

# ENDANGERED SPECIES

**Technical Bulletin** Department of Interior, U.S. Fish and Wildlife Service  
Endangered Species Program, Washington, D.C. 20240

## Three Species Proposed for Endangered Species Act Protection

A species of turtle, plant, and fish thought vulnerable to extinction were proposed recently by the Fish and Wildlife Service (FWS) for listing as Endangered or Threatened. If the proposals later become final, Endangered Species Act protection will be extended to the following taxa:

### Flattened Musk Turtle (*Sternotherus depressus*)

A small aquatic species, the flattened musk turtle is found only in parts of the Black Warrior River system in northern Alabama. This distinctive reptile is declining in numbers and range, primarily because of water quality degradation and collecting. The FWS has proposed listing it as a Threatened species (F.R. 11/1/85).

The flattened musk turtle apparently has rather specific habitat requirements, which include rivers or large creeks with alternating pools and vegetated shallows, an abundance of submerged rocks, and plenty of small mollusks for food. Good water quality is particularly important; there should be low silt loads and deposits, a minimal bacteria count, and little chemical pollution. Unfortunately, population surveys, observations, and U.S. Geological Survey water quality records indicate that only 15 percent of stream habitat within the river basin remains quality habitat for the turtle.

Siltation appears to be a primary factor in the habitat degradation. By 1975, approximately 117 square miles within the flattened musk turtle's range had been disturbed by surface mining of the underlying coal deposits, an activity that produced 50 percent of the region's accelerated erosion and sedimentation. The Alabama Surface Mine Commission notes that the rate of coal production from surface mining increased about 30 percent from 1975 to 1985, and the U.S. Department of Agriculture (USDA) estimates that 419 square miles will be disturbed by 2020. Logging, another significant source of erosion, is



Photo by C. Kenneth Dodd, Jr.

*The flattened musk turtle (Sternotherus depressus) is a small aquatic species with a distinctly flattened carapace up to 4.7 inches (119 millimeters) long and dark brown to orange in color.*

expected to almost double by the same year. In 1980, annual erosion from commercial forest land in the Black Warrior Basin was already 5,350,000 tons, and the USDA predicts that rate will increase 78 percent by 2020. Soil lost from crop land and pastures in 2020 is projected to be 2,569,000 tons above the amount annually replaced.

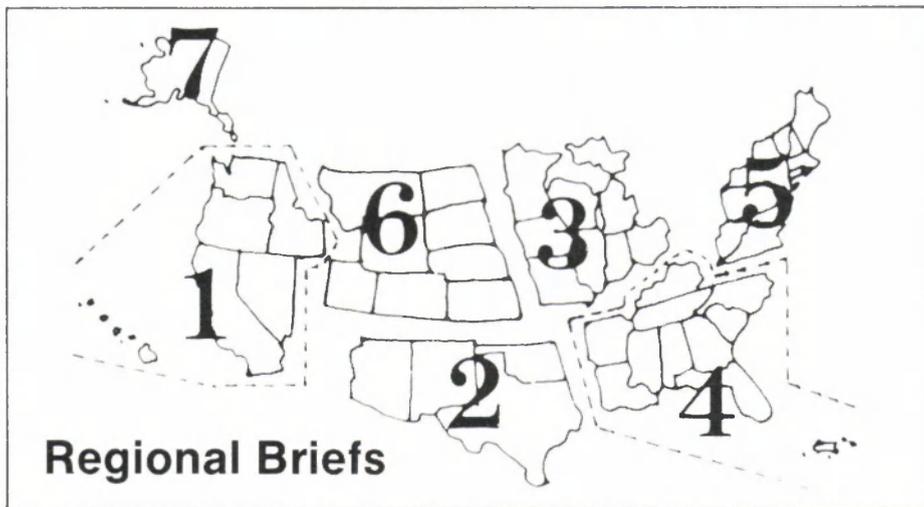
Siltation presumably affects the flattened musk turtle by 1) reducing or eliminating populations of mollusks and other invertebrates upon which the turtles feed, 2) physically altering the rocky habitats where turtles seek food and cover, and 3) forming a substrate in which heavy metals and toxic chemicals tend to accumulate. The flattened musk turtle is also vulnerable to chemical and sewage pollution, which can erode its shell, cause infections, and further reduce food organisms. Most of the pollution is from "non-point" sources, such as acid mine drainage, agricultural chemical runoff, and industrial and residential effluents.

Another threat to the flattened musk turtle is commercial exploitation. Most of the formerly good populations have been considerably reduced this way in

recent years. Turtles have appeared on several animal dealer price lists at more than \$80 each. It is hoped that a bill passed by the Alabama legislature in May 1984 to prohibit collecting of flattened musk turtles without a permit may control trade in the species.

Several Federal activities could have an impact on flattened musk turtle habitat and could be affected by a final listing rule. U.S. Forest Service-approved logging programs often include clear cutting, road building, and application of herbicides and/or insecticides. Such practices would likely increase the amounts of silt and chemical pollution in the Black Warrior River system. Mineral leasing by the Bureau of Land Management, certain Federal Highway Administration projects, and activities permitted or carried out by the U.S. Army Corps of Engineers (such as dredge and fill operations) could lead to greater siltation and further degrade the habitat. Projects funded by the USDA through the Agricultural Stabilization and Conservation Service and the Soil Conservation Service could produce both adverse and beneficial effects.

*(continued on page 5)*



## Regional Briefs

**Endangered Species Program regional staffers have reported the following activities for the month of November:**

**Region 1**—At a recent recovery team meeting for the light-footed clapper rail (*Rallus longirostris levipes*) and Califor-

nia least tern (*Sterna antillarum browni*), it was reported that the tern population increased in number from 518 fledglings in 1984 to 682 in 1985. Several colonies experienced reduced predation pressure, which accounts for the increase in productivity. Also reported was that a red fox (*Vulpes vulpes*) removal pro-

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

F. Eugene Hester, *Acting Director*  
(202-343-4717)  
Rolf L. Wallenstrom  
*Associate Director and  
Endangered Species Program Manager*  
(202)-343-4646)  
John L. Spinks, *Chief,  
Office of Endangered Species*  
(703-235-2771)  
Thomas J. Parisot, *Chief,  
Federal Wildlife Permit Office*  
(703-235-1937)  
Clark R. Bavin, *Chief,  
Division of Law Enforcement*  
(202-343-9242)

TECHNICAL BULLETIN Staff  
Michael Bender, *Editor*  
Denise Henne, *Assistant Editor*  
(703-235-2407)

### Regional Offices

**Region 1**, Lloyd 500 Bldg., Suite 1692, 500 N.E. Multnomah St., Portland, OR 97232 (503-231-6118): Richard J. Myshak, *Regional Director*; William F. Shake, *Assistant Regional Director*; Wayne S. White, *Endangered Species Specialist*.

**Region 2**, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321): Michael J. Spear, *Regional Director*; Conrad A. Fjetland, *Assistant Regional Director*;

James Johnson, *Endangered Species Specialist*.

**Region 3**, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500): Harvey Nelson, *Regional Director*; John S. Popowski, *Assistant Regional Director*; James M. Engel, *Endangered Species Specialist*.

**Region 4**, Richard B. Russell Federal Bldg., 75 Spring St., S.W., Atlanta GA 30303 (404-221-3583): James W. Pulliam, *Regional Director*; John I. Christian, *Assistant Regional Director*; Marshall P. Jones, *Endangered Species Specialist*.

**Region 5**, One Gateway Center, Suite 700, Newton Corner, MA 02158 (617-965-5100): Howard Larsen, *Regional Director*; Stephen W. Parry, *Assistant Regional Director*; Paul Nickerson, *Endangered Species Specialist*.

**Region 6**, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303-236-7920): Galen Buterbaugh, *Regional Director*; John D. Green, *Assistant Regional Director*; Barry S. Mulder, *Endangered Species Specialist*.

**Region 7**, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542): Robert E. Gilmore, *Regional Director*; Jon Nelson, *Assistant Regional Director*; Dennis Money, *Endangered Species Specialist*.

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

**Region 1:** California, Hawaii, Idaho, Nevada, Oregon, Washington, and 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 Virgin Islands **Region 5:** Connecticut, Delaware, 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

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

gram at Seal Beach National Wildlife Refuge is closer to becoming a reality. Approximately 35-40 red foxes use the refuge and have seriously depleted its wildlife resources, including the light-footed clapper rail.

The Sacramento Endangered Species Office (SESO) staff met with Thomas Reid Associates and a project proponent on a proposed residential development along the base of Milagra Ridge in the city of Pacifica, California. Portions of the proposed development are habitat for the Endangered mission blue butterfly (*Icaricia icarioides missionensis*). Overall project mitigation includes a program to control exotic vegetation, which is the primary threat to the butterfly's larval food plants on the ridge.

The Olympia, Washington, Field Office personnel participated in the removal of elk from the Columbian White-tailed Deer National Wildlife Refuge. Twenty-three elk cows and calves were captured and transported off the refuge. Elk compete with the Endangered Columbian white-tailed deer (*Odocoileus virginianus leucurus*) for forage and escape habitat, and because of the large number of elk on the refuge, damage to deer habitat from trampling and overuse has occurred. This is the second year elk have been removed from the refuge.

At the request of the Fish and Wildlife Service (FWS) Division of Law Enforcement in Bellevue, Washington, and the National Marine Fisheries Service (NMFS) sea turtle coordinator in Hawaii, a dead leatherback sea turtle (*Dermochelys coriacea*) that had washed ashore near Ocean Shores, Washington, was examined. No determination of the cause of death could be made. NMFS law enforcement is currently investigating this incident, which is the fourth time a dead leatherback has been known to wash up on Oregon and Washington beaches this fall.

**Region 2**—By November 19, 94 whooping cranes (*Grus americana*) had arrived at Aransas National Wildlife Refuge (NWR) in Texas, including all 16 young banded in Canada in August. This is the largest number of young to arrive at Aransas since surveys began in 1938.

The two whoopers that spent September and October east of the Rockies in Colorado migrated into New Mexico early in November.

