the Tennessee Wildlife Resources Agency and the Kentucky Department of Fish and Wildlife, is focusing on the upper Cumberland River basin in Kentucky and Tennessee. The Tennessee Co-op Unit is concentrating its efforts on the Little South Fork of the Cumberland River. As recently as 1981,

the Little South Fork had one of the most diverse and abundant mussel faunas (22 species, 2 of which are listed as Endangered) in the Cumberland River system. Surveys of the area in 1987 and 1988, however, showed that the river's mussel population has crashed. Mussel density has declined significantly, and only 14 species recently have been found there alive. The little-wing pearly mussel (*Pegias fabula*) was the second most common mussel found in the 1981 study of the Little South Fork, but surveys of the same area in 1987 located no live specimens and the species is now listed as Endangered. Another federally listed species, the Cumberland bean pearly mussel (*Villosa trabalis*), also has been extirpated from this study area, along with mussels that elsewhere are relatively common. Although Endangered and non-listed spe-

cies survive in low numbers upstream, they have disappeared from the river downstream of strip-mined areas. The Tennessee Co-op Unit study may provide some answers on what happened in the Little South Fork.

The Service's Tennessee and Virginia Co-op Units also are working together on a study of mussel tissue and river substrate samples collected from streams affected by coal mining. Analysis of these samples should provide data on potentially toxic chemicals that may be associated with coal waste.

Once these studies are complete, the Service, other Federal and State agencies, and the coal industry will be better able to protect Endangered mussels during and after coal production and mine reclamation activities.



photo by Dick Biggins

**Biologists are surveying the Powell River to determine the abundance and diversity of the remaining mussel fauna.**



photo by Dick Biggins

**Coal-related pollution has seriously degraded much of the Powell River in southwestern Virginia, where coal waste is now a significant component of the river bottom.**

# Farm Bill

(continued from page 1)

tion Service to ensure that wildlife issues are considered when agency activities are planned. It also serves as a liaison between these agencies and State, local, and private resource agencies and organizations. The Service's contributions have been in three major areas: 1) conservation planning; 2) habitat protection and preservation; and 3) habitat restoration.

## 1) Conservation Planning

Effective land use planning is critical for meeting the conservation goals of the Food Security Act. One Federal agency, the Soil Conservation Service, is involved in preparing conservation plans for highly erodible farmlands. These plans feature management practices designed to lower erosion rates to an acceptable level and often include practices that benefit other resources, such as ground water or wildlife. Landowners also can request help from the Soil Conservation Service in developing conservation plans even for lands that are not highly erodible.

Success in effectively protecting wetlands, endangered species habitat, and other sensitive resources depends on landowner support. Over 90 percent of our Nation's existing wetlands, and most of its restorable wetlands, are on privately owned lands. In many instances, the Service can suggest conservation recommendations that promote both wildlife and economic uses of the land. The situation facing the San Joaquin kit fox (*Vulpes macrotis mutica*) habitat in south-central California provides an example. Several Farmers Home inventory properties occur on or adjacent to areas used by this Endangered animal. The conversion of many properties from rangeland to cropland made them marginal habitat for the fox because cultivation reduced the number of small mammals upon which the fox feeds. However, changing management of the property to a controlled grazing regime would promote the recovery of the fox's prey base while allowing agricultural use of the land. By looking at species-specific needs, it may be possible to develop similar agreements to benefit a wide variety of listed species.

Farmers Home has agreed also to consider the Service's conservation planning recommendations for projects that could have an impact on listing candidates when these recommendations would not significantly diminish the economic value of the property. For example, an agreement have been reached in southern California for the desert tortoise (*Gopherus agassizii*), a State-listed threatened species and candidate for Federal listing. A private developer had already negotiated with Farmers Home for the purchase of



photo by Jay Sheppard

*Typical habitat along the southwestern edge of the San Joaquin Valley of California for the blunt-nosed leopard lizard and San Joaquin kit fox.*

inventory property to be included as part of a racetrack site. The track was to be located next to the Bureau of Land Management's desert tortoise natural area. Although tortoises were not likely to occur on the property to be developed, they were known to occur in the adjacent area. There was concern that high noise levels from the racetrack would disturb tortoise behavioral patterns. To protect this sensitive species, Farmers Home agreed as a condition of sale to require the installation of noise barriers around the racetrack perimeter.

