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ENDANGERED SPECIES

Technical Bulletin

Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. 20204

Listing Protection is Proposed for Eight Vulnerable Species

During August and September of 1988, the Fish and Wildlife Service proposed to list eight taxa—five plants and three animals—as Endangered or Threatened species. If these species are listed, Endangered Species Act protection will be available to the following:

American Hart's-tongue Fern *(Phyllitis scolopendrium* var. *americana)*

The hart's-tongue fern is a species common in parts of Europe, but the rare American variety is restricted to a few locations in North America. This unique plant is found only at sites on or near dolomitic limestone (a type of limestone high in magnesium) with high humidity, shade, and a moist substrate.

The American hart's-tongue fern is currently known from two counties in Alabama, one county in Tennessee, one county in Michigan, two counties in New York, and seven counties in the Canadian Province of Ontario. In the northern part of its range, the variety occurs on or adjacent to limestone outcrops. The southern populations, however, are found only within limestone pits that trap cold air, have high humidity, and are well shaded. Such sites mimic the climate in which the northern populations grow.

Since the American hart's-tongue fern was discovered almost 200 years ago, this plant has been rare and limited to a small number of sites. Early concern for its survival is demonstrated by such articles as R. C. Benedict's 1925 publication, "Saving the Hart's Tongue." The primary threats to the fern include logging, quarrying, residential development, trampling, and other forms of habitat disturbance. Inappropriate collecting is another danger, at least to the smaller southern populations.

Michigan, Tennessee, and New York recognize the vulnerability of the American hart's-tongue fern and restrict take of the plant under State law. On September 12, 1988, the Service proposed to add Federal protection by listing the variety as Threatened. Some efforts to conserve the fern already have been made. The Tennessee site has been leased by The Nature Conservancy, two of the Michigan populations are on land owned by the Michigan Nature Association, and two of New York's sites are within State parks. Another of Michigan's populations is on land managed by the U.S. Forest Service (Hiawatha National Forest), which has rerouted a trail that traversed the area. One of Alabama's two sites is on a national wildlife refuge that was established by the Fish and Wildlife Service to conserve the Endangered gray bat *(Myotis grisescens).*

drawing by Ann E. Lacey, reprinted courtesy of New York State Museum-Albany

***American hart's-tongue fern* (Phyllitis scolopendrium var. americana)**

Four Florida Plants

Two of Florida's recently proposed plants, **Cooley's water-willow *(Justicia cooleyi)*** and the **Brooksville bellflower *(Campanula robinsiae)***, are herbaceous species found only in north-central Hernando County. Cooley's water-willow is a rhizomatous perennial belonging to the acanthus family (Acanthaceae) and has upright, quadrangular stems usually less than 16 inches (40 centimeters) tall. Its small flowers are lavender-rose in color

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Regional News

Regional endangered species biologists reported the following news and activities for August and September:

Region 1 — August 1988 marked the beginning of the temporary, experimental Andean condor *(Vultur gryphus)* release effort at Hopper Mountain National Wildlife Refuge in southern California. Four female Andean condor chicks that had hatched at the Patuxent Wildlife Research Center in Maryland, San Diego Wild Animal Park, and Buffalo, New York, Zoo were transported to the refuge and released into holding pens. Researchers observed how the chicks acclimated to their new surroundings and each other before releasing them into the large netted enclosure that will be their home until they are ready to fly. Unfortunately, one of the immature condors died, apparently of stress, during transport to the release site.

After their release, the Andean condors will be monitored in the wild for 2 years and then recaptured for permanent release in Columbia, South America.

The Andean condor experiment will allow biologists to evaluate techniques that can be used to reestablish a wild population of the critically Endangered California condor *(Gymnogyps californianus)* in the future.

* * *

Region 1 met with staff from Regions 2 and 6 to discuss future recovery actions for the American peregrine falcon *(Falco peregrinus anatum)* in the western States. In the early 1980's, fewer than 10 pairs nested in Oregon, Washington,California, and Idaho; today, however, 104 nesting pairs are known. The Regions agreed on a 5-point action plan:

1) The two existing recovery teams (Pacific population and Rocky Mountain/ Southwest population) will be combined into a single recovery team.