(continued on page 13)

# The Snail Kite, an Endangered Floridian

by Robin H. Fields  
Jacksonville Endangered Species Field  
Station

—second of two parts—

The question facing agencies and organizations interested in the snail kite (*Rostrhamus sociabilis plumbeus*) is "What can be done to protect this bird, its habitat, and its food source before the situation is too late?"

## State Action

Under its own Endangered and Threatened Species Act of 1977, Florida provides for research and management of State-listed endangered species to conserve and protect them as a natural resource. Regulations issued by the Florida Game and Fresh Water Fish Commission implement this protection through prohibitions on taking, possession, transport, or sale of the kite except under permit from the Commission; however, the regulations do not provide protection for habitat.

Florida's Water Management Districts (WMDs) were created in 1972 and are under the authority of the Florida Department of Environmental Regulation (DER). The DER is primarily responsible for monitoring water quality. The main functions of the WMDs are to promote the conservation, development, and use of surface and ground water; to develop and regulate dams, impoundments, and reservoirs; to prevent damage from floods, soil erosion, and excessive drainage; to preserve natural resources (including fish and wildlife); and to promote recreational development on public lands. WMDs also issue permits for certain water uses, develop water use plans, issue emergency prohibitions during droughts, and assist the DER with water pollution control.

## The Federal Approach

On the Federal level, the snail kite and its Critical Habitat receive the protection authorized by the Endangered Species Act of 1973, as amended, which includes prohibitions on taking, sale, offer for sale, import, and export of these birds without a Fish and Wildlife Service (FWS) permit.

The Act also requires that all Federal agencies ensure that their actions are not likely to jeopardize the survival of the species or adversely modify its Critical Habitat. One such agency that has consulted with the FWS on ways to avoid adverse impact on the snail kite is the U.S. Army Corps of Engineers (COE). This agency is responsible for administering Section 404 of the Clean Water Act of 1977, which deals with the protec-

tion of wetlands by regulating the discharge of dredge or fill materials into U.S. waters.

## Refuges and Preserves

The FWS manages the 145,635-acre Loxahatchee National Wildlife Refuge, which was established in 1951 through a cooperative agreement with the then Central and Southern Florida Flood Control District. Among the primary objectives of the Loxahatchee NWR is the management and protection of the snail kite. The refuge also acts as a clearinghouse for the Snail Kite Sighting Program, through which the public reports snail kite sightings to refuge staffers.



Photo by Luther C. Goldman

*male snail kite at Loxahatchee National Wildlife Refuge*

These data are evaluated by the refuge as a means of monitoring kite populations and movements. Such information is particularly valuable for a better understanding of kite dispersal patterns during droughts.

Other snail kite habitat is protected within Everglades National Park, located in the extreme southern tip of peninsular Florida. The heart of the Everglades, designated as a national park in 1947, is actually a river 6 inches (15 centimeters) deep, 50 miles (80 kilometers) wide, and flowing seaward on a riverbed that slopes just a few inches per mile.

In addition to governmental action, the National Audubon Society, an independent conservation organization, also works to save the snail kite. As part of its habitat conservation program, Audubon leases two areas totalling about 28,000 acres on the west side of Lake Okeechobee. This Audubon wildlife sanctuary is one of the kite's principal nesting areas.

## Recovery Efforts

In 1983, the FWS released the Everglade Kite Recovery Plan. (See story in BULLETIN Vol. VIII No. 8) This plan is a management tool developed to identify and implement the various steps needed to halt the decline of the snail kite and to recover the subspecies to a secure status. It addresses the roles of each of the involved agencies and organizations. A dynamic document, it is being updated as more data become available.

Obviously, the objectives of the numerous agencies that have a role in south Florida water management are not all compatible with optimum snail kite habitat management. Needs for water for agriculture, flood prevention, drinking, wildlife habitat, and recreation must all be integrated into a system that can meet these often conflicting demands. Innovative approaches on the part of the land, water and wildlife management agencies and organizations will be required to ensure the survival and recovery of the snail kite.

An example of a cooperative effort is about to begin. The South Florida Water Management District has designed an experimental water release program. Its purpose is to provide Everglades National Park, to the south, with water on a planned schedule in an attempt to restore more natural water conditions in the park.

As part of a Section 7 consultation with the COE on the experimental water release program, the FWS has recommended that a monitoring program be initiated to determine the impacts of the water release on Endangered species in the area, including the snail kite. It is hoped that valuable data will be gathered on such topics as snail kite use in the area, including feeding, nesting, and nest site location.

## Interagency Consultations

South Florida is recovering from a 1984-85 drought during which kites dispersed from their historic areas and

(continued on page 4)

# The Gating of Hubbard's Cave—A Volunteer Effort

By Robert R. Currie  
Asheville (North Carolina) Endangered  
Species Field Station

Progress toward the recovery of the Endangered gray bat (*Myotis grisescens*) received a significant boost last summer. A section of Hubbard's Cave, once a winter home of over 250,000 gray bats, was gated to exclude unauthorized trespassers. The cave is also a winter home for at least seven other bat species, including the Endangered Indiana bat (*M. sodalis*).

Human disturbance of the hibernating bats had reduced the gray bat population in Hubbard's Cave to about 150,000 individuals. The only feasible means of eliminating human disturbance of this gray bat hibernaculum was to build a gate which excluded humans but permitted free access for the bats. Over 5 years of hard work by The Nature Conservancy (TNC), Dr. Merlin Tuttle of Bat Conservation International (BCI), and the Fish and Wildlife Service's Asheville Endangered Species Field Station was required to initiate the project. TNC purchased the 50-acre Hubbard's Cave preserve, located in east-central Tennessee, in 1982, but delays in obtaining clear title to the property prevented TNC from closing on the purchase until 1984.

The smallest place to build a gate in the entrance to the bat section of the cave was 35 feet wide by 35 feet high. To construct a full bat gate over such a large opening would require over 100 tons of steel and 5 tons of concrete, at an estimated cost of over \$100,000.

The Cave Conservation Institute (CCI), a volunteer organization in southwestern Virginia, was contacted for assistance. CCI, which has helped to protect over a dozen caves in the southeast, visited the cave and designed a gate to fit the entrance. CCI estimated  
(continued on page 5)



Photo by Joy Franklin

The base of the Hubbard's Cave gate is more than 60 feet below the main cave entrance. A CCI volunteer is shown cutting steel with an oxy-acetylene torch. At this point, the gate was 20 feet high and two weekends from completion.

## The Snail Kite

(continued from page 3)

sought refuge in the few habitats that still retained water, such as the city of West Palm Beach's Water Catchment Area. During the drought, a biologist from Loxahatchee NWR documented about 370 kites feeding in the water catchment area and roosting in a site selected by Palm Beach County for development of a resource recovery facility. These kites represented over 50 percent of the total known kite population that existed before the drought. Across from the recovery facility site, another area has been selected for a planned industrial park. Both of these

projects would affect the kite, although neither is located within the designated Critical Habitat. Since Section 404 permits from the COE would be required, both projects will be subject to future Section 7 consultations.

Drought-related habitats are becoming increasingly rare in this rapidly growing State. When these habitats are gone, the snail kite will no longer have wet areas in which to seek refuge during general drought conditions. The result could be a drastic population decline. In the meantime, the Jacksonville Endangered Species Field Office is working with Palm Beach County to investigate alternatives to lessen the impact that the planned resource recovery facility could have on this important kite area.

Another COE consultation involves the use of a registered herbicide, Velpar, at Lake Okeechobee within an area that is designated as Critical Habitat for the snail kite. COE proposes to apply the herbicide as a means of controlling the Australian punk tree (*Melaleuca quinquerivaria*), an exotic species that is rapidly altering native habitats. The FWS is concerned that there are no data on the toxicity of Velpar to invertebrates, particularly the kite's primary prey, the apple snail (*Pomacea paludosa*). Section 7 consultations between the FWS and the COE are proceeding, and both agencies are working together to develop appropriate precautions and to investigate the possibility of collecting toxicity information.

## Hubbard's Cave

(continued from page 1)

that the gate could be constructed, using volunteer labor, for about \$15,000. Obstacles to be overcome included improving the road to the cave so that the steel, concrete, and heavy equipment needed for the project could get to the site, lining up volunteers to actually do the work, renting or buying equipment, and raising the money needed to do the work.

General Carl Wallace, the Adjutant General of the Tennessee Army National Guard, offered to improve the road and transport all construction materials to the site. This was accomplished during two weekends as a National Guard training exercise. A burglar alarm system with a direct line to the local sheriff was also installed by the National Guard to protect the equipment.

The Richmond Area Speleological Society, a non-profit group interested in the exploration and protection of caves, donated \$11,000 to TNC for the project. Mid-State Steel of Tennessee provided the steel for the gate at cost. Several member organizations of the National Speleological Society, including the Nashville Grotto, the Flittermouse Grotto of North Carolina, and the Birmingham Grotto, committed themselves to volunteer labor. Most of CCI's active

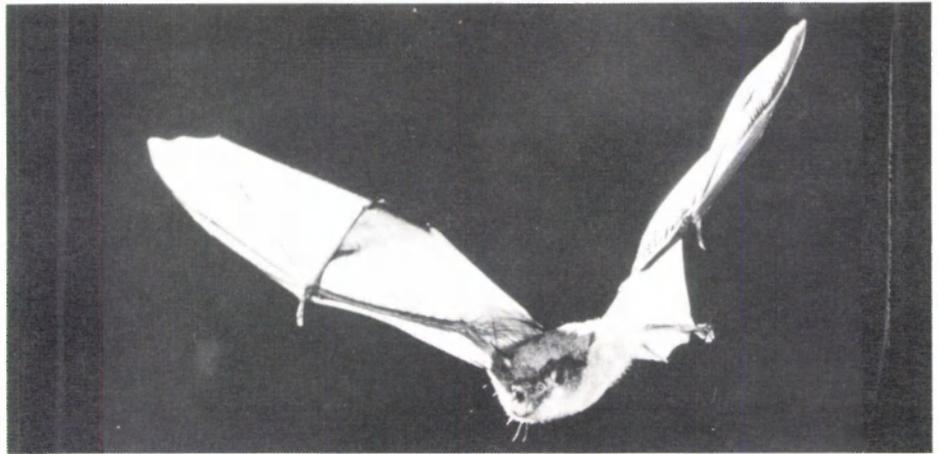


Photo by Merlin D. Tuttle, courtesy of Bat Conservation International

gray bat (*Myotis grisescens*)

members worked on the project from beginning to end, and several of TNC's members also helped.