Another form of conservation planning can occur during loan review. Farmers Home receives thousands of loan requests for rural housing, rural water supply, farming equipment and operations, and other purposes each year. Through the Memorandum of Understanding, the Service can participate in the loan review process by providing technical information on fish and wildlife resource impacts that could result from the loan activity and making recommendations to protect these resources. The result can be the establishment of a conservation easement, such as the 50-acre (20-ha) easement established in Oregon for a bald eagle roost site, or recommendations to avoid project impacts, such as the realignment of a water pipeline to avoid disturbing Houston toad (*Bufo houstonensis*) habitat in Texas.

## 2) Habitat Protection and Preservation

Three provisions of the Food Security Act allow the establishment of conserva-

tion easements to protect environmentally sensitive resources. Another law, the Agricultural Credit Act, also promotes habitat protection by allowing fee title transfer of property for conservation purposes. The habitat protected under these provisions provides long-term protection for waterfowl, endangered and threatened plants and animals, and other wildlife. When easements are established, an easement manager is designated to see that the land is managed for the intended conservation purpose. The easement manager can be a Federal, State, or local resource agency or a private conservation group. The landowner typically maintains most rights to the property, including control of public access and other uses of the property as long as the uses are compatible with the purpose of the easement.

### Inventory Property Easements

Reviewing Farmers Home inventory properties for wildlife resource values has been a significant commitment for the Service in the past year. Under Executive Orders 11988 and 11990, and Section 1314 of the Food Security Act, Farmers Home can establish easements for the protection of wetlands, floodplains, and other environmentally sensitive habitats. Lands come into Farmers Home inventory either through voluntary conveyance or foreclosure. Prior to resale, Farmers Home evaluates each property for the presence of important resources (as defined in the May 1987 Memorandum of Understanding). The Service provides technical assistance in determining impacts to these resources, which include wetlands; floodplains; riparian zones;



photo by Leon Snyder

**San Joaquin kit fox (*Vulpes macrotis mutica*)**

coastal barriers; threatened and endangered species (including candidate species, critical habitat, known occurrence areas, and potential habitat for release, restoration, and/or reintroduction); aquifer recharge areas; areas of high water quality or scenic value; and habitats of national, State, regional, or local importance. Farmers Home also assesses impacts to important cultural resources, such as archaeological sites.

Over 4,100 inventory properties have been reviewed nationwide and conservation easement recommendations have been made on about 25 percent of them.

If Farmers Home agrees to these easements, they will give protection to over 100,000 acres (40,000 ha) of sensitive habitat. Protective conservation easements have been recommended for numerous wetland habitats as well as for a wide variety of listed species, including the Indiana bat (*Myotis sodalis*), eastern indigo snake (*Drymarchon corais couperi*), and gray wolf (*Canis lupus*). For Farmers Home to accept easements for listed species, the Service must document that the species is known to occur on or adjacent to the property. At times, this can be difficult due to such factors as season-

al use. In such cases, the Service uses the best available information on habitat availability, known distribution, and other factors to document the importance of the particular property to the listed species.

Standard conservation easement language has been developed to address wetland and floodplain protection. In many instances, this standard language also serves to protect listed species. For endangered species issues or other wildlife values, the standard language may occasionally be modified to provide special consideration of such factors as precautions on the uses of pesticides in endangered species habitat. Establishment of conservation easements for listed species does not supersede the need for Federal agencies to comply with Section 7 requirements of the Endangered Species Act, but in many cases acceptance of these recommendations can mean avoiding impacts on listed species.

## Types of Easements Available Under the Food Security Act and Associated Programs

Provision	Length of Easement	Types of Habitat Protected
Conservation Reserve Program	10 years	highly erodible soils, vegetative filter strips, cropped wetlands
Debt-restructure Program (Section 1318)	50 years or more	highly erodible soil, upland, or wildlife habitat
Section 1314	in perpetuity	any sensitive environmental habitat
Executive Orders 11988 and 11990	in perpetuity	wetlands and floodplains
other lands	term varies based on agreement	any sensitive environmental habitat

### Conservation Reserve Program Easements

The Conservation Reserve Program is a voluntary program designed to conserve and improve soil and water resources by taking highly erodible cropland, cropped wetlands, and vegetative filter strips out of production for a 10-year period. In return, the landowner receives an annual rental payment and agrees to establish permanent wildlife cover on the set-aside acres, for which the Agricultural Stabilization and Conservation Service will share up to 50 percent of the actual cost. Creation or restoration of shallow water wetlands is an acceptable wildlife cover practice that

*(continued next page)*

## Farm Bill

(continued from page 7)

results in significant benefits to waterfowl and other wildlife.