2) The new team will prepare an addendum plan that links the two existing recovery plans.

3) Region 1 will host a meeting of experts to consider the recovery actions needed to integrate the recovery plans.

4) A thorough status review of the species will be initiated.

5) A reintroduction plan for 1989 will be prepared.

* * *

The Boise, Idaho, Fish and Wildlife Enhancement Field Station of the U.S. Fish and Wildlife Service has completed a 3-year cooperative agreement with the Bureau of Land Management to study a variety of issues related to the status and recovery of the Malheur wire lettuce *(Stephanomeria malheurensis)* and Macfarlane's four o'clock *(Mirabilis macfarlanei)*, two Endangered plants in Idaho and Oregon. The work has been an interagency effort: the Service organized and coordinated the work while the Bureau of Land Management contributed over $8,000 toward the study. Students and faculty at Boise State College also participated.

The research examined the important pollinator insects, the effects of livestock grazing on plant vigor, and artificial propagation. An intensive search for new colonies was included in the study. A total of 13 colonies of the four o'clock are now known. Nine were discovered as a result of this study, and one additional colony was established through outplantings. If these colonies can be secured from

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

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Final Listing Rules Approved for 25 Species

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During August and September of 1988, thirteen plant and twelve animal species were added to the Federal list of Endangered and Threatened species. The following now receive protection under the Endangered Species Act:

Mead's Milkweed *(Asclepias meadii)*

This tall grass prairie perennial, a member of the milkweed family (Asclepiadaceae), has a solitary stalk 8 to 16 inches high and broadly ovate opposite leaves with a whitish "waxy" covering. Historically ranging throughout much of the tall grass prairie, the plant is now restricted to 81 populations in 23 counties in Kansas, Missouri, Iowa, and Illinois. Only 15 percent of the populations are found on public land and receive official protection. The survival of the species is threatened by urban development, agricultural expansion, and detrimental agricultural practices. The small number of plants at each site and the species' poor reproductive success also threaten the continued existence of the species. Mead's milkweed was proposed for listing as a Threatened species in the October 21, 1987, *Federal Register* (see summary in BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 1, 1988.

Sandplain Gerardia *(Agalinis acuta)*

The sandplain gerardia, an annual member of the snapdragon family (Scrophulariaceae), is 4 to 8 inches tall with showy pink flowers. The species is known to occur only on open, sandy grasslands on Cape Cod, Massachusetts (two sites), and Long Island, New York (six sites), and on one serpentine barren in Baltimore County, Maryland. Another small population was discovered in early October in Rhode Island. Historically, the sandplain gerardia also occurred in Connecticut, but it is now believed extirpated in that State. The species is threatened by the continuing loss of its coastal grassland habitats due to residential and commercial development. The discontinuation of livestock grazing and the suppression of fires also have enabled competing woody vegetation to claim many of the plant's historical sites. The sandplain gerardia was proposed for listing as an Endangered species in the November 19, 1987, *Federal Register* (see summary in BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 7, 1988.

Mohr's Barbara's-buttons *(Marshallia mohrii)*

This perennial herb, a member of the aster family (Asteraceae), grows 1.0 to 2.3 feet tall with pale pink to lavender flowers. It typically occurs in moist prairie-like openings in woodlands and along shale-bedded streams. Other populations are located in swales on roadside rights-of-way. This species is known to exist on only 13 sites in Alabama and 1 site in Georgia. Five of these populations are confined to roadside rights-of-way and are threatened by routine maintenance practices or any future road expansion. Plants on the remaining privately owned sites are potentially threatened by conversion of their habitat to improved pastures or cropland. Woody plant succession also poses a threat to the survival of this species. Mohr's Barbara's-buttons was proposed for listing as a Threatened species in the November 19, 1987, *Federal Register* (see BULLETIN Vol. XIII, No. 6–7), and the final rule was published on September 7, 1988.

