September 1987 Vol. XII No. 9

ENDANGERED SPECIES

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

Two Plants and Three Animals Proposed for Listing

Five taxa were proposed by the Fish and Wildlife Service during August for addition to the Federal lists of Endangered and Threatened wildlife and plants. If the proposals are later made final, Endangered Species Act protection will be extended to the following:

Lakeside Daisy (*Hymenoxys acaulis* var. *glabra*)

Radiant masses of yellow blossoms make the Lakeside daisy one of Ohio's more spectacular wildflowers. This low-growing, herbaceous perennial with densely tufted leaves is a member of the aster family (Asteraceae). In the United States, the Lakeside daisy is currently known from one fragmented population on the Marblehead Peninsula of Ottawa County, Ohio. Former populations in Mason, Will, and Tazewell Counties of Illinois were extirpated by the effects of quarrying, grazing, and industrial development on the plant's limited habitat. In Ontario, Canada, where it is considered rare, the Lakeside daisy occurs in small areas on Manitoulin Island and the Bruce Peninsula. Because of this plant's limited distribution and vulnerability, the Service has proposed to list it as Threatened (F.R. 8/19/87).

The most serious threat to the Lakeside daisy is habitat destruction. This plant grows only in dry, rocky prairie areas. In Ohio, the sole remaining U.S. population consists of seven scattered colonies on private land that is actively being quarried for limestone. Lakeside daisies occasionally reappear 15 to 20 years after quarrying operations have moved to a different site, but not abundantly. Another significant threat is the succession of woody growth, which reduces the amount of open, sunny praine needed by the Lakeside daisy.

Because none of the known Lakeside daisy populations are on public lands, the involvement of private landowners in management and recovery activities will be essential. The landowners have been informed of the daisy's presence and precarious status, and the Service will seek their cooperation in conservation actions for the species.

Houghton's Goldenrod (*Solidago houghtonii*)

Another member of the aster family, Houghton's goldenrod is a perennial that grows up to 30 inches (77 centimeters) tall and produces clusters of relatively large yellow flowers in a more or less flat-topped inflorescense. This species is native to sand beach flats along the northern shorelines of Lakes Michigan and Huron, including some areas inhabited by two other listing candidates, the Pitcher's thistle (*Cirsium pitcheri*) and dwarf lake iris (*Iris lacustris*). *S. houghtoni* habitat faces threats from residential development, off-road vehicles and other human-related disturbance, and hydrological changes in the Great Lakes (e.g., rising lake levels). Accordingly, this species has been proposed for listing as Threatened (F.R. 8/19/87).

Currently, there are 39 known *S. houghtoni* sites in 8 Michigan counties and 2 sites in Ontario, Canada. Of the U.S. populations, 2 are on Federal lands, 11 are on State lands, and one is on property owned by The Nature Conservancy; the remaining 25 areas are on privately owned land subject to various types of habitat alteration. Up to 10 formerly known *S. houghtoni* populations may have been extirpated within the past 10 years. The sites on Federal lands—a small island in Chippewa County (administered by the Bureau of Land Management) and an area of Hiawatha National Forest in Mackinac County—are not imperiled by any known Federal activities.

Two Klamath River Fishes

The **Lost River sucker (*Deltistes luxatus*)** and the **shortnose sucker (*Chas-***

(continued on page 8)

photo by Guy Denny

Lakeside daisy

Endangered species program regional staff members have reported the following activities for the month of August:

Region 1 — The woodland caribou (*Rangifer tarandus caribou*) translocated to northern Idaho from British Columbia, Canada, to augment an Endangered herd are being monitored through radio telemetry. One female caribou was found dead, but the cause of death could not be determined. The good news is that most of the transplanted animals are remaining in the area of the releases.

* * *

While conducting a field examination of the proposed Shorelands project in the San Francisco Bay area with representatives of the project applicant, the Sacramento Endangered Species Office staff discovered that a 20-acre wetland on which two salt marsh harvest mice (*Reithrodontomys raviventris*) were trapped in 1985, recently had been disked. The site lies within the proposed right-of-way of a major access road to the proposed development. The landowner had been notified by certified mail in 1986 that Endangered mice inhabited the area that now has been disked.

* * *

The El Segundo blue butterflies (*Euphilotes battoides allyni*) began their mating flight about 3 weeks earlier this year than previously recorded. The population is up to approximately 2,000 adults. Lange's metalmark butterflies (*Apodemia mormo langei*) also started to fly earlier this summer than in years past. Also, the population is expected to be higher than in the prior 9 years.

* * *

The Sacramento Office issued a final Biological Opinion addressing the exploration for oil reserves over a 27 square mile portion of the southern San Joaquin Valley. Species of concern included the federally-listed San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia silus*), and giant kangaroo rat (*Dipodomys ingens*). Measures incorporated as project actions by the applicant, Chevron USA, included pre-project surveys, avoidance of sensitive areas, rehabilitation of temporarily disturbed habitats, and construction of barricades to prevent future vehicle intrusion. These measures were developed prior to issuance of the opinion through discussions among the applicant, consulting Federal agencies, and the Service.

* * *

The Bureau of Land Management reports 90 percent survival of the Malheur wire-lettuce (*Stephanomeria malheurensis*) planted in the recovery effort initiated earlier this year. Reduced survival was reported from plots where plants were placed with sage and cheat grass. Given the success of the recovery action, a change in the permit for collecting seeds will be initiated.

* * *

The Region 1 Director has signed a finding that the information in a petition for list-

(continued on next page)

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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. **Region 8**: Research and Development nationwide.

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ing the northern spotted owl (*Strix occidentalis caurina*) as Endangered is "substantial" under the terms of the Endangered Species Act. The Fish and Wildlife Service is now undertaking a status review on the owl, and asks that any pertinent information be sent to the Regional Director. (address on BULLETIN page 2).

Region 2 — Based on counts made in June, a minimum of 454 Ozark big-eared bats (*Plecotus townsendii ingens*) were present in previously known maternity caves in Oklahoma. This count is 15 higher than the count in 1986, and is in addition to 260 bats found in a previously unreported maternity cave recently located. (This new cave was mentioned in last month's BULLETIN.)

* * *

Another record for whooping crane (*Grus americana*) reproduction occurred this summer in Canada; 23 or 24 fledging-age chicks were present in early August in Wood Buffalo National Park. Twenty-one of the chicks were banded. The previous high production was the 21 offspring produced in 1986. With the excellent chick production of 1987, 125 to 130 whooping cranes can be expected to arrive at wintering grounds on the Texas coast this winter.