Over 28 million acres (11 million ha) have already been set aside under this program, and the national goal is to have over 45 million acres (18 million ha) enrolled by 1990. To participate in this program, landowners place bids with the Agricultural Stabilization and Conservation Service during twice annual sign-ups.

### Debt-restructure Easements

Section 1318 easements, commonly referred to as "debt-restructure" easements, are one of about 10 loan servicing options that can be considered by landowners who meet certain conditions of delinquency on Farmers Home loans. In return for a 50-year or longer conservation easement, landowners can have their debt written down by the value of the easement area. These easements are considered only when requested by the landowner, and they must be able to make it feasible for the landowner to pay off any remaining debt. They can be established for conservation and wildlife purposes on land that is wetland, upland, or highly erodible. In late November 1988, Farmers Home sent out approximately 81,000 notices of delinquency and default requesting landowner input regarding loan servicing options. However, fewer than 350 landowners requested consideration of a conservation easement. For landowners who did, however, this program may provide a valuable way for them to reduce their debt to a point where they

can maintain a viable farming operation while also benefiting wildlife.

### Fee Title Transfers

Section 616 of the Agricultural Credit Act allows the transfer of Farmers Home inventory property, or interest therein, to any State or Federal agency for conservation purposes without reimbursement. Priority consideration is given to land transfers that promote the North American Waterfowl Management Plan, recovery of endangered species, or habitat of national importance. Based on information from the Service and other sources, Farmers Home determines if the land is marginal for agriculture, has special management importance, or is environmentally sensitive. If the property meets any of these criteria, it can be considered for transfer to a Federal or State conservation agency. The prior owner/operator is allowed to exercise rights of buyback/leaseback before a transfer is considered.

The first fee title transfer under this provision occurred in Grays Harbor County, Washington, on an 85-acre (34-ha) tract along the Chehalis River. This former dairy farm will be managed by the Washington Department of Wildlife for waterfowl, fisheries, and wildlife production and for wetland and floodplain protection. It contains extensive wetlands that provide breeding and feeding areas for waterfowl and is within known bald eagle wintering range. The river border contains gravel bars used by salmon and steelhead for spawning areas.

Numerous fee title transfers are under consideration nationwide. Many will provide direct protection for listed species as well as a chance to promote the enhancement of existing habitat for these

species. For example, a 640-acre (259-ha) property in California that contains habitat for the San Joaquin kit fox, palmate-bracted bird's-beak (*Cordylanthus palmatus*), blunt-nosed leopard lizard (*Gambelia silus*) and Tipton's kangaroo rat (*Dipodomys nitratooides nitratooides*) probably will be transferred to the State for management. Possible types of habitat enhancement for these species could include planting and protecting native plant species, managing grazing, and improving existing alkali sinks.

### 3) Habitat Restoration

The Service is undertaking a major wetland restoration effort on lands associated with the Food Security Act and related programs. Wetland restoration addresses many conservation issues, including soil erosion, ground water recharge, surface and groundwater quality, safe and adequate water supply, stabilization of flood and drought cycles, recreation, and provision of wildlife habitat.

In southern California, a 203-acre (82-ha) easement, which will be managed by the Service, has been established for wetland protection. Wetland restoration will improve habitat for the Endangered Yuma clapper rail, waterfowl, and other birds.

Over 15,000 (6,100 ha) acres of prairie potholes, bottomland hardwood forests, and other wetlands were restored last year on lands associated with the Food Security Act in the midwest and southeast. About half of the restoration was on Farmers Home inventory lands, with most of the remainder on Conservation Reserve properties. Thousands of additional acres throughout the Nation will be restored this year.

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## Wolf Longevity in the Wild

L. David Mech<sup>1</sup>

The maximum age any mammal reaches in the wild is difficult to measure unless aging techniques are available for that species. In the case of the gray wolf (*Canis lupus*), aging methods are still being developed and tested. Information from captive wolves indicates that 16 years is probably close to the maximum life span for the species in captivity. However, until recently, no one knew how long wolves live in the wild.