Chisos Mountain Hedgehog Cactus *(Echinocereus chisoensis* var. *chisoensis)*

This barrel-shaped cactus, a member of the family Cactaceae, has deep green to bluish-green stems up to 6 inches tall with showy red, white, and fuschia flowers. The entire known population of approximately 1,000 plants occurs in Big Bend National Park, Texas. Although collecting this plant without a permit is prohibited under National Park Service regulations, the species is vulnerable to illegal collecting, road maintenance, and trail construction. Habitat degradation from former grazing, climactic changes, or other undetermined factors also may be limiting the success of seedling establishment. The Chisos Mountain hedgehog cactus was proposed for listing as a Threatened species in the July 6, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 8), and the final rule was published on September 30, 1988.

Bradshaw's Lomatium *(Lomatium bradshawii)*

Bradshaw's lomatium, a small, herbaceous perennial plant in the family Apiaceae, is endemic to the lowland prairie community of the Willamette River Valley in Oregon. Once distributed throughout the valley, only 11 populations remain in isolated pockets. Over 90 percent of the known plants are located within a 10-mile radius of Eugene, Oregon. These few remnant populations are threatened by agricultural, residential and industrial development. Suppression of fire also appears to be allowing competing woody vegetation to invade the prairie habitat, causing a decline in the species at most of the sites. Bradshaw's lomatium was proposed for listing as an Endangered species in the November 21, 1986, *Federal Register* (see BULLETIN Vol. XI, No. 12), and the final rule was published on September 30, 1988.

Large-fruited Sand-verbena *(Abronia macrocarpa)*

This herbaceous perennial, a member of the four o'clock family (Nyctaginaceae), may reach a height of 20 inches and has showy pink-purple flower clusters. The only known population of the large-fruited sand-verbena occurs on sand dunes that lie entirely within a residential resort community in east Texas. In 1986, it was estimated that the population contained 250 plants. Because of its small population size and limited distribution, this species is vulnerable to residential development, recreation, and commercial use. The large-fruited sand-verbena was proposed for listing as an Endangered species on June 16, 1987 (see the summary in BULLETIN Vol. XII, No. 7), and the final rule was published on September 28, 1988.

Fassett's Locoweed *(Oxytropis campestris* var. *chartacea)*

This herbaceous perennial, a member of the pea family (Fabaceae), is covered with dense, white silky hairs and has rose-purple flowers. Fassett's locoweed is only known to occur on six sites in central Wisconsin, where it is found on sandy/gravelly shorelines of small inland lakes, and its total known population numbers fewer than 5,000 individual plants. The species occurs entirely on privately owned land, and is vulnerable to shoreline development and grazing. Fassett's locoweed was proposed for listing as a Threatened species in the December 4, 1987, *Federal Register* (see BULLETIN Vol. XII, No. 1), and the final rule was published on September 28, 1988.

Harperella *(Ptilimnium nodosum)*

The harperella is an annual in the family Apiaceae growing up to 3 feet in height. This plant is found only in two habitat types: shallow, intermittently flooded coastal plain ponds and rock or gravel beds along clear, swift-flowing streams. Only ten viable populations are known: six stream populations in Alabama, Maryland, North Carolina, and West Virginia, and four pond populations in Georgia and South Carolina. Over half of the histor-

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ically known harperella populations have disappeared. Wetland drainage, water quality degradation, siltation, filling or deepening of ponds, home and road construction, mining, and other forms of development threaten the plant's habitat. A proposal to list the harperella as an Endangered species was published on February 25, 1988 (see summary in BULLETIN Vol. XIII, No.3), and the final rule was published on September 28, 1988.

Mountain Sweet Pitcher Plant *(Sarracenia rubra* spp. *jonesii)*

This subspecies of pitcher plant in the family Sarraceniaceae is a perennial insectivorous herb endemic to mountain bogs and streams in North and South Carolina. Twenty-six populations of the plant were reported historically, but only 10 remain (four in North Carolina and six in South Carolina). Most of the populations are extremely small, and eight of them are on private land. The survival of this species is threatened by drainage, impoundment, grazing, natural succession, collecting, and development. On February 10, 1988, a proposal was published to list the mountain sweet pitcher plant as an Endangered species (see BULLETIN Vol. XIII, No.3); the final listing rule was published on September 30, 1988.