Chick production has been good in Canada since 1984. A recent evaluation of population trends indicates a 10-year periodicity in production of young that is probably associated with nesting habitat conditions. Recent declines in the water

(continued on page 11)

Reintroduction of Colorado Squawfish into the Lower Colorado River is Proposed

The Colorado squawfish (*Ptychocheilus lucius*) is North America's largest minnow, with records of specimens reaching 6 feet long and 80 pounds in weight. Historically, this fish was plentiful throughout the Colorado River and its major tributaries in Arizona, New Mexico, Utah, Colorado, and Wyoming. Many early settlers preferred the squawfish as a food source over the native trouts, and described the flesh as white, flaky, and sweet. Squawfish can readily be caught by sport anglers using artificial lures or bait.

After much of the natural Colorado River ecosystem was altered by the construction of dams, the diversion of water, and the introduction of exotic fishes, Colorado squawfish disappeared from the lower river basin. The last known naturally occurring squawfish specimen from Arizona waters was collected in 1969. Currently, the only surviving natural populations occur in parts of the upper Colorado River basin, especially in segments of the Green and Colorado Rivers within Utah and Colorado.

In August 1985, as part of an effort to recover the Endangered Colorado squawfish, the Fish and Wildlife Service and Arizona Game and Fish Department began a 10-year cooperative program to establish two "experimental populations" in the Salt and Verde Rivers of Arizona (see BULLETIN Vol. X No. 10). This category of experimental population, along with the subcategories of "essential" and "non-essential," were authorized by the 1982 amendments to the Endangered Species Act. The purpose is to promote wider acceptance of attempts to reintroduce listed species by allowing additional management flexibility (see BULLETIN Vol. IX No. 9). Under that authority, more than 176,386 Colorado squawfish have been stocked into Arizona waters, and another 100,000 are due to be stocked in autumn 1987.

With the encouragement of the Arizona Game and Fish Department, which hopes to establish a sport fishery for the Colorado squawfish in the lower Colorado River, the Service proposed to establish a third non-essential experimental population of the species in Arizona (F.R. 8/26/87). Habitat that appears suitable for the Colorado squawfish still remains in parts of the lower river; the reintroduction site would be the main river channel between Imperial Dam and Parker Dam. This stretch is within the species' historical range and is isolated from all other Colorado squawfish populations.

Management authority for non-essential experimental populations is described in Section 10(j) of the Endangered Species Act. In essence, they are treated as species *proposed* for listing as Endangered or Threatened. Although Federal agencies are required to "confer" with the Service on activities that may jeopardize such designated populations, the results of these conferences are non-binding. In the lower Colorado River, any experimental population of Colorado squawfish is expected to be compatible with existing recreational and other uses. The proposed designation also contains a special rule authorizing sport take of the Colorado squawfish from the experimental population if the angler is complying with all applicable State fishing regulations.

If the proposal is approved, all reintroduction stock will come from Dexter National Fish Hatchery in New Mexico, where successful techniques for rearing Colorado squawfish have been developed. Fry produced at the hatchery would be provided to the State of Arizona's Page Springs Hatchery in Cornville, where they would be raised to fingerling size. As many as 100,000 fingerlings could be released the first year, and plans call for stocking annually over 10 years. Annual surveys would monitor fish health and population changes.

photo by Donald P. Toney

Colorado squawfish

Running Buffalo Clover Discovered at New Sites

Judy Jacobs
Annapolis, Maryland, Field Office

This has been a good year for the running buffalo clover (*Trifolium stoloniferum*). When this rare plant was listed as Endangered (June 5, 1987), it was known from only a few individuals at one site in West Virginia. A second site, containing four individuals in 1984, failed to appear in 1985 and 1986. This past summer, however, a single plant did reappear at this second West Virginia site. In even better news, three new populations of this rare clover were recently discovered. One population in north central Kentucky was found by Mark Evans, botanist with the Kentucky Heritage Program, and two nearby in southeastern Indiana were discovered by Mike Homoya and Jim Aldrich, Indiana Heritage Program botanists.

These finds greatly increase the genetic base of the species and improve its chances for recovery. Also, the new locations allow greater insights into the plants' habitat requirements. All are located in relatively rich soils in areas that are occasionally mowed or grazed. This supports the hypothesis that occasional, moderately intense disturbance may benefit the clover or even be essential to its maintenance. Agricultural researchers are interested in studying the running buffalo clover's potential as a forage plant. This, of course, would require that vigorous plants can be grown and maintained in a field situation. Identifying the factors that the clover requires for vigorous growth is a top recovery priority for this Endangered plant.

photo by Rodney Bartgis

running buffalo clover

Federal Protection Approved for Inyo Brown Towhee and Puerto Rican Crested Toad

The **Inyo brown towhee (*Pipilo fuscus eremophilus*)** is a medium-sized, sparrow-like songbird restricted to desert riparian habitat in the Argus Mountains of Inyo County, California. Fewer than 200 are estimated to remain. These non-migratory birds are highly dependent on dense vegetation that faces potential threats from overgrazing, water diversion, mining, and certain recreational activities. The Fish and Wildlife Service's November 23, 1984, proposal to list the Inyo brown towhee as Threatened (see summary in BULLETIN Vol. IX No. 12) was made final August 3, 1987.

About three-fourths of the towhee's habitat is within the U.S. Navy's China Lake Naval Weapons Center. The Navy base has eliminated livestock grazing on the testing range, and is working to control the harmful impacts of wild burros and horses on the fragile desert riparian zones. Most of the other Inyo brown towhee habitat is on property administered by the Bureau of Land Management. Both agencies are planning a cooperative program to conserve the towhee's habitat. There are no known Federal projects or activities that will be significantly affected by the listing rule.

Included in the final listing rule was a designation of Critical Habitat (see maps in the August 3, 1987, *Federal Register*). In response to a request by the State of California, the Service concurrently proposed to designate several additional areas as Critical Habitat.

The **Puerto Rican crested toad (*Peltophryne lemur*)** is an amphibian yellowish-olive to blackish-brown in color with prominent crests above the eyes. This species was known historically from two islands, but it apparently has been extirpated from one — the island of Virgin Gorda in the British Virgin Islands — and remains only on the main island of Puerto Rico. Its populations declined as breeding areas were drained or filled in for construction, cultivation, and mosquito control. Because development pressure where the sole known healthy population survives is accelerating, the Service proposed December 23, 1986, to list *P. lemur* as Threatened (see summary in BULLETIN Vol. XII No. 1). The final rule was published August 4, 1987.