Until about 7 months of age, wolf pups can be distinguished from adults by the presence of milk teeth. Thus, if wolves are caught before gaining their permanent teeth and are then fitted with a radio transmitter, they can later yield some information about longevity. Even adult wolves that are followed long enough can provide minimal indications of longevity. Through the latter method, the Patuxent

Wildlife Research Center's Minnesota Field Station has been able to learn how old at least some wolves live to be in the wild.

Three females lived at least 9 years to 12 years and 8 months, and three males lived at least 9 years and 6 months to at least 11 years and 7 months. None of these wolves died of old age. One was killed illegally by humans, one was killed by other wolves, one starved, and three were still alive when their radio collars failed. Thus, all of these ages are minimal estimates of potential lifespan in the wild.

It is noteworthy that one wolf produced pups even when she had reached 10 years of age. Another bore pups when at least 8 years old and ovulated when at least 9 years old. A third female was last known to have produced pups when at least 7 years old (and probably 8). From

the time she was at least 8 years (and probably 9) through at least 12 years and 8 months (and probably 13 years and 8 months) old, this third female wolf did not produce any pups that survived into summer. However, she did travel with at least two different males during her non-productive years. With regard to male wolves, one sired pups when at least 10 years and 10 months old. From these data and those from captive wolves, it appears that prime age in wild wolves probably extends up to about 11 years and maximum lifespan to at least 13.

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

# Final Listing Rules Approved for Two Species

During April 1989, final listing rules were published for two species, bringing Endangered Species Act protection to the following:

## Dwarf-flowered Heartleaf (*Hexastylis naniflora*)

This low-growing herbaceous plant in the birthwort family (Aristolochiaceae), has dark green, heart-shaped leaves and small, inconspicuous jug-shaped flowers that are usually beige to dark brown in color. The plant grows in acidic soils along bluffs and hillsides in boggy areas next to streams, and along ravines in the upper piedmont of North and South Carolina. Much of the habitat that the dwarf-flowered heartleaf prefers has been

altered by conversion to peach orchards and pastures, destroyed by housing construction, or flooded by impoundments. Only 24 populations are known to occur in an 8-county area, and only 4 of these sites receive some protection. The Fish and Wildlife Service proposed on April 21, 1988, to list the dwarf-flowered heartleaf as Threatened (see BULLETIN Vol. XIII, No. 5), and the final rule was published in the April 14, 1989, *Federal Register*.

## Magazine Mountain Shagreen (*Mesodon magazinensis*)

The Magazine Mountain shagreen is a dusky brown or buff colored land snail approximately 0.5 inches (13 millimeters)

wide and 0.3 inches (7 mm) high. Its entire range is within the Ozark National Forest. More specifically, the snail is known to occur in small numbers only on rock slides on the north slope of Magazine Mountain in Logan County, Arkansas. Because of its limited range, the snail is vulnerable to collecting and to any adverse habitat modification. Recreational developments or activities, military training exercises, and forestry activities are potential threats to the species if they occur on the north slope of the mountain. The Service proposed the Magazine Mountain shagreen for listing as a Threatened species on July 5, 1988 (see BULLETIN Vol. XIII, No. 8), and the final rule was published on April 17, 1989.

## Regional News

(continued from page 2)

effort for this Threatened fish is approximately 50 percent complete. Prospects for accelerated recovery have improved with recent successes in artificial propagation at the California Department of Fish and Game's Kernville hatchery and a commitment by the State for a recovery coordinator position. An ambitious stream restoration and reintroduction program is scheduled for the 1989 field season. Under the accelerated schedule, complete recovery of this Threatened fish may be only 3 to 4 years away.

**Region 2**—U.S. Fish and Wildlife Service bald eagle (*Haliaeetus leucocephalus*) nest watchers saved an 8-week-old chick from starvation. They observed that one chick in the nest was having difficulty eating and was regurgitating all consumed food. After several days of observation, the situation remained and the chick became weak from lack of food. The nest watchers contacted a biologist, who removed the starving chick and delivered it to a veterinarian. The veterinarian removed a large fish vertebra that had become lodged in the chick's throat. After a week of recuperation, the eagle chick was returned to the nest and was expected to fledge successfully.

Robert Mesta, Raptor Biologist with the Service's Phoenix, Arizona, Ecological Service Field Office, participated in a joint U.S./Mexico research project in Sonora, Mexico. A team of U.S. and Mexican biologists surveyed approximately 120 miles (190 kilometers) of the Rio Yaqui Drainage by canoe, searching for breeding bald eagles and checking the status of three known nests. One of the nest sites was occupied and had three nestlings, the second nest had failed, and the third was unoccupied. No new nests were discovered. Little is known about this small

population, which was discovered in 1986, or about its possible relation to bald eagles breeding in Arizona. This is the third year the eagle survey has been conducted by the joint team.