The actual work on the gate began in July. Volunteers spent six 2½-to 3-day weekends pouring concrete, and cutting, carrying, and welding the steel. Four to five welding machines were kept running almost continuously. TNC reimbursed volunteers for their travel expenses, provided food, and arranged for sleeping and cooking facilities at a nearby summer camp. The Asheville Endangered Species Field Station, TNC, and the volunteers feel the protection of Hubbard's Cave was well worth the massive effort.

The gated section of Hubbard's Cave will be open for exploration from mid-May through mid-August, when the bats are not present, and the section most popular with cavers will remain open year-round. For information on visiting Hubbard's Cave, contact the Tennessee Nature Conservancy, P.O. Box 3017, Nashville, Tennessee 37219.

Poorly designed gates can be very harmful to bats. For information on the proper use of gates to protect bats, contact Robert Currie at the Asheville Field Office (100 Otis Street, Room 224, Asheville, North Carolina 28801).

## Proposed Species

(continued from page 1)

Comments on the proposal to list the flattened musk turtle as a Threatened species are welcome, and should be sent to the Endangered Species Field Station, U.S. Fish and Wildlife Service, Jackson Mall Office Center, Suite 316, 300 Woodrow Wilson Avenue, Jackson, Mississippi 39213, by December 31, 1985.

### Large-flowered Skullcap (*Scutellaria montana*)

A rare member of the mint family, *S. montana* is known from only 10 locations in the mountains of southeastern Tennessee and adjacent areas in Georgia. Fewer than 7,000 individuals exist, and over 90 percent of them are concentrated at two sites. Threats to the species and its habitat include logging, urbanization, and a quarrying operation. Due to its vulnerability to extinction, the FWS has proposed listing the large-flowered skullcap as Endangered (FR 11/13/85).

*S. montana* is a herbaceous plant with stems growing 12 to 22 inches (30 to 55 centimeters) high and opposite leaves 2 to 3 inches (5 to 8 centimeters) long. Its attractive blue and white flowers appear in May and early June, and the fruit, a

light brown nutlet, matures in late June to early July. The species occurs on moist rocky slopes under a canopy of mature hardwoods (primarily oaks and hickories). All known sites show little or no evidence of disturbance from logging or livestock grazing. Core samples taken from surrounding trees show ages ranging from 70 to over 200 years old, depending on the site.

Currently, of the ten known populations of *S. montana*, seven are in Georgia and three are in Tennessee. The largest Georgia population, occurring in Floyd County, contains approximately 1,300 plants, and most of the site is owned and protected by The Nature Conservancy. All six of the other Georgia populations of *S. montana* are much smaller, and are located on privately owned land. The species' largest known population, consisting of about 5,000 plants, is in Marion County, Tennessee. Approximately half of these plants are on land owned and managed by the Division of Forestry, Tennessee Department of Conservation; the others are on private property that has been subdivided for residential development and is currently being offered for sale. Both of Tennessee's other *S. montana* populations are on unprotected land and contain only a few plants.

The overwhelming concentration of most *S. montana* individuals at two sites increases the species' vulnerability to extinction. Historically, it probably was more widespread, but the mature hardwood stands that *S. montana* requires have become quite limited. The factors that led to the species' decline threaten the few remaining plants with extinction. Because the plants are attractive and vulnerable to collecting, the FWS decided not to pinpoint the populations with a proposed designation of Critical Habitat; however, habitat conservation measures of the Endangered Species Act will apply if the species is listed.

Comments on the proposal to list *S. montana* as an Endangered species are welcome from all interested agencies, organizations, and individuals, and should be sent to the Field Supervisor, Endangered Species Field Station, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801, by January 13, 1986.

### Waccamaw Silverside (*Menidia extensa*)

This fish derives its common name, the Waccamaw silverside, from the silvery stripe along each side and from  
(continued on page 12)

# APPROVED RECOVERY PLANS

This issue of the BULLETIN summarizes some of the recovery plans for listed species that have been approved during 1985. Copies of the plans can be purchased approximately 6 months after their approval from the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852; telephone 800/582-3421 (toll free).

## Brady Pincushion Cactus (*Pediocactus bradyi*)

The Brady pincushion cactus is a rare species known only from a few sites within Coconino County in northern Arizona. Since its discovery in 1958, this cactus has declined markedly due to collecting and habitat alteration. It was listed in 1979 as Endangered, and the *Brady Pincushion Cactus Recovery Plan* was approved on March 28, 1985.

*P. bradyi* grows on gravelly limestone benches and terraces in the Navajoan Desert near the Marble Canyon of the Colorado River. Its potential habitat is estimated to total 17,000 acres (70 square kilometers), but the species has been found on only 10 to 20 percent of the portion that has been searched. Populations are scattered throughout private property, Bureau of Land Management (BLM)-administered land, National Park Service lands, and the Navajo Indian Reservation.

One of the most serious threats to the survival of the Brady pincushion cactus is collecting. This cactus is in high worldwide demand by certain collectors because of its rarity, and its removal from native habitat by individual hobbyists and by commercial suppliers has been noted. As it is one of the most difficult cacti to grow on its own roots in cultivation, there is a continuing demand for replacement stock. Seed collection also can be harmful because *P. bradyi* is fairly short-lived and produces an annual average of only 25 seeds per plant.

Some habitat within the species' historical range has been destroyed, and there is danger of further degradation. An immediate source is off-road vehicle (ORV) use. Four-wheel drive vehicles in particular are causing damage to the populations west of Marble Canyon. Uranium exploration and mining on the Arizona Strip (the part of Arizona north of the Colorado River) represent further potential threats to Brady pincushion cactus habitat. There are a number of claims filed for areas near *P. bradyi* populations, and the BLM has received plans for exploration on apparently suitable habitat adjacent to a known colony.

Livestock grazing in areas likely occupied by the Brady pincushion, including four BLM allotments, could be affecting the species by trampling the plants and

disturbing their habitat. Grazing on all of the allotments occurs primarily during the wet season, between November and May. This is also the period during which *P. bradyi* is emergent and most vulnerable to the effects of trampling; at other times, most of the stem retracts into the soil.

## Recovery Actions

The *Brady Pincushion Cactus Recovery Plan* seeks to ensure the species' survival by reducing the drain on wild populations from collectors and by carefully managing the habitat. When 75 percent of its known habitat receives permanent protection, a reclassification from Endangered to Threatened can be considered; the criteria for recovery and a subsequent delisting, however, cannot be established until there is a complete census of the cactus within its known range.

One of the recovery plan's highest priorities is simply a greater enforcement of existing conservation laws. Federal land managing agencies also can fully use their regulatory authorities for conserving the habitat. For example, the recovery plan recommends that the BLM, which regulates mining on public land, review the files of mining claimants and inform them about the presence of any listed species.

Specific management actions can be taken to conserve known Brady pincushion cactus sites. Signs informing people that cacti are protected by Federal and State laws could deter some potential collectors. Relocating a roadside gravel dump that destroyed some former *P. bradyi* habitat would eliminate use of the site as a parking area for collectors and could make it possible to rehabilitate the habitat. The recovery plan also suggests that the National Park Service act to control ORV damage to *P. bradyi* habitat near Lees Ferry by erecting signs and by the "judicious placement of boulders."

A high priority recommendation of the recovery plan is development of a Habitat Management Plan (HMP) for Brady pincushion cactus habitat on BLM-administered lands. An HMP, the primary management tool BLM uses to conserve listed species, has been drafted and addresses the impacts of such activities as grazing, mining, and ORV use. If a complete ORV closure is found to be necessary, a formal designation should be pursued. The impacts of livestock, particularly in the vicinity of feeding and watering sites, also need to be monitored regularly. Already, plans for three proposed "range improvement" projects (fences, water catchments and troughs) have been drawn in a way to avoid *P. bradyi* habitat. The

BLM also has established new procedures to improve its monitoring of three of the cactus populations. FWS biologists will work cooperatively with the BLM on developing management plans.

A better knowledge of *P. bradyi* ecology is necessary for land managers to make the wisest possible decisions regarding the species' habitat. The data will also be important for evaluating any plans to artificially propagate *P. bradyi* for reestablishing populations and/or for developing a legal trade in the species. (The FWS is considering the possibility of encouraging trade in cultivated specimens of listed cacti as a means of reducing the demand for cacti illegally collected from the wild.)



*The Brady pincushion cactus (Pediocactus bradyi) is a small, semiglobose plant that bears straw-yellow flowers. During the dry season, most of the stem retracts into the soil.*

Drawing by Susan Edwards, courtesy of the Natural Resources Defense Council

# Recovery Plans

(continued from page 6)

## Knowlton Cactus (*Pediocactus knowltonii*)

*P. knowltonii*, the smallest member of its genus, may also be the most vulnerable. The only known viable population is restricted to a single hill of gravelly alluvial deposits south of La Boca, Colorado, in San Juan County, northern New Mexico. A second population, consisting of two individual plants, is located in Reese Canyon (also San Juan County), but it shows no sign of reproduction and may be the last survivors of a 1960 transplant attempt.

In 1960, the *P. knowltonii* population was estimated at more than 100,000 plants. That same year, however, some members of the New Mexico Cactus and Succulent Society set out to "rescue" the Knowlton cactus from flooding due to the construction of the Navajo Dam. They collected all the plants they could from the La Boca population, and some might have been transplanted at Reese Canyon. The removal ultimately turned out to be unnecessary because the floodwaters of Navajo Lake never affected the species' habitat.

*P. knowltonii* numbers continued to decline until, by 1979, there were probably fewer than 1,000 remaining and the species was listed as Endangered. At that time, many collectors believed the cactus to be extinct in its natural habitat. Since 1980, seeds left in the soil have germinated, and the *P. knowltonii* population has increased to approximately 7,000 plants. But the species is still very vulnerable to collecting. Many hobbyists and cactus dealers know the exact location of the La Boca population, which is concentrated on 12 acres (5 hectares), with the highest densities within only 2.5 acres (less than one ha). Almost all of the remaining plants are young, which suggests that collectors are still selectively removing older specimens. With the number of seed-bearing cacti decreasing, fewer seedlings are becoming available to replace them.