* * *

These listed animals are now protected under the Endangered Species Act, the terms of which are summarized in this BULLETIN at the end of the story on species newly proposed for listing.

Final Regulations on Turtle Excluder Devices

Gloria Thompson
National Marine Fisheries Service

Six species of sea turtles are listed under the Endangered Species Act as Endangered or Threatened. Five of these, the loggerhead, Kemp's ridley, green, leatherback, and hawksbill, are caught in shrimp trawls in waters off the southeastern United States. Based on observer data, the U.S. Department of Commerce estimates that 47,973 turtles are incidentally caught annually and, of these, 11,179 die. To combat this problem, the National Marine Fisheries Service (the Commerce Department's agency responsible under the Endangered Species Act for marine species) developed gear that would release captured turtles without reducing the shrimp catch. By 1981, it produced the Turtle Excluder Device (commonly known as the TED) and began a technology transfer program to encourage voluntary usage by the shrimpers. This program included providing prototypes to shrimpers who wished to try them. Despite these efforts, there was little voluntary use.

On March 2, 1987, the agency proposed rules that would require U.S. shrimp trawlers in the Gulf of Mexico and in the Atlantic Ocean off the southeastern coast to use approved gear in specific locations and at specified times in order to reduce incidental captures of Endangered and Threatened sea turtles (see BULLETIN Vol. XII No. 4).

Based on comments received in writing and at 17 public hearings, the agency published final regulations in the June 29, 1987, *Federal Register*. Measures to reduce the incidental take and mortality of sea turtles in shrimp trawls will be phased in as shown in the table. (Maps of the affected areas are included in the *Federal Register*.)

In offshore waters at specified times, all shrimp trawlers 25 feet and longer are required to use qualified TEDs, and all shrimp trawlers smaller than 25 feet are required to restrict tow times to 90 minutes or less. In inshore waters at specified times, all shrimp trawlers are required to restrict tow times to 90 minutes or less. In both inshore and offshore waters, shrimp trawlers that use TEDs are exempt from the tow time restrictions. The rules specify criteria and procedures for qualifying additional TEDs; specify areas, seasons, and vessel sizes for which approved TEDs or 90 minute tow times must be used; establish reporting requirements; continue measures for resuscitation and release of captured sea turtles; and continue the effects of designated Critical Habitat. These rules will reduce substantially the incidental catch and mortality of Endangered and Threatened sea turtles associated with shrimp trawling.

For further information on TEDs, contact the Office of Protected Resources and Habitat Programs, National Manne Fisheries Service, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235; 202/673-5348.

SUMMARY OF FINAL TED REGULATIONS

Areas	Start	Vessel Size	Requirement	Season	Coverage
Offshore					
Canaveral Area	10-1-87	≥25 ft	TED	all year	all waters
Southwest Florida Area	01-1-88	≥25 ft	TED	all year	shore to 15 miles[1]
Gulf Area	03-1-88	≥25 ft	TED	3/1 to 11/30	shore to 15 miles[2]
Atlantic Area	05-1-88	≥25 ft	TED	5/1 to 8/31	all waters
Canaveral Area	10-1-87	<25 ft	90 minute tow[3]	all year	all waters
Southwest Florida Area	01-1-88	<25 ft	90 minute tow[3]	all year	shore to 15 miles[1]
Gulf Area	03-1-88	<25 ft	90 minute tow[3]	3/1 to 11/30	shore to 15 miles[2]
Atlantic Area	05-1-88	<25 ft	90 minute tow[3]	5/1 to 8/31	all waters
Inshore					
Canaveral Area	10-1-87	all	90 minute tow[3]	all year	
Southwest Florida Area	01-1-88	all	90 minute tow[3]	all year	
Gulf Area	03-1-88	all	90 minute tow[3]	3/1 to 11/30	
Atlantic Area	05-1-88	all	90 minute tow[3]	5/1 to 8/31	

[1]Will extend to all waters 1-1-89.
[2]Will extend to all waters 3-1-89.
[3]Tow time restrictions do not apply to vessels using TEDs in each net during trawling.

The Endangered Palila of Hawaii

Donald W. Sparling
Environmental Contaminants Research Branch
Patuxent Wildlife Research Center

illustration by H. D. Pratt

palila

Biologists with Federal and State conservation agencies recently determined that the palila, a native species of Hawaiian bird, is still at critically low population levels. The palila is a member of the Hawaiian honeycreepers, a subfamily of birds found only in the Hawaiian Islands. This small, yellow-headed bird with a gray back, greenish wings and tail, and light belly once occupied much of the mamane-naio forests on the big island of Hawai'i but now only occurs on a small portion of Mauna Kea, one of the island's high volcanic mountains. Even within this fragment of its original range, the palila is considered to be at the minimal level needed to sustain itself, and the species is listed as Endangered.

Several factors have been suggested for the decline of this once plentiful species. Diseases like avian malaria and avian pox may limit the distribution of the species to higher mountain elevations where mosquitoes that carry the diseases are rare or absent. Human interference, such as military training activities, may discourage the birds from using otherwise suitable habitat. Perhaps the greatest problem currently facing the palila, however, is habitat destruction by non-native ungulates. Feral goats, feral sheep, and mouflon sheep extensively eat the young mamane trees on whose fruits palila depend for a source of food.

Because of these problems, the palila has twice been the subject of legal action at the Federal level. In 1979, a district judge in Hawaii ruled that the feral goats and sheep maintained for hunting purposes had to be removed from Mauna Kea, the last of the palila's habitat. In 1986, the district court determined that mouflon sheep, which had been introduced as trophy game animals, also had to be removed. The judge determined that mouflon posed harm to the ecosystem on Mauna Kea by eating mamane and naio, injuring large trees and preventing regeneration of mamane. The removal of mouflon should not only help protect the palila but other rare species of birds and plants as well.

Since 1975, the Fish and Wildlife Service, through its Mauna Loa Research Station, has monitored the populations of the palila and other endangered species of forest birds. In 1980, the palila monitoring program became more extensive when the Hawaii Department of Lands and Natural Resources' Division of Forestry and Wildlife cooperated as a partner in annual counts. At first, the counts were conducted once a year, but since 1984 two counts have been taken each year to coincide with the prebreeding and postbreeding seasons.

Biologists from the Fish and Wildlife Service and the Hawaii Division of Forestry and Wildlife conducted the most recent (July 1987) palila count. The population estimate reached was 3,624 ± 859 birds.