Since 1975, 218 whooping crane (*Grus americana*) eggs have been transferred from the whooper's only nesting grounds, in Wood Buffalo National Park, Canada, to sandhill crane (*Grus canadensis*) nests at Gray's Lake National Wildlife Refuge in southeastern Idaho. The goal has been to establish a second whooping crane population in the wild. Out of these 218 whooping crane eggs, 210 have hatched and 85 young have survived to flight age (90 days). The population peaked at 34 individuals in 1984-85, but declined to 14 (a figure that includes some translocated birds as well as eggs) by 1989. The causes of death have been identified for 24 of the birds, and include collisions with powerlines (41.6 percent), collisions with fences (20.8 percent), disease (16.7 percent), and avian predators (8.3 percent). The population decline since 1985 is a consequence of 3 years of drought at Gray's Lake (which limited chick survival) and continuing natural attrition of sub-adults and adults. An additional bird, a 5-year-old female, died in March after hitting a powerline in the San Luis Valley of Colorado.

The project, now in its 15th year, will be reviewed by the Service this summer. Although the experiment has successfully established a migratory population that uses the same areas as their foster parents, no whoopers have produced eggs. Female whooping cranes reach sexual maturity and produce fertile eggs at an average age of 5.4 years, although fertile eggs can be produced at age 3. During the project, females 4 to 8 years of age have passed through a breeding season on 20 occasions without producing young.

**Region 4** - The second year of status surveys for the seabeach amaranthus

(*Amaranthus pumilus*) has been completed. It shows fluctuations in some populations, but verifies the species' overall rarity and vulnerability to threats. This plant once grew on barrier islands and beaches from Massachusetts to South Carolina. Based on the results of status surveys funded by Regions 4 and 5, it is now extirpated from all but the southernmost portion of its range (North and South Carolina).

The species' habitat is extremely dynamic and very vulnerable to natural changes, such as beach erosion. The accelerating pace of coastal development along the eastern seaboard, where undeveloped beachfront is becoming rare, increases the species' vulnerability to extinction. Even populations on public land have succumbed to habitat destruction caused by off-road vehicles, dune restoration projects, construction of groins and breakwaters, and heavy recreational use. A U.S. Army Corps of Engineers dredging operation is currently depositing soil on an area in North Carolina that supports the second largest known population of the species.

Because this species has no close relatives, its extinction would be a considerable loss to botanical diversity. *Amaranthus pumilus* also is a valuable beach stabilizer. Its nutritional value is especially high because the seeds are high in lysine, an essential amino acid generally found only in low amounts in other grains and other *Amaranthus* species.

The Florida Game and Fresh Water Fish Commission is initiating a study on the life history, management, and status of fox squirrels (*Sciurus niger*) in Florida. Two subspecies of fox squirrels are found in Florida, and both are category 2 candidates for Federal listing. The mangrove fox squirrel (*S. n. avicennia*) is restricted to the Big Cypress area of south Florida. Sherman's fox squirrel (*S. n. shermani*) is found in north and central Florida. Hunting  
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# Regional News

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is not permitted for the mangrove fox squirrel, but is still legal to take the Sherman's fox squirrel. The results of the project will help the Commission decide if current management for fox squirrels in Florida is appropriate. The results will also help the Service decide whether or not either subspecies needs Federal listing protection.

Remember the Cross-Florida Barge Canal, a watery route across Florida first proposed by Thomas Jefferson, finally begun by the Corps of Engineers in the late 1960's, and terminated (deauthorized) by Congress in the 1970's as an environmental mistake? The project remains deauthorized, but what to do with the previously authorized portion, including several lakes, dams, locks, canals, and a thin corridor of mostly uplands stretching across peninsular Florida, was never decided. Should the resources now held and, to an extent, managed by the Corps as the Cross Florida National Conservation Area be returned to their original owners? If the Corps retains ownership, how should these resources be managed in the future? These and other questions will be addressed over the next several years as the Corps and other agencies and individuals discuss what to do with the project's remains. The Jacksonville, Florida, Field Office is actively working with the Corps to see what benefits for wildlife can be salvaged.