In an effort to protect the La Boca population of *P. knowltonii*, the Public Service Company of New Mexico donated the surface rights to 25 acres (10 ha) of land surrounding the population center to The Nature Conservancy (TNC). Six energy firms hold the mineral rights, however, and the site is in an area of proven oil and gas deposits. TNC hopes to obtain the cooperation of these firms so that any future energy exploration and/or production can be planned to avoid the cacti.

BLM administers the Reese Canyon site, where eight Knowlton cacti

## Legal Protection for Listed Cacti

A number of Federal and State laws have been passed to help conserve rare cacti. The Federal Endangered Species Act (ESA) was amended in 1982 to prohibit the removal of listed plants from lands under Federal jurisdiction without a permit. Arizona's Native Plant Law restricts the collection of Brady pincushion cacti without a permit for educational or scientific purposes, and prohibits collecting on private lands without the landowner's permission. A recently passed New Mexico law, which recognizes the Kuenzler hedgehog and Knowlton cacti as being endangered, also prohibits collecting of these species on public lands or on private lands without landowner permission. Collecting on the Navajo Indian Reservation also is prohibited.

Because prohibitions against take are usually difficult to enforce, controls on commercial trade in protected species are necessary. The ESA prohibits interstate and international trafficking in Endangered and Threatened species without a permit. Seeds and cuttings of Endangered plants are included under the ban, but seeds of commercially propagated Threatened plants are exempted. Nursery owners must obtain permits from the Federal Wildlife Permit Office (FWPO) in order to sell propagated stocks of listed species. Another Federal law, the Lacey Act, gives Federal support to State con-

servation regulations. Since 1981, it has prohibited interstate trade or export of native wild plants collected or possessed in violation of the State (or, in the case of Indian lands, the reservation) of origin.

International trade in rare cacti is further controlled by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Both *Pediocactus bradyi* and *P. knowltonii* are on Appendix I of CITES, which means that their export from the U.S. could occur only if 1) the importing country issues an import permit and 2) the Fish and Wildlife Service (FWS) finds that export will not be detrimental to the species and the FWPO issues an export permit. *Echinocereus fendleri* var. *kuenzleri* is on CITES Appendix II, which requires that the FWPO issue a permit before export. CITES regulations for artificially propagated cacti are more flexible; for further information, contact the Federal Wildlife Permit Office, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

Habitat conservation, another critical issue for rare cacti, is addressed in Section 7 of the ESA. Federal agencies are required to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize listed species. If an agency determines that one of its actions may affect such a species, it must consult with the FWS on ways to avoid jeopardy.

occurred in 1981. Several years ago, a road widening project resulted in the unintentional destruction of six of the plants; the other two continue to survive but show no sign of reproduction.

### Recovery Actions

*The Knowlton Cactus Recovery Plan*, approved on March 29, 1985, calls for restoring the primary (La Boca) population to approximately 100,000 cacti, a level near the estimated carrying capacity of its habitat, and for ensuring long-term protection of the site. More data are needed, however, before specific, quantitative recovery goals can be established.

This recovery plan, like all others for listed cacti, recommends that applicable State and Federal conservation laws be enforced as effectively as possible, particularly those addressing trade. Under Section 7 of the ESA, BLM has the responsibility to conserve habitat at the Reese Canyon site. A fence has been built around the site to protect the species and its habitat. The agency recently concluded a 2-year survey for *P. knowltonii* on lands it manages elsewhere in

the vicinity, and no other populations were discovered.

TNC, which owns the site of the only known viable population, has erected a strong barbed-wire fence to keep out cattle, and it will need periodic maintenance. Without a fence, cattle grazing on adjacent lands could enter the TNC property and trample the plants; the fence also might deter some collectors.

The loss of three-fourths of the Reese Canyon *P. knowltonii* population during a road widening project was a costly reminder that special care should be taken in the maintenance or construction of roads in the area. Any further roads planned for the Los Pinos River Valley or Reese Canyon area should include site surveys for Knowlton cacti. Surveys will also be needed prior to oil or gas development on potential *P. knowltonii* habitat in the area. If the species is found at a potential drill site, slant drilling should be considered.

Because the Knowlton cactus essentially exists at only one known site, the recovery plan highly recommends establishing other populations of the

(continued on page 8)

# Recovery Plans

(continued from page 7)

species in potential habitat within its historical range. Just such an effort began when cuttings were taken from some of the La Boca plants last spring and kept in a greenhouse until ready to transplant. In early September, 104 Knowlton cacti were introduced at a site in northwestern New Mexico. They will be monitored carefully to make certain if this is a valid recovery technique.

The project was a cooperative venture among the FWS, BLM, Bureau of Reclamation, State of New Mexico, and TNC.

## Kuenzler Hedgehog Cactus (*Echinocereus fendleri* var. *kuenzleri*)

An even rarer cactus is the Kuenzler hedgehog, which, until recently, was known in the wild from only two localities. A third locality approximately 40 miles to the north of the others was discovered recently. Collecting is critically endangering the survival of this variety, and there are several potential threats to its habitat. In an effort to prevent its extinction, the Kuenzler hedgehog was listed by the FWS in 1979 as Endangered.

The three population centers are in the Rio Hondo and Rio Penasco drainages of Lincoln, Otero, and Chaves Counties, New Mexico. Most of the occupied habitat for the Kuenzler hedgehog is on private property, although small amounts lie within Lincoln National Forest and lands administered by the BLM and the State of New Mexico. A few scattered plants may occur on the Mescalero Apache Indian Reservation.

Some of the Kuenzler hedgehog sites are visited periodically by cactus hobbyists and commercial dealers. The large magenta flowers are easily seen from as far away as 100 yards. U.S. Forest Service personnel observed two sites from which all of the Kuenzler hedgehog cacti were removed, and once the dormant seeds remaining in the soil germinated and the plants grew to flowering size, they also were taken. Both sites were on private or State lands, and therefore not afforded legal protection from collection or habitat destruction at that time. However, the New Mexico Endangered Plant Law, which took effect November 1, 1985, recognizes the Kuenzler hedgehog cactus as endangered. It prohibits collection of the cactus on public lands or on private lands without a permit. Any that occur on lands under Federal jurisdiction, however, receive protection from take and habitat degradation.

No known significant amount of suitable habitat has been destroyed by human activities; however, road con-



by Vic Stern

A Kuenzler hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*)

struction and maintenance, real estate development, and cattle grazing are potential future threats. Exclosure studies are being conducted to determine the extent of livestock-related impacts on seedling establishment and the survival of adult plants.

### Recovery Actions

The preliminary goal of the *Kuenzler Hedgehog Cactus Recovery Plan* (approved March 28, 1985) is to foster and maintain 5,000 individual plants, consisting of one or more wild, self-sustaining populations, for a period of 5 consecutive years. Once this has been accomplished, a reclassification of the cactus from Endangered to Threatened can be considered. Criteria to determine when the cactus is recovered have not yet been delineated.

Active enforcement of all endangered species conservation laws and regulations is particularly critical to the success of this recovery effort. As an Endangered plant, the Kuenzler hedgehog receives full ESA protection. Specific enforcement tasks should be identified and coordinated with the staff of the FWS Division of Law Enforcement.

Another high priority of the recovery plan is for the FWS to work with the Forest Service and BLM in developing management plans for the small portion of Kuenzler hedgehog cactus habitat on federally-administered lands. These plans, which will address potential impacts from ORVs, grazing, and mining, will assist both agencies in fulfilling their habitat conservation responsibilities under Section 7 of the ESA. Similar coordination with New Mexico officials regarding habitat on State lands is advocated.

Because most of the habitat is on private property, recovery will depend on the cooperation of the landowners. Once a good working relationship has

been established, agreements to protect the cactus and its habitat should be pursued.

Continued monitoring of the known populations, surveys to discover any other, evaluation of potential reintroduction sites, and research into improved propagation techniques are among the other subjects discussed in the recovery plan.

## New Mexico Ridge-nosed Rattlesnake (*Crotalus willardi obscurus*)

Ridge-nosed rattlesnakes (*Crotalus willardi*) are widely scattered in isolated populations throughout the southwestern United States and northwestern Mexico. These snakes, which are primarily diurnal, live in cool mountaintops at elevations between 6600-7100 feet. Often called "sky islands," these remote patches of pine-oak woodland habitat have supported ridge-nosed rattler populations for many thousands of years, resulting in the divergence of the separate populations into several distinct subspecies.

The New Mexico ridge-nosed rattlesnake (*C. w. obscurus*) was first collected from the Animas Mountains of southwestern New Mexico in 1957. Populations also occur in the adjacent Sierra San Luis de Chihuahua and, possibly, Sonora, Mexico. For several years, the Animas Mountains population was thought to belong to another subspecies, the west Chihuahua ridge-nosed rattlesnake (*C. w. silus*), but eventually the distinctiveness of *C. w. obscurus* was recognized.

The New Mexico ridge-nosed rattlesnake, the last subspecies to be discovered, is probably the most distinctive of the five recognized subspecies of ridge-nosed rattlesnakes. *C. w. obscurus* is grayish brown rather than the rich brown color of the other subspecies, and it lacks the white marks on its head that the other's possess. It is small, reaching less than 2 feet in total length, and feeds on a broad variety of prey, including small mammals, birds, lizards, other snakes, and arthropods. Because of its secretive nature, an accurate estimate of its numbers is not available.

This subspecies presents no real threat to humans in its extremely limited and restricted range. Though poisonous, it rarely strikes out in defense and its bite is relatively mild compared to that of most other rattlers. No fatality has ever been recorded as a result of a bite from a New Mexico ridge-nosed rattlesnake.

The greatest threat to *C. w. obscurus* is overcollection for the pet and zoo trades. Following publication of the first record of the New Mexico ridge-nosed

(continued on page 9)

# Recovery Plans

(continued from page 1)

rattlesnake in 1957, collectors from all parts of the country went to the Animas Mountains to obtain specimens. The snake's beauty, uniqueness, and rarity enticed many zoos and private collectors to pay very high prices for a single individual. Unscrupulous collectors often used highly destructive capture methods that destroyed habitat, further reducing the snake's range. Even more devastating is the method used by some collectors of pouring gasoline over the snakes' cover to force them out, often killing some in the process.