The most recent prebreeding count occurred in January 1987. State and Federal biologists estimated that there were 3,444 ± 956 palilas at that time. This January count was an appreciable increase over the previous year's prebreeding estimate and was the highest count since 1981.

Despite the possible increase in numbers of the palila over the past few years, the species still remains at critically low population levels. At present, biologists are cautiously optimistic that the birds may positively respond to the removal of ungulates from palila habitat. Intensive studies on the habitat requirements of this Endangered species are under way in hopes of a better understanding of how humans can ensure the continued survival of this beautiful bird.

Until recently, Mr. Sparling was with Patuxent's Mauna Loa, Hawaii, Research Station.

The Role of Lead in Condor Mortality

Oliver H. Pattee
California Research Station
Patuxent Wildlife Research Center

The precipitous drop in numbers of wild California condors (*Gymnogyps californianus*) has been attributed to a number of causes, including illegal shootings, collisions with man-made obstructions, environmental contaminants, and poisonings associated with animal damage control programs. The California condor population continued to decline even after the initiation of the California condor recovery research program in 1980. The wild population consisted of 15 to 17 individuals in the fall of 1984, yet by the spring of 1985 only 9 birds could be found. Only one of the 6 to 8 birds that vanished during 1984-1985 was recovered for necropsy, and it was found to have died of lead poisoning. Because the decline in the wild population appeared to be accelerating, a decision was made to bring all wild birds into the captive breeding flocks.

Of the four carcasses of California condors recovered since 1980, one died apparently of cyanide poisoning following an encounter with an M-44 device ("coyote getter") and the other three died of lead poisoning. The apparent source of the lead was bullet fragments, evidently obtained from game animal carcasses left in the field and subsequently fed upon by condors. A hunting season connection is further suggested by the timing of the deaths; the three birds were found dead or ill on January 3, March 22, and April 10. Since lead poisoning is a slowly debilitating prob-

(continued on next page)

Condor

(continued from previous page)

lem, exposure probably occurred much earlier. The bird captured January 3, 1986, in an extremely weakened condition exhibited elevated blood lead levels (1.8 parts per million, wet weight) when captured earlier (November 1, 1985) and had exhibited abnormal behavior by mid-December, 6 weeks later. This example suggests that a bird dying in April may have been exposed as early as December or January.

Although these data suggest that lead poisoning is an important cause of mortality in California condors, further research is essential. The Patuxent Wildlife Research Center will be examining the availability of lead and the susceptibility of cathartids to lead poisoning at its Ventura, California, and Laurel, Maryland, locations. Because the recovery effort emphasizes reestablishing a wild population of California condors, future research will concentrate on determining the magnitude of the lead problem and developing management schemes to alleviate the hazards. Initial work suggests that California condors can be attracted to supplied, contaminant-free carcasses for a significant portion (40-50 percent) of their diet.

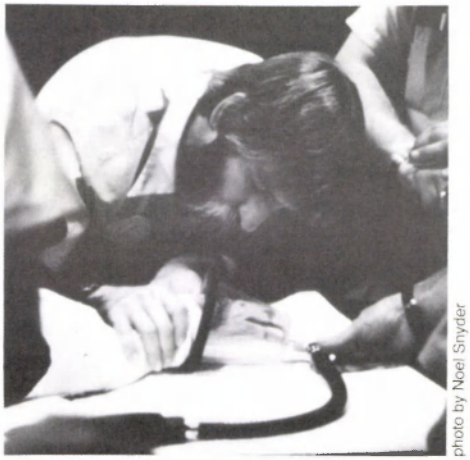

photo by Noel Snyder

California condor AC-3 was treated for lead poisoning at the San Diego Zoo but died January 18, 1986.

* * *

(*Editor's note*: Currently, all California condors are in two captive breeding flocks. There are 8 males and 6 females at San Diego Wild Animal Park and 5 males and 8 females at the Los Angeles Zoo.)

Man and Manatee: Planning for the Future

Thomas Baugh
Jacksonville, Florida, Field Office

The explosive growth in Florida's human population, coupled with related development, is threatening the fragile population balance of the manatee (*Trichechus manatus*). Florida grows by an estimated 800 to 1,000 people a day or in excess of 300,000 people a year. About 78 percent of the current 12 million residents live in Florida's coastal areas, and 82 percent of the projected 1986-1990 growth is expected to occur on or near the coast. Unfortunately, man and manatee are meeting in Florida waters with increasing frequency and the results are — all too often — dead manatees. In response, new, more comprehensive plans for this mammal's survival are being developed by the U.S. Fish and Wildlife Service and Florida Department of Natural Resources.

The best available information indicates that there are about 1,200 manatees using Florida waters, about 600 on each coast, with little to indicate any significant exchange between the two populations. These figures are based on an intensive survey conducted by Federal and State biologists when the manatees congregated in the warm water of power plant outflows during the exceptionally cold winter of 1983-1984.

Research has documented that at least 125 to 130 manatees die each year in Florida. Over the past 3 years, 30 percent of these deaths were caused by humans and, of those, 65 percent (19.5 percent of the total) were deaths due to boats and barges. The causes of an additional 36 percent of all manatee deaths are listed as unknown but are thought to include some additional deaths due to human causes. About 80 percent of all manatees are scarred by boat propellers. Even when manatees are not killed by propellers, scarring can interfere with feeding, reproductive activity, and the rearing of young. It is currently estimated that 120 to 130 manatees are born in Florida each year.

In Florida, the Fish and Wildlife Service shares manatee conservation responsibilities with the Florida Department of Natural Resources. Both agencies feel that development and implementation of manatee protection plans may aid manatee survival. To be effective, these plans must include provisions to reduce the number of human-related manatee deaths, stabilize manatee populations, and preserve and rehabilitate manatee habitat. These goals can be achieved by the careful integration of biological, social, economic, and other information; the analysis of this information in terms of manatee and human needs; specific recommendations for manatee recovery; and the communication of these recommendations to all interested parties.

At this time, it is anticipated that manatee protection plans will be developed for all areas of Florida that have manatee habitat. Draft manatee protection plans will be cooperatively prepared by the Service and the Florida Department of Natural Resources. The final protection plans will identify areas of greater or lesser risks to the manatees, specify the nature and intensity of those risks, and make specific recommendations to remove or control the risks. The development of comprehensive planning may be more effective than current approaches to manatee conservation and, at the same time, continue to allow for the multiple use of Florida waters.