**Region 5** - Peregrine falcons (*Falco peregrinus*) returned to several sites in the Green Mountains of Vermont and White Mountains of New Hampshire during late February. Up to 16 pairs of peregrines may nest in the two States this spring. In 1988, two out of three young produced in New Hampshire were at Holts Ledge. The U. S. Forest Service, U.S. Fish and Wildlife Service, and State agencies are coordinating on protection of nesting areas. Also, local helicopter users whose flights over these sensitive sites in past years have raised concern about disturbance of nesting falcons, have been contacted.

Results of the 1988 Mid-Winter Bald Eagle Survey in New Jersey have shown an unprecedented number of wintering bald eagles in the State. Thirty-eight bald eagles and two non-endangered golden eagles (*Aquila chrysaetus*) were found during the 2-day survey in January. New Jersey has only one active bald eagle nest; however, a recent surge in eagle activity at several potential nesting areas in the State offers hope for others in the future.

Region 5 has prepared and distributed the draft Sandplain Gerardia (*Agalinis*

*acuta*) Recovery Plan. This plant was listed in September 1988 as Endangered (see BULLETIN Vol. XIII, Nos. 9-10). It is known to occur at 10 sites in Massachusetts, New York, Rhode Island, and Maryland. Recovery actions include developing management and protection plans for each population and locating or establishing new sites.

**Region 6** - In April 1988, the Service received a petition to list a Montana plant, the Sapphire Mountain rockcress (*Arabis fecunda*), as an Endangered species. At the time, only 30-35 small populations were known, and they were threatened by livestock grazing and knapweed (*Centaurea* sp.) encroachment. Last summer, however, botanists working for the Montana Natural Heritage Program, aided by Section 6 funding, discovered 70 new populations in the Pioneer Mountain Range. As a result, the Montana Heritage Program requested that the petition be withdrawn.

A wildlife celebration, "Wings Over the Platte," held March 17-19, 1989, on the Platte River in Nebraska was an overwhelming success. It attracted more than 2,000 people from all across the country, as well as from Nigeria and France. This year, due to low water conditions in the nearby Rainwater Basin, the river was teaming with more waterfowl than usual. An estimated 5-7 million ducks and geese and 300,000 sandhill cranes were present on the river over the 3-day period. The event included workshops on waterfowl and river ecology and guided tours along the river. Unfortunately, no whooping cranes were present for the celebration, but one did arrive March 25 after the festivities were over. The bird, a female whooper, was given the name "Oklahoma" by the local community of Grand Island, Nebraska, because she overwintered her first year in Oklahoma. For the past 3 years, she has returned to the Platte to spend a month feeding in local fields. The rest and feeding stop gives her energy to make the long flight to Wood Buffalo National Park in northern Alberta, Canada. "Oklahoma" should reach sexual maturity this year, and it is hoped that she will pair and mate.

The Colorado River Fishes Recovery Team met in Phoenix, Arizona, on February 23-24 and completed its review of revised recovery plans for the Endangered humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and Colorado squawfish (*Ptychocheilus lucius*). The revised plans for the humpback and bonytail chubs will undergo public review soon, and the revised Colorado squawfish plan will be sent out for agency review. Fragmentation of squawfish habitat was identified by the team as a serious threat to its recovery and survival. Also, plans proposed by the State of Utah to intro-

duce non-native fish to provide forage for striped bass (*Roccus saxatilis*) in Lake Powell are being reviewed by the team as to the potential effects on the three Endangered fish.

The Interagency Grizzly Bear Committee met January 31 and February 1, 1989, in Billings, Montana, to discuss the status of the grizzly bear (*Ursus arctos*) in the Northern Continental Divide Ecosystem of northwestern Montana. It appears that this population may be nearing recovery. In addition, the Committee directed that a Conservation Strategy Document be developed to outline the population monitoring methods and habitat/population management that would be needed after a future delisting to ensure the population's survival. This Conservation Strategy Document would be signed by all State and Federal management authorities prior to a delisting, and the document is scheduled to be completed in December 1989.

During a March 16-17 meeting in Washington, D. C., the Committee briefed Congressional committee staffs, agency heads, conservation organizations, and private groups on Committee activities and the overall status of the grizzly bear in the lower 48 States. Particular interest was expressed in three areas: 1) the recovery and delisting prospects for the grizzly population in the Northern Continental Divide Ecosystem; 2) progress on the proposed augmentation effort in the Cabinet/Yaak Ecosystem; and 3) the need to ensure adequate funding for grizzly bear recovery.