Swamp Pink *(Helonias bullata)*

The swamp pink is a very attractive member of the lily family (Liliaceae), with a pink or purplish inflorescence at the top of a 1 to 2 foot stalk and lance-shaped evergreen leaves. Historically, this plant occurred in a variety of freshwater wetlands from southern New York to northern Georgia. Only about 75 populations of the species are now known, with 35 of them in New Jersey and the remainder in Virginia (16), North Carolina (7), Delaware (6), Maryland (4), South Carolina (1), and Georgia (1). The plant is believed to be extirpated from New York. The swamp pink is threatened by the filling and draining of its wetland habitats and by collecting. Pollution and sedimentation associated with urban and agricultural runoff also have rendered many habitats unsuitable for the species. On February 25, 1988, a proposed rule was published to designate the swamp pink as a Threatened species (see BULLETIN Vol. XIII, No. 3), and on September 9, 1988, the final rule was published.

Dwarf Lake Iris *(Iris lacustris)*

This herbaceous perennial, a member of the family Iridaceae, is less than 6 inches high and has attractive flowers that range in color from blue to dark violet. The species is found along the northern shores of Lakes Michigan and Huron, at about 60 sites in Michigan and 15 sites in Wisconsin, and in several areas of Ontario, Canada. It seems to thrive on calcareous gravels in partial shade near the lakeshores. Threats to this species include private residential shoreline development, road widening, chemical spraying and salting, and off-road vehicle use. Natural plant succession also has reduced habitat for the species. The dwarf lake iris was proposed for listing as a Threatened species on December 4, 1987 (see BULLETIN Vol. XIII, No.1), and the final rule was published September 28, 1988.

Erubia *(Solanum drymophim)*

The erubia is a tall evergreen shrub in the nightshade family (Solanaceae) that occasionally reaches 18 feet in height. This shrub is endemic to Puerto Rico, where it is found in evergreen forests on volcanic soils from 1,000 to 3,000 feet in elevation. Possibly once common, the species has been widely extirpated due to deforestation and deliberate eradication efforts. Only one population of about 200 individuals is known to survive. This site is on private land and is subject to commercial development. Proposed for listing as an Endangered species on November 19, 1987 (see BULLETIN, Vol. XII, No. 11–12), the erubia was listed in final on August 26, 1988.

Hinckley Oak *(Quercus hinckleyi)*

This low-growing shrubby evergreen, a member of the family Fagaceae, grows amid the Chihuahuan Desert scrub vegetation of western Texas where it usually forms dense thickets. Four populations of the Hinckley oak have been documented, one of which was discovered in 1988. Three of the known populations are on Big Bend Ranch, which was recently purchased by the State of Texas as a State park. The fourth population is on private land near a State highway. The plants are potentially threatened by road improvements, wildlife predation, disease, hybridization with other oak species, and collecting. On September 16, 1987, the Hinckley oak was proposed for listing as a Threatened species (see BULLETIN Vol. XII, No. 10); on August 26, 1988, the listing was made final.

Five Texas Cave Invertebrates

These small invertebrates are restricted to six or fewer small, dry caves near Austin, Texas. The **Tooth Cave pseudoscorpion *(Microcreagris texana)*** resembles a tailless scorpion, and is known to occur in only two caves. **The Tooth Cave spider *(Leptoneta myopica)*** is sedentary, spinning webs from the ceiling and walls of only one cave. The light yellowish-brown **Bee Creek Cave harvestman *(Texella reddelli)*** is probably predatory on small insects, and lives in at least five caves. The reddish-brown **Tooth Cave ground beetle *(Rhadine persephone)*** probably feeds on cave cricket eggs, and is known to occur in only two caves. The dark-colored, short-winged **Kretschmarr Cave mold beetle *(Texamaurops reddelli)*** is known to live in only four caves. The primary threat to these five species comes from potential loss of habitat due to urbanization. All of these caves are on private land, and most are in an area on which road, residential, commercial, and industrial development is likely. One of the caves may have already been lost to development. The five invertebrates were proposed for listing as Endangered species on April 19, 1988 (see BULLETIN Vol. XIII, No. 5), and the final rule was published on September 16, 1988.