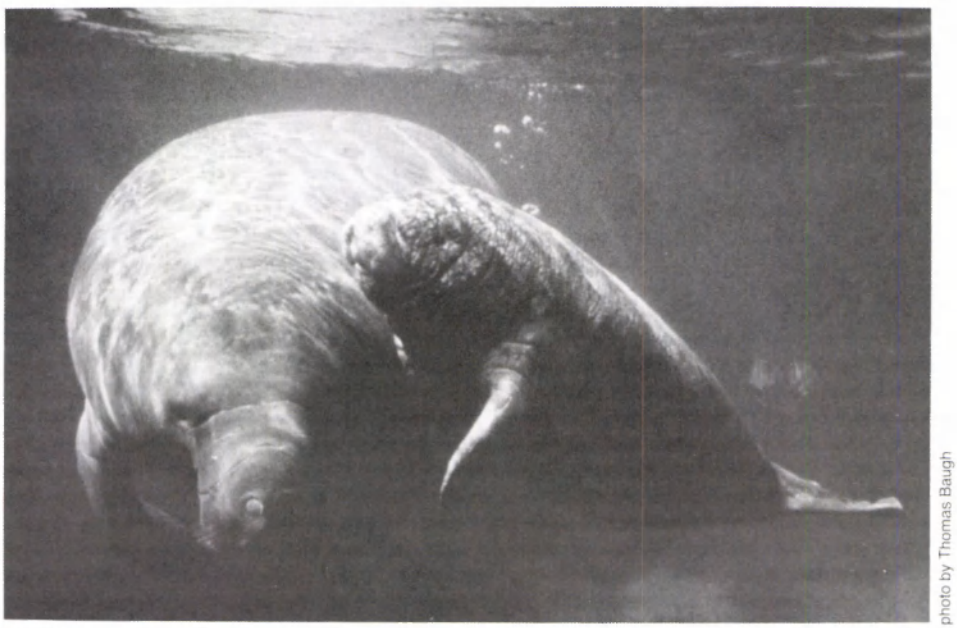

photo by Thomas Baugh

Florida manatee and young

Proposed Listings

(continued from page 1)

***mistes brevirostris*)** are fishes native to the Klamath Basin of south-central Oregon and north-central California. Both are normally large and long-lived; for example, *D. luxatus*, the sole species in its genus, can reach about 10 pounds in size and live at least 40 years. Widespread moderation of their natural riverine habitat, water pollution, and impacts from exotic fish species have severely reduced the range and numbers of *D. luxatus* and *C. brevirostris*, prompting the Service to propose listing them as Endangered (F.R. 8/26/87).

Historical biological surveys in the Klamath Basin (1879, 1898) indicated the presence of large populations of fishes, suckers in particular. Spawning runs of suckers were large enough to provide a major food source for Indians and local settlers. Even through the 1970's, runs of suckers moving from Upper Klamath Lake to spawning areas in the Williamson and Sprague Rivers were great enough to support a popular sport fishery. During the past 3 years, however, the Klamath Tribe and local biologists have been alarmed enough by sharp population declines in both species that the Oregon Fish and Game Commission closed the 1987 sport fishery.

Although the causes of the decline are varied and not fully understood, there clearly has been a drastic reduction in spawning success. The construction of dams has been particularly destructive in that they have blocked the fishes from the habitat they need for successful spawning. Recent data show that neither species has successfully recruited young into the population for approximately 18 years. One dam alone, the Sprague River Dam near Chiloquin, Oregon, probably eliminated more than *95 percent* of the two species' historical spawning habitat in the Upper Klamath Lake drainage. Although fish ladders have been built, their effectiveness in facilitating movement of suckers over the dam has been minimal to non-existent; Lost River and shortnose suckers are strong swimmers, but their leaping ability is greatly limited.

Hybridization with related species is a threat to the genetic purity of the Lost River and shortnose suckers. Although hybridization does occur naturally, it becomes a problem when one species (such as *C. brevirostris*) becomes more rare. Further, hybridization is facilitated by dams that, when they block natural spawning runs, force individuals of different species to spawn in mass in the dam tailwaters. Exotic fishes are yet another threat because they can compete with native species for food, prey on larval suckers, and introduce new parasites and/or diseases.

Upper Klamath Lake and its tributaries are now the primary refuge for the remaining Lost River and shortnose suckers. However, survey work performed during 1984-1986 by the Oregon Department of Fish and Wildlife, the Klamath Tribe, and the Fish and Wildlife Service revealed continuing, drastic declines there as well. For example, the estimated population of 23,123 Lost River suckers in the 1984 Upper Klamath Lake spawning run fell to 11,861 by the 1985 run.

Photo by M. Coleman

shortnose sucker

Most of the habitat occupied by the two fishes is administered by the U.S. Forest Service, although some marshes used by both species are within the Upper Klamath National Wildlife Refuge. Forest Service and refuge personnel have been actively involved in determining the status of fish resources in the area and will be important in conservation of the two suckers. Possible recovery actions to be evaluated include rehabilitation and protection of the few remaining spawning streams, obtaining pure stock for captive propagation and reintroduction, and research into structures or methods to help the fish move successfully around dams. Moreover, if the listing proposal is made final, Federal agencies involved in funding, authorizing, or carrying out any action that may affect the two fishes (e.g., new dams, water diversion projects) will be required to consult with the Fish and Wildlife Service on ways to avoid jeopardizing the species' survival.

Visayan Deer (*Cervus alfredi*)

Known only from the Visayan Islands in the central Phillipines, this small deer has the most restricted range of all surviving species in the genus *Cervus*. It is a small animal, standing only about 25 inches (64 centimeters) at the shoulder. This deer's coat, remarkably dense and soft, is generally dark brown on the upper parts and buff-colored below. Yellowish white spots on the shoulders, back, and sides are one characteristic that distinguishes the Visayan deer from related species.

The Visayan deer originally occupied eight islands and was fairly widespread until World War II. After the war, the advent of intensive upland logging led to a precipitous decline in the species' numbers. Logging not only eliminated the dense forest habitat upon which the Visayan deer depends but also made its range more accessible to settlers and hunters. The increasing human population in the region practiced slash-and-burn agriculture, which involves clearing away trees, harvesting crops until the soil is exhausted, and moving on to another area. This practice, which is shrinking tropical forests worldwide, has accounted for about as much forest destruction in the Phillipines as commercial logging. In an ironic twist, logging was greatly curtailed in this area of the Phillipines in 1983, but the resulting unemployment led many people to turn to slash-and-burn agriculture and to subsistence hunting. Habitat loss has been so devastating that the Visayan deer is thought to have disappeared entirely from four of the islands comprising its historical range. It still survives on the other four (Leyte, Negros, Samar, and Panay), but only in relatively small, isolated pockets of habitat.