Collecting continued relatively unabated until April 19, 1974, when an agreement restricting entry to the Animas and protecting the snake's habitat was signed by the Fish and Wildlife Service (FWS) and the property owner. In January 1975, the subspecies' population in New Mexico was given protection by the State as an endangered species. On August 4, 1978, the FWS listed *C. w. obscurus* as Threatened and designated its Critical Habitat as the western part of the Animas Mountains.

Habitat alteration through other means also threatens this ridge-nosed rattler. Fire and excessive cattle grazing could affect the populations in the Animas Mountains because of the limited habitat and restricted distribution of the subspecies. Mining, development, and wood harvesting in its range might also threaten its survival. Mining is of particular concern because mineral rights in the area have been retained by Tenneco, the previous owner of the property,

which has continued to explore for minerals in the area. Other threats to the New Mexico ridge-nosed rattlesnake include predation, starvation, and disease. The present disjunct distribution of the various populations would make recolonization of *C. w. obscurus* after a major die-off virtually impossible.

## Recovery Actions

The *New Mexico Ridge-nosed Rattlesnake Recovery Plan*, approved by the FWS on March 22, 1985, outlines steps that should be taken in order to improve the status of this snake to the point where its survival is secure. The plan is tailored specifically for recovery of the New Mexico population, but most of the proposed recovery actions also are applicable to populations in the Sierra San Luis. The objectives of the plan are to confirm the major threats to the survival of all *C. w. obscurus* populations and to propose actions designed to ensure that this snake remains a part of our natural heritage.

Since populations of ridge-nosed rattlesnakes in the Animas Mountains are protected by both the State of New Mexico and the Federal government, current laws must continue to be enforced to ensure that illegal collecting, harassing or killing of the snakes, and destruction of their habitat does not occur. Every effort should also be made to obtain written agreements with private, State, Federal, and international authorities to provide enforceable protection measures to guarantee that essential habitat of *C. w. obscurus* is preserved.

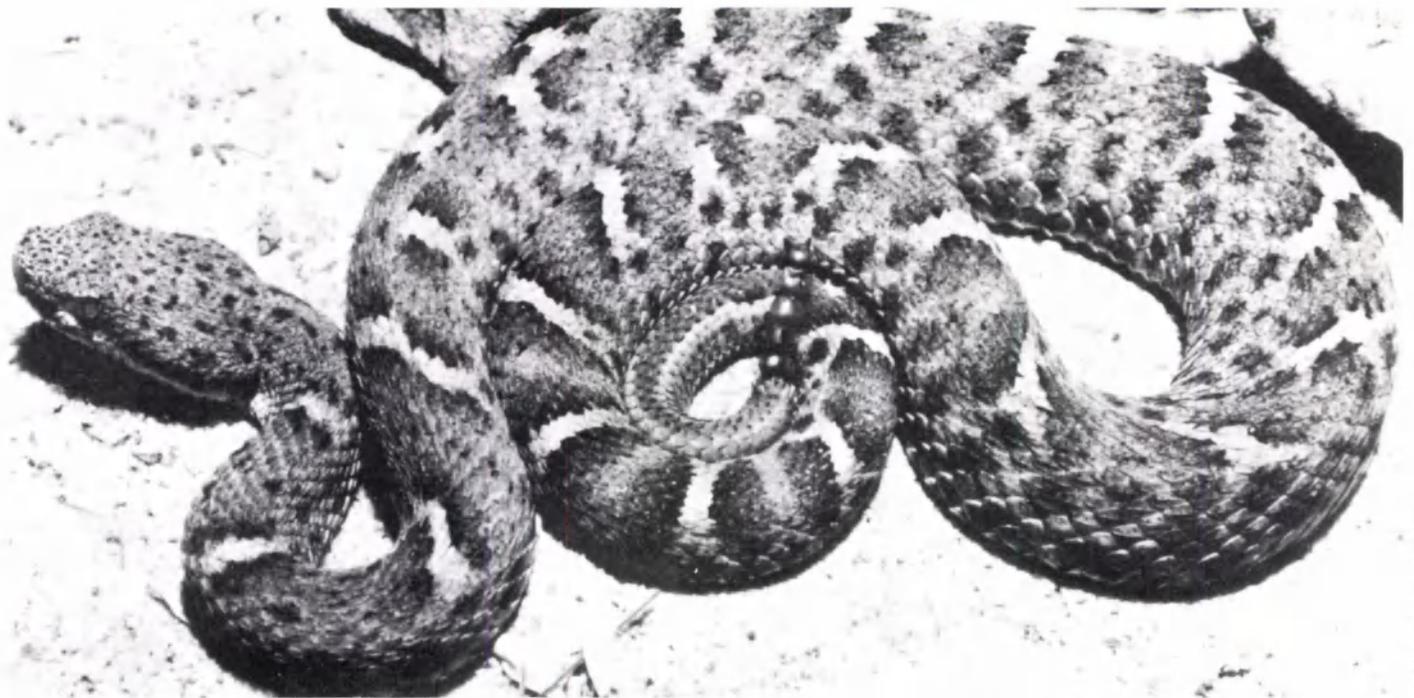
Much still remains to be learned about all ridge-nosed rattlesnakes, especially

the New Mexico subspecies. All that really is known about *C. w. obscurus* is that it is confined to a very small area, geographically isolated from other populations, and apparently very scarce. Consequently, further study is essential to better understand the needs of this obscure animal. The recovery plan calls for the establishment of a program designed to monitor populations of the New Mexico ridge-nosed rattlesnake on a regular basis in order to gather necessary data on distribution, movements, numbers, and population structure. Studies should also be conducted to determine appropriate habitat management practices.

In addition to population and habitat studies, data should be obtained on various aspects of the snake's behavior, including activity and reproductive patterns, prey relationships, and mortality factors. Once all the data are gathered, plans to reduce or eliminate threats to *C. w. obscurus* can be developed and implemented.

There are currently no unoccupied areas where the snake historically occurred that would be suitable for reintroduction to broaden its limited range. Nonetheless, the recovery plan proposes that establishing two or three "zoo" populations, one from Sierra San Luis stock and two from the Animas Mountains, would be advantageous to the rattler's recovery. Not only could more be learned about the basic biology of the species by studying the individuals, but surplus snakes could be released into both the Animas and Sierra San Luis to augment existing populations, should the need arise.

(continued on page 10)



The New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*) is probably the most distinctive of the five recognized subspecies of ridge-nosed rattlesnakes.

Photo by Robert Simmons

# Recovery Plans

(continued from page 5)

## Texas Poppy-mallow

Described by the Garden Club of America as among Texas' most beautiful wildflowers, the Texas poppy-mallow (*Callirhoe scabriuscula*) also is one of the State's rarest. The few small populations apparently are restricted to an unusual habitat type, pockets of deep, sandy soil blown from alluvial deposits, found along the Colorado River in Runnels County, Texas. Over recent years, many of the plants have been lost due to habitat destruction. Sand mining is the most immediate threat, although grazing, other forms of habitat damage, and collecting also are problems. *C. scabriuscula* is increasingly in danger, and could become extinct in the wild within the next decade unless immediate action is taken.

The *Texas Poppy-mallow Recovery Plan*, written by Dr. Bonnie Amos of Baylor University, was approved by the Fish and Wildlife Service (FWS) on March 29, 1985. It outlines management steps to conserve the remaining plants and their habitat, although limits in current data make it impossible to quantify the future conditions that will be needed to declare the species as recovered. Once more information is gathered, the plan will be reevaluated to determine if specific recovery goals can be calculated.

The highest priority of the plan is to secure the existing *C. scabriuscula* populations and their habitats. All currently known individuals occur on private lands; therefore, landowner cooperation is essential for the survival, not to mention recovery, of the species. The FWS hopes that property owners, after being notified of the plant's presence and rare status, will take an active interest in its conservation. Sand mining could be shifted to other areas, while fencing could control the harmful effects of collectors and cattle (which sometimes trample the plants and disturb the soil). Area landowners should be made aware of the potential damage to the species from herbicides and insecticides, which can eliminate both the plant



Photo by Bonnie Amos

*The cup-shaped flowers of the Texas poppy-mallow are wine-purple with a dark maroon center, making this Endangered plant one of the state's most attractive wildflowers.*

and its pollinators. The plan also calls for

There are other windblown sand deposits in the region similar to those occupied by *C. scabriuscula*, and they should be searched thoroughly to learn whether or not any unknown populations exist. If no other plants are discovered, the alternative of reestablishing the species in unoccupied parts of its historical range will take on greater importance. Additional populations would provide the species with some insurance in the event that the currently known plants suffer catastrophic destruction.

annual monitoring of existing populations to document any further declines in numbers and/or range.

Some plants were seen on a State road right-of-way in 1978, but have not been observed there since that time. It is possible that, with the cooperation of the Texas Highway Department, *C. scabriuscula* could reestablish itself in this area. Road-

side mowing would have a serious impact on the plant, and should be conducted after the flowering and fruiting season. Some populations of the species also occur on or near a railroad right-of-way, where herbicide spraying takes place.

In order to make management plans as effective as possible, it may be necessary to learn more about the ecology and life history of *S. scabriuscula*. Studies on seed viability, germination, seedling establishment, and plant demographic trends could provide information vital to reestablishing the species. An analysis of environmental factors (such as soil and moisture conditions) could aid in habitat management and in selecting potential reestablishment sites. The recovery plan also calls for further investigations into the species' apparent dependence on a few pollinators to determine if it is a limiting factor, particularly in view of pesticide use in the area.

## The U.S. Plant Rescue Center Program

by Jeffrey P. Jorgenson  
Federal Wildlife Permit Office

An illegal shipment of orchids was seized recently by plant inspectors of the Animal and Plant Health Inspection Service (APHIS, Department of Agriculture). The importer subsequently forfeited the plants and, in accordance with a cooperative program established by the Departments of Agriculture (USDA)

and the Interior, the plants were assigned to a "plant rescue center."