Alabama Cave Shrimp *(Palaemonias alabamae)*

The Alabama cave shrimp is another rare cave-dwelling species. This small, nearly transparent freshwater crustacean has been found in only two caves in Alabama. The population in one of the caves has declined and may no longer exist. Groundwater contamination from surface runoff, low population levels, and collecting are the major threats to the survival of the species. The Alabama cave shrimp was proposed for Endangered status on November 19, 1987 (see BULLETIN Vol. XII, No. 11-12), and the final rule was published on September 7, 1988.

Shasta Crayfish *(Pacifastacus fortis)*

The Shasta crayfish is native to a small portion of the Pit River drainage system, including tributaries of the Hat Creek and Fall River subdrainages, in California. Its preferred habitats are cool, clear, spring-fed lakes, rivers and streams. Because of its specialized habitat needs, the Shasta crayfish is particularly vulnerable to changes in its aquatic environment. Major threats to the crayfish include: 1) habitat degradation and loss due to water diversion and impoundment projects, agricultural and residential development, and water pollution, and 2) competition with introduced crayfish. A comparison of population surveys conducted during 1978–1979 and 1985–1986 revealed the Shasta crayfish population had dropped more than 50 percent in the intervening 6 years, and that the remaining population numbered fewer than 3,000 individuals. On July 10, 1987, the Shasta crayfish was proposed for listing as an Endangered species (see BULLETIN Vol. XII, No. 8), and on September 30, 1988, the listing was made final.

Boulder Darter *(Etheostoma* sp.)

This small, olive- to gray-colored fish inhabits swift current flowing over boulder

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substrate in the Elk River system of Tennessee and Alabama. It is known to occur in disjunct segments on about 62 miles of the Elk River, and in about 2 miles of 2 Elk River tributaries. The current distribution represents a substantial reduction over the darter's historically known range. The species' decline has resulted primarily from habitat alteration associated with water impoundments. Water pollution from improper pesticide use, toxic chemical spills, uncontrolled phosphate mining, and increased levels of siltation could further threaten the species. The boulder darter was proposed for listing as an Endangered species on November 17, 1987 (see BULLETIN Vol. XII, No. 11–12), and the final rule was published on September 1, 1988.

Two Long-nosed Bats

Both the **Mexican long-nosed bat *(Leptonycteris nivalis)*** and **Sanborn's long-nosed bat *(L. sanborni)*** are adapted for life in arid country, and are found mainly in desert scrub habitat in the U.S. parts of their range. They depend largely on caves for roosting and on the flowers of agaves and certain cacti for food. Both species evidently have declined in recent years, and the remaining populations are jeopardized by disturbance of roosting sites, loss of food sources, and direct killing by humans. The Mexican long-nosed bat originally occurred from southwestern Texas and perhaps southwestern New Mexico, through much of Mexico, to Guatemala. The only roosting site in the U.S. currently known to be in use is a cave in Big Bend National Park, Texas. Sanborn's long-nosed bat originally occurred from central Arizona and southwestern New Mexico, through much of Mexico, to El Salvador. Only one breeding population (about 500 bats) is now known to occur in the U.S. in southeastern Arizona, although two other small populations may survive in this area. These bats were proposed as Endangered species on July 6, 1987 (see BULLETIN Vol. XII, No. 8); the final rule was published on September 30, 1988.

Stephens' Kangaroo Rat *(Dipodomys stephensi)*

This small, nocturnal rodent is endemic to southern California. The species probably once occurred through annual grassland or sparse coastal sage scrub of the Perris and San Jacinto Valleys and up adjoining sandy washes. However, urban and agricultural development have greatly reduced the habitat and range of the Stephens' kangaroo rat. Most of the species' remaining habitat is in private ownership, and consists of small (less than 10 acres), isolated pockets that are not expected to support the species indefinitely. The Stephens' kangaroo rat was proposed for listing as an Endangered species on November 19, 1987 (see BULLETIN, Vol. XII, No. 11–12), and the final rule was published on September 30, 1988.