The Visayan deer was proposed by the Service on August 19 for listing as an En-

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Proposed Listings

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dangered species. Although it already is protected under Phillipine law and some of its habitat falls within government reserves, the deer is still being sought for food and the hunting pressure is intense. The current Phillipine government is concerned about the deer and its habitat; however, enforcement personnel and funding for conservation work are in short supply. Attempts to establish a captive breeding facility in the Phillipines have not yet been successful. Further complicating the picture is the fact that, to a large extent, the Visayan deer occurs in areas that are sometimes under the influence of rebel forces and where military operations take place.

If current trends continue, the Visayan deer may not survive the twentieth century. By focusing more attention on the plight of this small but beautiful animal, the Service hopes to stimulate international efforts to preserve ecosystems in the Phillipines. The nation's new government has shown much interest in such efforts.

* * *

Available 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; prohibitions against certain practices; the requirement for 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 or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and 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 authorize, fund, 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 non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. For plants, the rule is different; the prohibition against collecting applies only to listed plants found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against take of listed plants.

Indiana Bats: Down for the Count

Richard L. Clawson
Missouri Department of Conservation

Standing above the entrance to a cave in southern Indiana, I prepared to descend, rigging to a rope my team and I had dropped into the 30-foot pit. I had come to conduct my biannual census of the Endangered Indiana bats (*Myotis sodalis*) that hibernate there each winter. Listening to the roar of trucks and cars on the nearby interstate highway, I was struck by the thought that thousands of people drove past that cave every winter, oblivious to the bats or their plight. Few people know about Endangered bats and fewer still care. And yet I was about to witness one of the most spectacular sights of my career in biology: a living tapestry of irregular shape, 20 feet long and 10 feet across, composed of animals so tiny that I could cup one entirely within my closed hand. The bats were arrayed on the ceiling of a ledge so cramped that I had to take great care not to dislodge them as I crawled beneath to measure their cluster and census them.

Usually, about one-fourth of the Indiana bats that hibernate in this cave form the same cluster in the ledge area. The rest are nearby, their clusters extending into a large room. I have been in awe of this particular cluster since I began censusing the cave 4 years ago, and I always come away a bit humbled. Despite our ability to count them, to weigh and measure them, to record the temperature at their roost site, or whatever other physical parameters we care to examine, we still do not know some of the most fundamental things about them. How far did they come, where did they spend the summer, what habitats do they use and need and what threatens them there, how did they find this particular cave, what would they do if it became unavailable to them, and an entire host of other questions concerning their biology and behavior remain to be answered.

I was on my way down to count these Endangered bats, but it is they who are on the way down. Even with our best efforts to date, I still counted fewer Indiana bats rangewide than I did 2 years before. I have conducted this census three times now, and each time, despite individual fluctuations among the caves, gains at one have been more than offset by losses at another; the result has been continued decline.

Causes of Decline

The Indiana bat is a medium-sized member of its genus and weighs less than one-third of an ounce (6 to 9 grams). No subspecies are recognized. They are found throughout much of the eastern half of the United States, with the largest hibernating populations found in Indiana, Missouri, and Kentucky. The species is extremely vulnerable due to its penchant for aggregation; fully 85 percent of the entire known population winters in only seven caves.

Indiana bats have been little studied and, until very recently, poorly known even in terms of their distribution, abundance, and status. The work of early investigators was limited to the hibernation caves used by the species, and only since the mid-1970's has anything been learned about their summer distribution and ecology.

photo by Merlin D. Tuttle, Bat Conservation International

Indiana bats are so small that one can fit within a closed hand.

One of the first species in the United States to be recognized as Endangered, the Indiana bat has received legal protection as such since the passage of the Endangered Species Act of 1973. It is endangered primarily due to the direct and indirect actions of man. The most serious known cause of decline is human disturb-

(continued on next page)

Indiana Bats

(continued from page 9)

ance of hibernating bats. Once in hibernation, bats must conserve their body fat supplies until spring or face starvation. When aroused from hibernation, they can expend 10 to 30 days of these limited reserves.

Vandalism and direct destruction of roosting bats have been documented as well. Improper gating of cave entrances and construction for cave commercialization have altered cave microclimates, rendering some caves unsuitable for Indiana bat hibernation.

Other human-related factors that have been implicated in the decline of the species include habitat changes (such as stream channelization and bank modification, forest cleanng and alteration, and agricultural development) and indiscriminate collecting. Although pesticide poisoning of Indiana bats has not been documented, other North American bats in agricultural habitats have declined due to the effects of pesticides, and it is likely that the species suffers at least some level of contamination. Natural phenomena associated with Indiana bat declines include flooding of hibernacula, freezing during severe winter weather, and collapse of mines occupied for hibernation.

Habitat

Indiana bats hibernate in large, densely packed clusters of about 300 bats per square foot in caves or mines that have stable winter temperatures below 50 degrees Fahrenheit, with the preferred temperature being 39 degrees to 46 degrees. Specific roost sites that provide this climate are selected and used from year to year. Usually the majority of bats will be found just beyond the twilight zone of the hibernation cave, but this varies with time of season and configuration of the cave. Only a small percentage of the available caves provide for the Indiana bat's specialized requirements. For example, only 24 of Missouri's more than 4,700 known caves ever have contained hibernating colonies larger than 100 Indiana bats.

Recent studies indicate that Indiana bat maternity colonies are formed mostly in riparian and floodplain forest near small to medium-sized streams, although bats also have been found along tree-lined drainage ditches and in upland sites. It may be that this apparent pattern is more a function of habitat availability than of the species' actual preference. Clearing for agriculture has restricted forest habitats largely to riparian zones in their summer range. To date, few maternity roosts have been studied. Of these, three have been in riparian habitat and one was in an open, pastured woodlot. Roosts also have been found in the hollow of a tree and behind loose, exfoliating bark of both dead and living trees.

Optimum summer habitat must include mature trees, both to provide roost sites and because Indiana bats forage around the crowns of large trees. Preferred stream habitat appears to consist of streams lined on both banks with mature trees that overhang the water by at least 10 feet. Streams without riparian vegetation do not appear to be suitable. Upland forest with a well-developed canopy but poorly developed sub-canopy layer also appears to provide summer habitat.