Continued illegal killing of grizzlies in the Selkirk and Cabinet/Yaak Ecosystems prompted a meeting of 50 law enforcement and management personnel from the U. S. Fish and Wildlife Service, U. S. Forest Service, the States of Montana, Idaho, and Washington, and the Canadian Province of British Columbia on March 21-22, 1989, in Post Falls, Idaho. Of the 11 grizzly bears radio collared in the Selkirk Mountains in Idaho since 1984, 5 have been killed illegally. The meeting was held to develop a coordinated law enforcement and public education program in the area to limit further illegal kills.

Planning continues for the placement of two subadult female grizzly bears in the Cabinet Mountains of northwest Montana in July or August of 1989. The Cabinet Mountains population is estimated to comprise fewer than 15 bears. A local citizens' group has been formed to work with the involved agencies and ensure that local input is part of the program. The citizens' group and the agencies are preparing a question-and-answer brochure on the grizzly and the placement of bears in the Cabinets. The brochure will be distributed throughout northwest Montana. In addition, the citizens' group is preparing a

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# Regional News

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slide program for showing to local organizations and schools. It also will present two public forums on grizzly bear augmentation to give citizens the chance to ask questions and express concerns.

During the fall of 1988, 8,000 Threatened greenback cutthroat trout (*Oncorhynchus clarki stomias*) were moved from the Bozeman Fish Technology Center in Bozeman, Montana, to the State's Bluewater Springs Trout Hatchery in Bridger. The move was prompted by concern about the spread of "whirling disease" in western trout streams. As a precaution, the plan now calls for keeping the greenbacks at Montana's Bluewater facility, which is certified disease-free, during the fall, winter and spring. The fish are scheduled to be released this summer into restored lake and stream habitats in Rocky Mountain National Park, Colorado.

The Federal Highway Administration and the Service have reached agreement on measures to protect the Mead's milkweed (*Asclepias meadii*), a Threatened plant, from potential impacts of the proposed Lawrence Trafficway on this species' habitat. The project would entail construction of a 14-mile (22-kilometer) highway around the city of Lawrence in eastern Kansas. The original highway alignment would have crossed an area of native prairie known locally as Elkins Prairie. The 70-acre (28-hectare) Elkins Prairie is an excellent example of virgin tall grass prairie and contains the largest known Mead's milkweed populations. The tract also contains habitat for the western prairie fringed orchid (*Platanthera praeclara*), a species proposed for Federal listing in October 1988 (see BULLETIN Vol. XIII, Nos. 11-12).

Consultations among the two Federal agencies and local sponsors resulted in an agreement for highway alignment changes to avoid direct impacts on Mead's milkweed. Concerns about possible secondary impacts due to increased development incentives along the new highway were alleviated through zoning guidelines. This is a fine example of inter-agency cooperation for protecting listed species while accommodating project goals.

For many years, Kansas has maintained a significant wintering population of bald eagles but no nesting has ever been documented in the State. The surrounding States of Colorado, Missouri, Nebraska, and Oklahoma have, currently or in the past, reported the nesting of bald eagles. This year, Kansas may be added to the list.

Late this past winter, a pair of bald eagles was observed near a creek arm opening into Clinton Reservoir, a Corps of

Engineers flood control facility south of Lawrence. The eagles constructed a nest in a large dead cottonwood tree, and in late March they were observed sitting on the nest in an incubation posture. As of May 2, it was not known if there were eggs in the nest. It is suspected that the birds are first-year nesters and are developing fidelity to the area.

A meeting was held April 11, 1989, with representatives of the Service, Kansas Department of Wildlife and Parks, and Corps of Engineers to discuss how to protect the birds from human disturbance during the critical nesting period. They decided to establish a restricted area 200 yards (183 meters) in radius from the nest. The Corps agreed to place buoys in the reservoir marking the waterward limit of the boundary. For its part, the Service agreed to post signs at boat ramps and other access areas to make the public aware of the presence of the bald eagles, their need to be left undisturbed, and the facts concerning their protection under the Endangered Species Act.

Scientists from several agencies and educational institutions are teaming up to investigate various aspects of desert tortoise (*Gopherus agassizii*) nutrition in the northeastern Mojave Desert. Cooperating agencies and institutions include the Bureau of Land Management in Arizona and Utah, Arizona Game and Fish Department, Utah Division of Wildlife Resources, U. S. Fish and Wildlife Service, U. S. Forest Service, Colorado State University, and Brigham Young University.