In this case, the orchids were sent to the Wheeler Orchid Collection and Species Bank in Muncie, Indiana. Affiliated with Ball State University, this facility is one of 31 designated Plant Rescue Centers nationwide that have agreed to care for rare plants that have been seized and otherwise would be destroyed. After 30 days, the confiscated orchids became a part of the Wheeler Orchid Collection.

According to Mr. Russell Vernon, the curator, they will be used for scientific research, display, environmental education, and propagation.

Founded in 1972, the Wheeler Orchid Collection and Species Bank long has been involved in the conservation and propagation of orchids. The collection consists of more than 7,000 specimens representing more than 3,000 species from throughout the world. Since 1979,

(continued on page 11)

# Rescue Center

(continued from page 10)

the U.S. Fish and Wildlife Service (FWS) has assigned more than 1,000 plants from 15 countries to Wheeler. These specimens are readily accessible to interested persons and organizations. In addition, pollen, seeds, and plant divisions are exchanged with other institutions and growers to enhance the availability of rare species and reduce the need for wild collecting. These exchanges also help to secure the future for species that may become extirpated due to habitat loss. According to Vernon, native habitat in an area 7 times the

area of Rhode Island vanishes every 3 months within the tropical regions of the world.

## CITES Trade Controls

The orchid shipment mentioned above was seized because it lacked an export permit. All orchids, as well as cacti and many other vulnerable taxa, are listed on Appendix I or II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and their international trade is strictly regulated under a permit system.

In 1983, the countries party to CITES agreed to eliminate the "personal bag-

gage" exemption for living specimens. This means that export permits will have to be obtained for all shipments of live CITES-listed plants and animals, while most plant parts, products, and derivatives will still be eligible for the exemption.

The FWS established the Plant Rescue Center Program in 1978 in response to the need to care for plants legally abandoned (voluntary action by importer) or forfeited (specimens taken from importer after completion of judicial procedures) to the U.S. Government due to noncompliance with CITES import/export requirements. Initially, the Federal Wildlife Permit Office, acting as the U.S. CITES Management Authority, assigned these shipments to the National Botanical Garden in Washington, D. C., and affiliated agencies. Their capacity to care for abandoned or forfeited plants was soon reached, however, and the Permit Office had to enlist additional centers. Today, 31 public institutions and one government research laboratory cooperate as Plant Rescue Centers.

## Facility Requirements

There are several basic conditions that a prospective Plant Rescue Center must meet or accept, assuming that it has the facilities and expertise to keep the plants healthy. The center must be a public, nonprofit entity and be, or be associated with, a public botanical garden, zoological park, or research institution. Specimens may only be displayed, propagated, or used for other purposes consistent with CITES. The assigned specimens remain property of the U.S. Government, and the rescue center may not trade, sell, or otherwise dispose of these specimens; propagules of these specimens, however, may be traded commercially. Upon acceptance as a Plant Rescue Center, the institution becomes eligible to receive shipments of abandoned and forfeited plants.

## Assignment of Seized Plants

Several factors are taken into account in assigning abandoned or forfeited plants, including the port at which the specimens were seized, the distance to an appropriate Plant Rescue Center, the expertise of nearby centers, and climatic conditions where the plants will be kept. Plants held in Hawaii or Puerto Rico usually are assigned to local Plant Rescue Centers rather than sent to the mainland. The Permit Office does not assign shipments to northern sections of the U.S. during winter in order to avoid freezing the plants during transit. It also considers the expertise and limitations of the center; several have indicated an interest in receiving only

(continued on page 12)



Stanhopea wardii



The Wheeler facility contains a large Paphiopedilum collection.

Photo courtesy of Wheeler Orchid Collection

Photo courtesy of Wheeler Orchid Collection

## Rescue Center

(continued from page 11)

certain taxa or shipments containing only small quantities of plants.

### Assignment Procedure

The general assignment procedure, typically conducted through telephone contacts, is as follows:

A shipment is inspected by USDA Plant Inspectors and, if found not to be in compliance with CITES, usually is detained. At this point, most importers voluntarily abandon the plants, which are then assigned to a rescue center. In rare cases, such as those of returning travelers or business people new to the plant trade, the importer is given the choice of abandoning the specimens, obtaining proper export documentation from the country of export/reexport, or returning the plants to the country of export at personal expense. (Most eventually are abandoned.) Any that have not been returned or abandoned within 20 days automatically are forfeited to the U.S. Government if no proper documentation has been obtained.

Upon abandonment, the USDA contacts the Permit Office, which selects an

appropriate Plant Rescue Center, confirms its interest and ability to receive the shipment, and advises the USDA, which then packages the specimens for air or surface shipment and sends them, at U.S. Government expense, to the center. It takes only about 30 minutes from the time the USDA notifies the Permit Office until the Permit Office notifies the USDA concerning which Plant Rescue Center will receive the plants.

The Permit Office prepares a written notification to the Plant Rescue Center and the USDA confirming the shipment, as well as to the officials in the country of export/reexport asking if they are interested in return of the shipment. After 30 days, if the foreign official does not want the plants back or has not responded, the shipment becomes part of the rescue center collection. However, several countries have requested that plants be returned, and they usually have been shipped back via a national airline at no cost to the foreign government.

### Plant Rescue Center Activities in 1984

During 1984, the Permit Office assigned 99 intercepted shipments to 23

Plant Rescue Centers. These shipments contained 1,665 plants, 100 kilograms of *Abies guatemalensis* seed, 50 grams of *Encephalartos* sp. (Zamiaceae) seed, and 2 tree fern trunks. They had originated in 32 countries (not including one shipment of unknown origin). In addition, 13 shipments (containing 22,145 plants, including 21 cacti, 3 cycads, 21 orchids, and 22,000 Zamiaceae) were returned to two countries of export.

The Plant Rescue Center Program enables the United States to meet its conservation obligations under CITES, while avoiding the problems that might occur if USDA Plant Inspectors had to resolve each abandonment case individually. More importantly, it provides care and protection for highly desirable but vulnerable plant resources. For additional details on the program, contact the Federal Wildlife Permit Office, 1000 N. Glebe Road, Room 611, Arlington, Virginia 22201 (telephone 703/235-2418).

## Proposed Species

(continued from page 5)

its only known range, Lake Waccamaw and its immediate outflow in Columbus County, North Carolina. Sometimes also referred to as the skipjack or glass minnow, the species has a slim and almost transparent body. Adults usually reach only about 2.5 inches (6.5 cm) in length.

Silversides become sexually mature at one year of age and they spawn from April to June. Most die shortly after spawning, although a few may survive a second winter. With such a brief life cycle, the Waccamaw silverside could become extinct if its ecosystem ever deteriorates to the point that reproduction fails for even a single season. The vulnerability of this fish and its habitat prompted the FWS to propose listing it as a Threatened species (F.R. 11/7/85).

Lake Waccamaw, where the species is locally abundant, is unique in a number of ways. Although it is fed by acidic swamp streams, the lake has a virtually neutral pH. Dr. Charles Yarborough of Wingate College (North Carolina), who has been studying Lake Waccamaw, describes it as "an island of neutrality in an acid sea." This condition, rare among North Carolina's coastal plain lakes, probably results from the buffering effects of an exposed limestone formation. The waters support an unusually diverse fish and mollusk fauna. Already

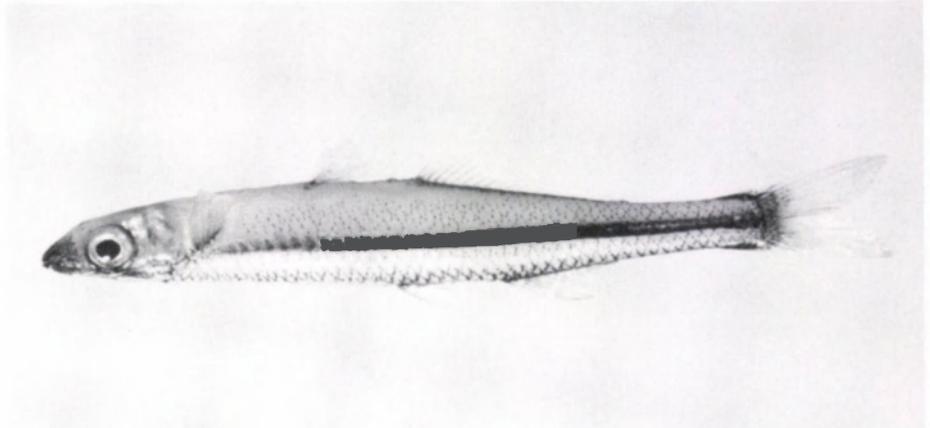
a registered North Carolina Natural Heritage Area, Lake Waccamaw also has been proposed as a National Natural Landmark. The lake is owned by the State and administered by the North Carolina Division of Parks.

The Waccamaw silverside's restricted range increases its vulnerability to habitat degradation. It has not been collected outside the lake, with the exception of the immediate outflow during periods of very high water. Lake Waccamaw is large, occupying approximately 8,934 acres (3,618 hectares), but has an average depth of only 7.5 feet (2.3 meters). Historically, good water quality has been one of the most important factors in the survival of the silverside. Unfortunately, recent studies indicate that the lake may be experiencing

increases in nutrient loading, which could lead to large blooms of algae. If this trend continues, it could unbalance the sensitive, natural lake ecology and put it in danger of eutrophication. Large mats of decomposing algae could consume dissolved oxygen, making it unavailable for the fish. The lake environment is also vulnerable to the potential effects of certain land use practices within the watershed if these activities do not take into account the fragility of the Lake Waccamaw ecosystem.

North Carolina's Division of Parks already regulates commercial use and the construction of piers, docks, drainage ditches, and similar activities on the lake. Current recreational and scientific take of the species is not a threat and

(continued on page 13)



Waccamaw silverside (*Menidia extensa*)

Photo by B M Burr

# Proposed Species

(continued from page 12)

should not be affected by a listing rule. The State Wildlife Resources Commission regulates taking of the Waccamaw silverside through the issuance of collecting licenses. Since scientific and commercial take under current guidelines are not considered threats to the species, the proposed listing rule contains an exemption to the general prohibitions on this activity. Collecting of the Waccamaw silverside would not be subject to Federal regulations if conducted in full accordance with State laws pertaining to the species.