Ecology and Behavior

Indiana bats are insectivorous. More than eight orders of insects have been identified in studies of their habits. Moths (order Lepidoptera), beetles (Coleoptera), and flies and midges (Diptera) are preferred prey.

Indiana bats are active from April through October, migrating seasonally between their summer roosts and hibernation caves. Summer colonies begin to disperse in August, and migrants return to their hibernacula in the months from August through October. The females enter hibernation first, followed by the males. It is during this time that mating takes place. Females store the sperm until spring, when ovulation and fertilization occurs.

In the yearly cycle, females leave the hibernacula first, in late March or early April. Males follow, but their exit is spread over a longer period, and some remain near their hibernation caves throughout the summer. Pregnant females migrate to their maternity roosts, arriving in early to mid-May where they form colonies of 50 to 100 individuals. The young, one per female, are born in June or early July. Males may migrate as well but, like most other species of bats, they generally do not roost with the females and young during the nursing period.

Preservation Efforts

An Indiana Bat/Gray Bat Recovery Team was assembled in the 1970's. The Recovery Team's responsibilities include advising the U.S. Fish and Wildlife Service of actions deemed necessary to preserve these endangered bats. Among these are monitoring the populations, cave protection, public education, and others. Actions for the Indiana bat to date have centered on the hibernation caves.

The team separated caves known to harbor Indiana bats into several classes based on population sizes. The most important (Priority 1) caves, of which there are 8, recorded populations of 30,000 or more bats each. The second category (Priority 2) contained populations above 1,000 but less than 30,000. All of the Priority 1 caves are or soon will be in public ownership, and of these six are gated or fenced and the other two will be protected in the near future. Many of the Priority 2 caves are protected as well.

Since 1983, I have censused seven of the eight Priority 1 caves on behalf of the Service. (One is an extremely dangerous abandoned mine that cannot be censused). We elected to have only one person census these caves in order to reduce observer bias, thus attempting to ensure that population trends noted in the census were real. Regular censusing did not begin until the 1980's and was not standardized until 1983. Over that time span, the Indiana bat has declined by 55 percent in these caves. The situation in the Priority 2 caves in several States is similar, with notable exceptions in Indiana and Kentucky. Despite efforts to protect this species during hibernation, the population has continued to decline.

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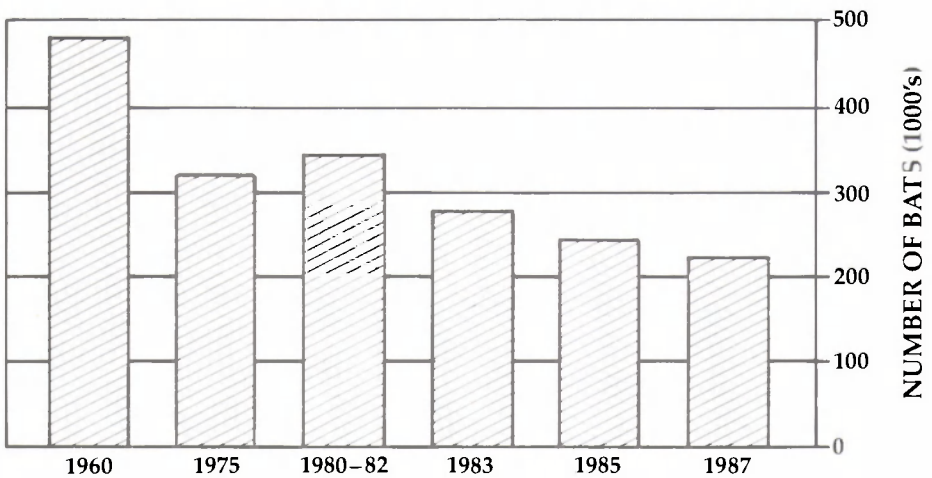
INDIANA BAT POPULATIONS
AT 7 PRIORITY 1 HIBERNACULA-1960-1987



Indiana Bats

(continued from page 10)

The Future

Overall, the prognosis for the Indiana bat is not good. We must gain a better understanding of the rest of its life cycle, learn what factors besides the known hibernation-associated ones are contributing to the species' decline, and correct them. A radio telemetry study of a maternity colony is getting underway in Illinois and may help provide answers. Research is needed throughout the principle summer range of the Indiana bat to determine its habitat preferences, whether or not summer habitat is a limiting factor, and what threats there are to its existence during the non-hibernation period (particularly from pesticides).

I hope that in the future when I go down to census Indiana bat populations, the trend is reversed and I can chronicle the rebound of this endangered bat. There still is time, and the mechanism (the Endangered Species Act) is in place to accomplish it, but if the Indiana bat continues to be "down for the count," the species could be knocked out completely.

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(*Editor's note*: Mr. Clawson has been a member of the Indiana Bat/Gray Bat Recovery Team since 1980 and team leader since 1984.)

Regional News

(continued from page 4)

level of the nesting area may indicate the beginning of a dry cycle that could cause reproduction or chick survival to decline in future years. Water conditions are still fair in the nesting grounds, but winter precipitation will be important in determining 1988 nesting habitat conditions.

Twelve whooping crane chicks hatched in May from eggs taken to Grays Lake National Wildlife Refuge in Idaho, but only 2 could be found by mid-August. Sandhill cranes (*Grus canadensis*) also experienced poor chick production and survival at the refuge this year. The cause of the poor survival rates is unknown.

* * *

Bitter Lake National Wildlife Refuge recently announced its intention to manage its aquatic resources for native fishes. The refuge, located in east-central New Mexico along the Pecos River, is home to the Endangered Pecos gambusia (*Gambusia nobilis*), the Threatened Pecos bluntnose shiner (*Notropis simus pecosensis*), and several listing candidates, including the greenthroat darter (*Etheostoma lepidum*) and the Pecos pupfish (*Cyprinodon pecosensis*). James Brooks, fisheries management biologist from Dexter National Fish Hatchery in New Mexico, has initiated surveys of the refuge's ponds and sinkholes. With the assistance of the refuge staff, all non-native fishes will be removed from the refuge in order to provide secure habitats for native fish and to enhance their recovery potential.

Region 4 — The Endangered Mississippi sandhill crane (*Grus canadensis pulla*) set a record for the number of nests produced during its March-June 1987 nesting season. The 18-year-old record of eight nests in one season was broken on May 25, when a pair of cranes that had lost its nest earlier in the season renested. Nine nests containing a total of 14 eggs were found on and near the Mississippi Sandhill Crane National Wildlife Refuge in Jackson County, Mississippi. In addition, although successful nesting by restocked cranes has never been documented, refuge biologists found a nest with a chick on April 8, 1987, belonging to a 5-year-old released crane and a wild mate. Since the discovery of that first nest in April, three more nests have been produced by released cranes. The four new pairs resulted in a near doubling of the five-nest total found in 1986. The long-term recovery goal for the Mississippi sandhill crane is a stable population of 100 cranes and 30 breeding pairs. Currently, there are 50 to 55 cranes and a minimum of 9 breeding pairs.