The Beaver Dam Slope population of the desert tortoise in Washington County, Utah, falls within the northeastern Mojave. It was listed in 1980 as Threatened, but it has continued to decrease. Competition with livestock for food plants is one of several factors implicated in the decline. Some biologists estimate that the number of tortoises in this population has fallen over 50 percent since 1980. This continuing decline is believed to be related to long-term changes in range condition and the composition of plant species. The new studies are designed to answer questions relating to the tortoise's nutritional requirements on different habitat sites and under different grazing management regimes. The physiological condition of desert tortoises will be determined through examinations of blood and bone samples, and the nutritional value of several plants they are believed to forage upon will be measured at different growth stages. Livestock-tortoise overlaps in the selection of foraging plants will be examined in the future.

**Region 9 (Washington, D.C., Office)**—The Branch of Listing and Recovery, Division of Endangered Species and Habitat Conservation (EHC), is preparing a policy statement on the regulatory definition of "vertebrate population." Under the Endangered Species Act, vulnerable

species of plants and animals may be listed as Endangered or Threatened. The Act defined "species" to include subspecies, plant varieties, and distinct populations of vertebrate animals. Precisely defining "vertebrate populations" is necessary because, once listed, populations receive full legal protection under the Act. Over the years, the Service has been petitioned to take action on questionably distinct groups (e.g., "the squirrels in the park") and other entities that some interests want listed, reclassified, or delisted.

More precisely defining vertebrate populations would permit the Service to concentrate its resources on those that clearly need protection. A draft of the policy will be circulated to the Regions soon.

In a related matter, representatives of Regions 1, 2, and 6 are scheduled to meet June 15 in Denver to discuss the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and several other listing candidates. They have requested Jay Sheppard of EHC/Listing and Recovery and Richard Banks of Region 8 to participate in the discussion, which will be used in part to review the draft "vertebrate population" policy. More news about this issue will be included in future editions of the BULLETIN.

EHC/Listing and Recovery is working with the International Association of Fish and Wildlife Agencies to establish procedures for the reporting of "reasonably identifiable" State expenditures (in addition to Section 6 Federal grants) for endangered species conservation. An annual report to Congress on such spending is required under the 1988 amendments to the Endangered Species Act (see BULLETIN Vol. XIII, Nos. 11-12).

The Service's Interim National Pesticide Consultation Team met at the Region 9 EHC office May 22-26 to work toward completion of the Endangered Species Act/Section 7 consultation on 108 pesticide registrations. The final biological opinion regarding the potential impacts of these chemicals on endangered species is due to the Environmental Protection Agency June 9, 1989. (See feature article in BULLETIN Vol. XIV, Nos. 1-2.) On May 26, regional Section 7 coordinators met at EHC to discuss upcoming consultations on other pesticide registrations.

The Service has released a videotape presentation entitled "Wetlands in Crisis," which was produced at the direction of Secretary of the Interior Manuel Lujan. The video illustrates the importance of wetland habitats to many animals and plants, including Threatened and Endangered species, and summarizes various activities of the Service, such as the National Wetlands Inventory, wetland restoration programs, and Section 404 permit reviews. "Wetlands in Crisis" will be available soon in each of the Service's regional offices.

## BOX SCORE OF LISTINGS AND RECOVERY PLANS

Category	ENDANGERED			THREATENED			SPECIES TOTAL	SPECIES WITH PLANS
	U.S. Only	U.S. & Foreign	Foreign Only	U.S. Only	U.S. & Foreign	Foreign Only		
Mammals	32	19	241	6	2	23	323	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	3	1	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	6	0	0	10	7
Clams	32	0	2	0	0	0	34	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	153	6	1	40	6	2	208	85
<b>TOTAL</b>	<b>360</b>	<b>49</b>	<b>468</b>	<b>108</b>	<b>22</b>	<b>39</b>	<b>1046*</b>	<b>285**</b>

Total U.S. Endangered **409**

Recovery Plans approved: 245

Total U.S. Threatened **130**

Total U.S. Listed **539**

\*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

\*\*More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife  
May 31, 1989 36 plants

May 1989

Vol. XIV No. 5

# ENDANGERED SPECIES

## Technical Bulletin

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

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