The listing proposal included a designation of Critical Habitat for Lake Waccamaw and a 0.4 mile (0.6 km) section of Big Creek, which feeds the lake. Currently, the FWS is aware of only one proposed Federal project that may affect the Waccamaw silverside and its proposed Critical Habitat—the relocation of U.S. Highway 74. The FWS has been in contact with the Federal Highway Administration and the North Carolina Department of Transportation concerning possible means of avoiding any adverse impacts.

Comments on the proposal to list the Waccamaw silverside as a Threatened species are welcome, and should be

sent to the Field Supervisor, Asheville Endangered Species Field Office, by January 6, 1986.

## Available Conservation Measures

If the proposals to list the flattened musk turtle, large-flowered skullcap, and Waccamaw silverside are made final, they will receive the protection authorized under the Endangered Species Act. (The conservation measures applied to Threatened species are the same as those for Endangered species, except that the classification of Threatened allows for special rules to grant greater management flexibility.) Among the benefits of a final listing are the prohibitions on interstate or international trade in listed species without a permit; the obligation for the FWS to develop a species recovery plan; and the possibility of Federal funding for State conservation efforts. Such financial aid is authorized under Section 6 of the Act for States that have approved Endangered Species Cooperative Agreements with the FWS. Currently, Georgia and North Carolina have such agreements covering the species discussed in this report.

The take of listed plants is not prohibited by the Act unless they are on land under Federal jurisdiction, although State conservation laws apply in many

cases. With regard to animals, it is generally illegal to take, possess, or transport listed species within the United States without a Federal permit; however, an exception to the prohibition on take is available in certain circumstances for species listed as Threatened. Such an exception was included in the proposal to list the Waccamaw silverside as Threatened, since the threat to this fish is habitat degradation rather than take. State regulations already govern take of the Waccamaw silverside, and, as long as they are complied with, Federal permits for this activity will not be required.

Habitat conservation is addressed under Section 7 of the Act, which requires Federal agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize a listed species or adversely modify its Critical Habitat. Even though the FWS deemed it unwise to publicize the exact location of the remaining large-flowered skullcap and flattened musk turtle locations with a designation of Critical Habitat, these species will receive Section 7 habitat protection if listed. If a Federal agency finds that one of its activities may affect a listed species, it is required to consult with the FWS. Through consultations early in the planning process, it is usually possible to find ways of achieving project goals without jeopardizing listed species.

## Regional Briefs

(continued from page 2)

A half-hour television tape was made on the recovery of the gray wolf (*Canis lupus*) and on the Idaho State Historical Museum's wolf exhibit. The program, made in cooperation with the Boise area's Channel 12, aired throughout the Boise Valley.

The managed snow goose hunts that were held at Bosque del Apache NWR during late October and early November failed to achieve one objective, that of encouraging geese to continue their southward migration to reduce the potential disease hazard and competition for refuge foods. Two hundred hunters took about 100 geese. Record numbers (50,000) of snow geese were using the refuge in late November.

Nine delegates of the People's Republic of China visited the regional Endangered Species Office December 1-3 as part of a 16-day tour of the United States. Delegates spent a full day at the Bosque del Apache NWR learning about refuge biology and management and viewing various species, including the whooping crane. Their visit included a

tour of the Rio Grande Zoological Park, in Albuquerque, New Mexico, where the delegates saw Endangered bald eagles (*Haliaeetus leucocephalus*) and Mexican wolves (*Canis lupus*), and heard presentations about captive management of Endangered species. They will visit Aransas and Santa Ana NWR's in Texas before going on to Louisiana, Washington, D.C., and Madison, Wisconsin.

The FWS has established a "Mexican Wolf Captive Management Committee," which met for the first time at the Rio Grande Zoo on November 15. The committee is composed of a representative from each facility holding Mexican wolves, and one representative each from the FWS and the Mexican Wolf Recovery Team. The status of the 29 animals in the Mexican Wolf Captive Breeding Program was reviewed, decisions were made for the 1986 breeding season, and guidelines for the operation of the committee were discussed. It is hoped that this committee can establish a sound captive program for the Mexican wolf.

A status report on the black-capped vireo (*Vireo atricapillus*) was completed

recently. In 1985, 35 adult vireos were found in only three places in Oklahoma (representing about 12 breeding pairs) and 280 adults in 33 places in Texas (representing about 168 breeding pairs). The black-capped vireo is threatened by cowbird parasitism in both Oklahoma and Texas. For example, at the largest known colony at Wild Basin near Austin, Texas, only two young were fledged in 1984. With cowbird control in 1985, 24 young were fledged.

Through purchase and easement agreements, the FWS has acquired five eastern Oklahoma bat caves for the preservation of the Endangered Ozark big-eared bat (*Plecotus townsendii ingens*). These new acquisitions will become part of the Sequoyah NWR. Recent surveys indicate that there are probably fewer than 400 Ozark big-eared bats left in the wild. The species' historic range included the States of Oklahoma, Arkansas, and Missouri; however, the species is presumed extirpated in Missouri.

This bat is a sensitive, cave-roosting species whose decline is thought to be caused by human disturbance of its maternal and hibernating colonies. It is

(continued on page 14)

## Regional Briefs

(continued from page 13)

hoped that acquisition and management of these caves will reduce human disturbance and allow the species' numbers to increase. Research on the other ecological needs of the species has been contracted to the Oklahoma Cooperative Wildlife Research Unit and is being conducted in cooperation with Regions 3 and 4.

**Region 3**—Dr. Gareth J. Thomas, Deputy Head of Research at the Royal Society for the Protection of Birds in the United Kingdom, recently visited the regional office to discuss toxic/non-toxic shot issues. Dr. Thomas had already conferred with FWS and other officials in Washington, and numerous State agencies and private individuals in the Midwest. He is traveling under a fellowship from the Winston Churchill Memorial Trust and hopes to acquire enough information on the steel shot issue to prepare for steel shot use in the United Kingdom.

The Consolidated Grain and Barge Company of St. Louis, Missouri, has requested an exemption from the requirements of Section 7 of the Endangered Species Act to permit establishment of a barge fleeting area on the Ohio River near Mound City, Illinois. The Endangered orange-footed pearly mussel (*Plethobasus cooperianus*), located in close proximity to the proposed fleeting area, could be affected by the barge company's planned activities.

A meeting was held between Minneapolis public health officials, members of the peregrine falcon (*Falco peregrinus*) reintroduction project, and an aid to the city's mayor concerning use of strychnine to control pigeons in the city. Such use could be detrimental to the peregrine reintroduction efforts there. The city agreed to discontinue the use of strychnine and will probably use netting as an alternate control method.

*Lindera melissifolia* (pondberry) is a 6-foot tall shrub that grows in bottomland forests only in extreme southern parts of Missouri, and 11 sites in 5 States in Region 4. The plant was proposed as Endangered on August 13, 1985. (See BULLETIN Vol. X No. 9.) The FWS recently learned from The Nature Conservancy (TNC) that a logging operator had encroached upon TNC property in Missouri and severely damaged a pond-

berry population. TNC is interested in pursuing legal action.

**Region 4**—Sixty days in jail and a financial loss of close to \$20,000 was the punishment one Florida man received recently for the killing of an Endangered Key deer (*Odocoileus virginianus clavium*). The Federal judge in a Key West court case recommended that the jail term be carried out at a prison farm or under a work release program. The man's financial losses included the State court fine and costs, bond forfeiture, legal fees, and confiscation of his automobile.

About 40 dead loggerhead sea turtles (*Caretta caretta*) washed ashore during October on the Pea Island NWR and adjacent National Seashore Recreation Area in North Carolina. Most of these mortalities are thought to have resulted from turtles being caught and entangled in shrimp trawls. If this is the cause, there is an urgent need for use of the trawling efficiency device (TED), which excludes sea turtles from trawl nets.

The Puerto Rico Department of Natural Resources (DNR) took a significant step toward improved Endangered species management with passage of its *Regulation to Govern the Management of Threatened and Endangered Species in the Commonwealth of Puerto Rico*. This regulation, which went into effect September 28, 1985, provides full Commonwealth protection for all federally listed species and other species considered threatened or endangered in Puerto Rico. Passage of this regulation enabled the DNR to enter into a full cooperative agreement with the FWS under Section 6 of the Endangered Species Act. Projects to be undertaken under this new agreement include recovery efforts for the Puerto Rican parrot (*Amazona vittata*), Puerto Rican plain pigeon (*Columba inornata wetmorei*), yellow-shouldered blackbird (*Agelaius xanthomus*), Culebra Island giant anole (*Anolis roosevelti*), Monito gecko (*Sphaerodactylus micropithecus*), and hawksbill sea turtle (*Eretmochelys imbricata*).

The Florida Power and Light Company (FPL) has received final approval from the South Florida Water Management District to drill three artesian wells at its Fort Myers power plant. These wells, to be completed by December 15, will provide a backup source of warm water for manatees (*Trichechus manatus*).

During the winter of 1984-85, a maximum of 338 manatees were observed at the Fort Myers power plant and the nearby Caloosahatchee River. Proposed changes in the plant's operation schedule last winter and a resulting reduction in the warm water discharged from its cooling facilities led to concern for the wintering manatees, which are vulnerable to cold water temperatures. Subsequently, FPL made a decision to temporarily run the power plant during critical cold periods of the 1984-85 winter for the primary benefit of the manatee. It is hoped that the artesian wells will provide acceptable warm temperatures and a more economical solution to meet the needs of this Endangered species.

The spring pygmy sunfish (*Elassoma* sp.), a Category 1 listing candidate, appears to be alive and well following transplant efforts last year initiated in the vicinity of an extirpated historical site in Limestone County, Alabama. On September 13, 1985, John J. Pulliam III of the FWS Endangered Species Field Station in Jackson, Mississippi, and Dr. Maurice F. (Scott) Mettee of the Alabama Geological Survey were successful in collecting one male and three females, all juveniles, from Pryor Spring #2, site of the 1984 transplant. Pryor Spring #2 is adjacent to Pryor Spring #1, which was one of only two known historical sites but is now unoccupied by the fish. Also, an additional 120 fish were collected on September 13 from Moss Spring, the other known historical site, and released into Pryor Spring #2 to bolster the new population. Moss Spring is currently protected under a Conservation Agreement with the landowner.