* * *

Two Florida east coast beach mice may be proposed for listing as Endangered or Threatened. The Anastasia Island beach mouse (*Peromyscus polionotus phasma*), considered for Endangered status, formerly occurred from the mouth of the St. Johns River in Duval County south along the coastal beaches to the end of Anastasia Island in St. Johns County. Most of the former habitat for this subspecies has been destroyed by beachfront development. Today, viable populations are believed to occur only at the Anastasia State Recreation Area on the northern part of Anastasia Island and on the Fort Matanzas National Monument at the southern end of the island. The southeastern beach mouse (*Peromyscus polionotus niveiventris*), considered for Threatened status, formerly occurred from Ponce (Mosquito) Inlet, Volusia County, south along the coastal dunes to Hollywood Beach, Broward County. As with the Anastasia Island beach mouse, much of the habitat of this subspecies has been destroyed by beach development. Good but vulnerable populations remain on Federal lands on Merritt Island and the Canaveral National Seashore where there are sizable amounts of protected habitat.

* * *

The taxonomic status of the Okeechobee gourd (*Cucurbita okeechobeensis*), a listing candidate, is being investigated by the Jacksonville, Florida, Field Office. The plant was once relatively abundant near the southern and eastern shores of Lake Okeechobee until agricultural development destroyed most of its habitat in the 1920's. Dr. R. W. Robinson, a squash and pumpkin geneticist at the New York State Agriculture Experiment Station of Cornell University, has not found the gourd in recent years. Two other biologists have located only a few plants. The Okeechobee gourd is similar to a Mexican gourd described as *Cucurbita martinezii* by Liberty Hyde Bailey of Cornell, who had collected and worked with the Florida gourd earlier. The Mexican gourd has proved popular among American vegetable breeders as a source of genetic disease resistance for domestic gourds and squashes, a quality that has encouraged searches for new populations and evaluation of its relationship to the Florida plant.

In 1980, Dr. Robinson and a collaborator presented evidence in a newsletter article that the Florida and Mexican gourds should be assigned to the same species. He has continued to examine the gourds and is still convinced that the difference between them is slight. A Russian-language paper by A.I. Filov, which recently came to the attention of Cornell scientists, formally combined the two gourds into a single species. Filov, in 1966, named the Mexican plants *Cucurbita okeechobeensis* var. *martinezii*. A Cornell student, T. Andres, who is completing a doctoral thesis in *Cucurbita* systematics, is likely to treat these plants similarly. This taxonomic treatment leaves the Florida Okeechobee gourds as a distinct variety that remains eligible for Federal listing separately from the Mexican gourds.

* * *

Region 5 — The annual Virginia big-eared bat (*Plecotus townsendii virginianus*) maternity colony census, conducted this past June, showed that the number of adult female bats has increased for the fifth consecutive year. In West Virginia, where the majority of colonies (nine) occur, the count is up only 2 percent from last year, but the population has grown by nearly a third since the surveys began in 1983. The population at Virginia's one colony is apparently stable. At Kentucky's three colonies, numbers were up more than 40 percent from last year. Continuing these counts annually will reveal long-term trends within colonies and may also shed light on the dynamics of colony formation and division.

* * *

An Endangered mollusk, the pink mucket pearly mussel (*Lampsilis orbiculata*), has been rediscovered at its

(continued on page 12)

Regional News

(continued from page 11)

type locality in the upper Ohio River. It was found upstream of Huntington, West Virginia, by Service biologist Bill Tolin. This is the first time in 75 years that this mussel has been seen in this river reach; there is only one other occurrence in the Ohio basin within a thousand river miles. This find indicates that water quality in the area is still high enough to provide habitat for this rare mussel. Actually, according to Tolin, water quality in the area has greatly improved in recent years.

Region 7 — Last observed on Adak Island in 1975 by botanist Dr. David K. Smith, the Aleutian shield-fern (*Polystichum aleuticum*) is one of the rarest ferns in North America. In April 1987, the Service proposed that the Aleutian shield-fern be designated an Endangered species (summary in BULLETIN Vol. XII No. 5-6). Efforts in recent years to find an extant population of *P. aleuticum* had failed until this August, when Dr. Smith—after searching for several days—located seven plants on Mt. Reed, Adak Island, Alaska. Now assured that the shield-fern is not extinct, evaluation of a final rulemaking adding this plant to the Endangered species list will continue.

* * *

The most recent recovery effort for the Endangered Aleutian Canada goose (*Branta canadensis leucopareia*) was the successful translocation of 136 birds (60 adults and 76 goslings) from the main breeding island of Buldir to Amchitka Island, Alaska. It is our hope that female hatch-year birds from this release will return to Amchitka when sexually mature and establish breeding territories there. Field biologists from the Alaska Maritime National Wildlife Refuge also confirmed that Aleutian geese are once again nesting on Agattu Island. This population was reestablished in 1984 after the introduced arctic foxes (*Alopex lagopus*) were removed and family groups of geese from Buldir were released there. For the first time in decades, Aleutian geese were found nesting on Nizki Island. Nizki was the site of a release of over 350 primarily captive-propagated Aleutian geese in 1981. Currently, Aleutian geese nest on Chagulak, Agattu, Nizki, and Kaliktagik Islands in addition to Buldir.

BOX SCORE OF LISTINGS/RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES HAVING PLANS
Mammals	27	20	242	5	0	22	316	23
Birds	60	16	141	7	2	0	226	55
Reptiles	8	6	60	11	4	13	102	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	39	4	11	24	6	0	84	45
Snails	3	0	1	5	0	0	9	7
Clams	28	0	2	0	0	0	30	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	5	0	0	13	12
Plants	126	6	1	28	3	2	166	56
TOTAL	309	52	466	90	15	37	969	247**

*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, green sea turtle, Olive ridley sea turtle, leopard, and piping plover.

**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: 213
Number of species currently proposed for listing: 20 animals
35 plants

Number of Species with Critical Habitats determined: 98
Number of Cooperative Agreements signed with States and Territories: 49 fish & wildlife
34 plants

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ENDANGERED SPECIES

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