*Jamesianthus alabamensis* (Alabama jamesianthus) was one of the candidate plant species for which field work was conducted by the Jackson, Mississippi, Field Station botanist last fall. This member of the aster family is endemic to a small area in northwestern Alabama, where it may occur along banks of first- and second-order streams. Several additional populations were located within its narrow range during the survey. Most of the populations observed appeared healthy and vigorous; however, many sites showed evidence of disturbance from cattle grazing and trampling. Additional field work will be conducted to determine the plant's rarity and to accurately assess the threats to its survival.

Jacksonville Endangered Species Field Station biologists recently undertook a field investigation to determine if habitat still remains at three sites in Lake

(continued on page 15)

## Regional Briefs

(continued from page 14)

County, Florida, which were known to contain populations of the rare plant, *Warea amplexifolia* (wide-leaf warea). This plant, a member of the mustard family, is a Category 1 listing candidate. It was last surveyed in 1979 when populations were found to occur at only four sites in Florida (three in Lake County and one in Polk County).

The Polk County site was relocated in 1984 and found to be still supporting a *W. amplexifolia* population. The three Lake County sites also were located, but one had been completely destroyed by construction of several commercial establishments. The two other sites were found to still contain suitable habitat for the plant, and one is now protected as part of the Lake Griffin State Park. Unfortunately, the biologists were not able to find specimens of *W. amplexifolia* actually growing at either site, although this may have been because the season was too advanced. The warea, which is an annual plant, probably had already completed its flowering and seeding and died earlier in the year. The fact that suitable habitat remains makes it likely that both sites still support populations of this species.

**Region 5**—Endangered Species Office personnel in Regions 4 and 5 have been working together to determine the cause of mussel die-offs in the Powell River in Virginia and Tennessee. Several Endangered mussels occur in this river, and their survival is being threatened by some unknown cause.

The Region 5 staff is conducting a nationwide consultation for the Environmental Protection Agency on the registration of the pesticide Diazinon to determine possible adverse effects on federally listed and proposed species. All FWS regional offices have been contacted for input.

**Region 6**—In last month's BULLETIN, it was reported that black-footed ferrets (*Mustela nigripes*) were being held in captivity at two research centers in Wyoming and that they were having problems with canine distemper. The current status of the captive population is one healthy ferret (female) and two sick ferrets (one male, one female) at the original research facility, and six healthy ferrets (four females, two males) at the other location.

Land and air survey crews are taking advantage of recent snows to observe

black-footed ferret tracks to determine the number of ferrets still alive in the original colony near Meeteetse, Wyoming. Ferret sign should become more abundant in December after prairie dogs go into hibernation. Ferrets do not make abundant trenches that can be easily seen from the ground and air on snow until after prairie dogs begin hibernation.

The American Peregrine Falcon Recovery Plan was revised recently. The original plan, which covers the Rocky Mountain Southwest populations, was approved in 1977. The revision was completed to update the goals, implementation schedule, and data contained in the plan based on the most current information. Copies of the revised American Peregrine Falcon Recovery Plan can be obtained from the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852 (800-582-3421).

**Region 7**—On November 6, 1985, the Environmental Protection Agency signed an experimental use permit authorizing use by the FWS of the toxicant Compound 1080 to eradicate introduced Arctic foxes (*Alopex lagopus*) from remote, uninhabited Kiska Island.

This action will promote the recovery of the endangered Aleutian Canada goose (*Branta canadensis leucopareia*), which once nested on this and many other Aleutian Islands.

The FWS appreciates the support received from groups such as the Pacific Flyway Council, the Pacific Seabird Group, the National Audubon Society, and the American Wilderness Alliance. Although some have spoken out against this program, the FWS is greatly encouraged by the overwhelming support from a concerned and knowledgeable public that realizes Arctic foxes are ecologically damaging and out of place in these island ecosystems where marine birds and waterfowl have evolved in the absence of mammalian predators. It is hoped that, in the near future, Kiska will once again be home to nesting Aleutian geese and many other species of migratory birds.

**Region 8 (Research)**—A manatee, released after 5 years of captive rehabilitation at various oceanaria in Florida, was successfully tracked by satellite telemetry in both freshwater and saltwater habitats in spring 1985. The floating radio transmitter, attached by a belt, was monitored by Denver Wildlife Research Center's Sirenia Project biologists and cooperators via polar-orbiting satellites

belonging to the National Oceanic and Atmospheric Administration. The manatee joined wild individuals and traveled within Florida from its release point in the Homosassa River to preferred habitat at the mouth of the Suwanee River. This kind of seasonal movement is typical of manatees from the area.

This study demonstrates that rehabilitated manatees can be successfully reintroduced into the wild. Additionally, the satellite-monitored location data provided important habitat information to the Jacksonville, Florida, Endangered Species Office in considering ongoing Endangered Species Act Section 7 responsibilities for the mouth of the Suwanee River.

The drastic decline in the native fauna of Guam in recent years has resulted in the listing of seven Guam birds as Endangered. (See BULLETIN Vol. IX No. 9.) The biggest threat to their survival and recovery is the brown tree snake (*Boiga irregularis*). This introduced species apparently arrived soon after World War II, and in the absence of predators has undergone a population explosion, resulting in the crash of native bird and mammal populations on which it feeds.

Research biologists with the Denver Wildlife Research Center's Herpetological Studies Project initiated work in June 1985 to develop ways to control the snake population and to devise a strategy for preventing the spread of the snake to other islands where it could cause similar ecological damage. Emphasis of work to date has been on determining actual densities of snakes in various bird habitats on Guam, developing traps and attractants for capturing snakes, and evaluating a variety of control techniques that could be used to lower snake predation on island birds. No ready solution currently exists for control of this snake; further research is needed.

## Foreign Mailings

Some of our readers pass along extra copies of the BULLETIN to their colleagues in foreign countries. While this is fine, please note that the BULLETIN self-mailer works *only* for mailing to an address in the United States. When mailing to another country, the BULLETIN must be enclosed in an envelope or the U.S. Postal Service *will not* deliver it.

# New Publications

*The Rare Vascular Plants of British Columbia* (Syllogeus No. 59) by Gerald B. Straley, Roy L. Taylor, and George W. Douglas, has just been published by the National Museum of Natural Sciences in Ottawa, Canada. Information on 816 rare plants is presented in the form of an annotated list. Cited references, herbaria consulted, the total range for each taxon, the range in British Columbia, the biogeoclimatic zone and habitat in which each taxon is found in the province, and distribution maps for the rarer taxa are included. Copies may be obtained free of charge by writing to: Rare and Endangered Plants Project, National Museum of Natural Sciences, Ottawa, Ontario, Canada K1A 0M8.

Similar lists of rare vascular plants have been published by the National Museum of Natural Sciences for Alberta, Manitoba, New Brunswick, Nova Scotia, Quebec, Saskatchewan, and the Yukon, and some are still available. Also, the *Atlas of the Rare Vascular Plants of Ontario* is nearing completion, with 3 of the 4 installments now published. Part 4 should be available in fall 1986. Order the *Atlas* and/or any of the other provincial rare plant lists free of charge from the above address.

The *Audubon Wildlife Report*, designed to be a comprehensive reference guide to Federal wildlife management laws, programs, and agencies, is availa-

## BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED			THREATENED			SPECIES* TOTAL	SPECIES HAVING PLANS
	U.S. Only	U.S. & Foreign	Foreign Only	U.S. Only	U.S. & Foreign	Foreign Only		
Mammals	25	19	234	4	0	22	304	23
Birds	60	13	141	3	1	0	218	54
Reptiles	8	6	60	8	4	13	99	18
Amphibians	5	0	8	3	0	0	16	6
Fishes	37	4	11	19	3	0	74	39
Snails	3	0	1	5	0	0	9	7
Clams	23	0	2	0	0	0	25	19
Crustaceans	3	0	0	1	0	0	4	1
Insects	8	0	0	5	0	0	13	10
Plants	86	5	1	23	2	2	119	43
<b>TOTAL</b>	<b>258</b>	<b>47</b>	<b>458</b>	<b>71</b>	<b>10</b>	<b>37</b>	<b>881</b>	<b>220**</b>

\* Separate populations of a species, listed both as Endangered and Threatened, are tallied twice. Species which are thus accounted for are the gray wolf, bald eagle, American alligator, green sea turtle, Olive ridley sea turtle, and leopard.

\*\* More than one species may be covered by some plans, and a few species have more than one plan covering different parts of their ranges.

Number of Recovery Plans approved: 185  
 Number of species currently proposed for listing: 28 animals  
 30 plants

Number of Species with Critical Habitats determined: 91  
 Number of Cooperative Agreements signed with States: 42 fish & wildlife  
 17 plants

November 30, 1985

ble from the National Audubon Society. Included in the 650-page volume are individual accounts on a number of Threatened and Endangered species, many of them written by Fish and Wild-

life Service biologists. Copies of the report can be purchased for \$16.50 (postpaid) from the National Audubon Society, 950 Third Avenue, New York, New York 10022.

## NMFS Whale Report

Copies of "The Status of Endangered Whales," a review of knowledge about whale distribution, migration, life history and ecology, exploitation, abundance, and management, are available from the National Marine Fisheries Service (NMFS). The 64-page, illustrated report consists of separate papers on the eight listed whales, along with an introductory overview, and appeared in the *Marine Fisheries Review* (46(4), 1984). Free copies of the report can be obtained from the Protected Species Division, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, Washington, D.C. 20235.



*Humpback Whale (Megaptera novaeangliae)*  
 Drawing by Evelyn Ficzyck

December 1985

Vol. X No. 12

# ENDANGERED SPECIES

## Technical Bulletin

Department of Interior, U.S. Fish and Wildlife Service  
 Endangered Species Program, Washington, D.C. 20240

FIRST CLASS  
 POSTAGE AND FEES PAID  
 U.S. DEPARTMENT OF THE INTERIOR  
 PERMIT NO. G-77