Visayan Deer *(Cervus alfredi)*

Known only from the Visayan Islands in the central Philippines, this small deer has the most restricted range of all surviving species in the genus *Cervus*. The deer, standing about 25 inches at the shoulder, has a dark brown coat with light spots. It originally inhabited eight islands and was fairly widespread in the early 20th century. Logging and slash-and-burn agriculture eliminated much of the dense forest habitat on which the deer depends, and made its range more accessible to hunters and settlers. Today the deer survives on only four islands, in relatively small and isolated patches of remnant habitat. Although the deer is protected by Philippine law, hunting pressure is intense, especially during the dry season when the forests are more accessible. If the current rate of habitat loss and hunting pressure continue, the largest group is not expected to survive to the end of the century. The Visayan deer was proposed for listing as an Endangered species on August 19, 1987 (see BULLETIN Vol. XII, No. 9), and the final rule was published on September 1, 1988.

Mussel Reintroduction May Reduce Danger to Listing Candidates

Dick Biggins
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Two species of mussels that are candidates for possible listing proposals, the slab-side pearly mussel *(Lexingtonia dolabelloides)* and the rough rabbit's foot pearly mussel *(Quadrula cylindrica strigillata)*, have been reintroduced into their historical habitat in the Duck River in south-central Tennessee. The reintroduction was a cooperative effort of the Fish and Wildlife Service (Tennessee Cooperative Fishery Research Unit and the Asheville Field Office) and the Tennessee Valley Authority. This project involved the movement of 1,213 individuals (102 slab-side pearly mussels and 20 rough rabbit's foot pearly mussels, with the remainder made up of six noncandidate mussel species).

The mussels, which were collected from the Duck River downstream of the reintroduction site, were marked and

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photo by Dick R. Biggins

Eight species of mussels, including two that are candidates for listing proposals, were placed into their historical range in the Duck River.

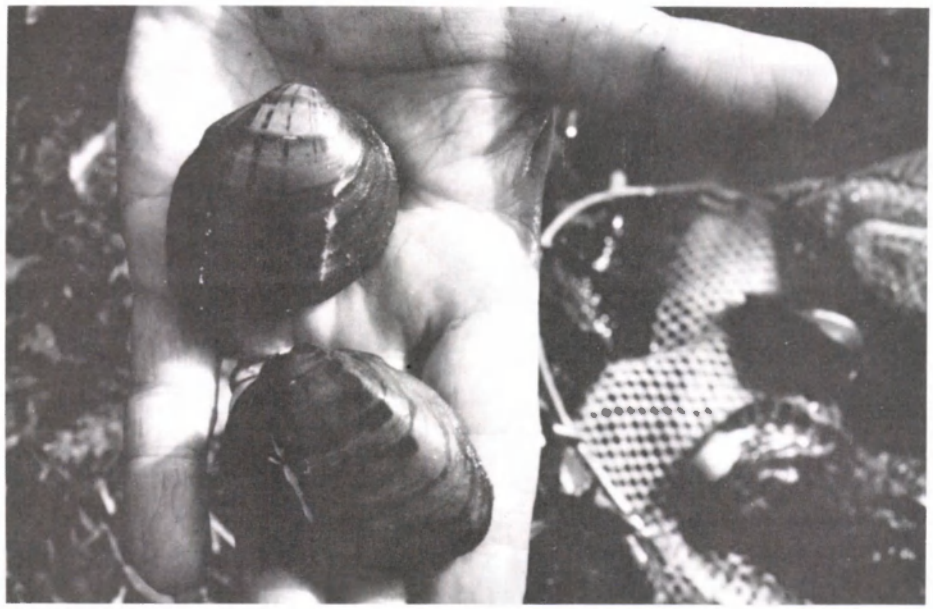

photo by Dick R. Biggins

***slab-sided pearly mussels* (Lexingtonia dolabelloides)**

Mussel Reintroduction

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inserted into the gravel substrate in a grid pattern throughout the transplant riffle area, producing a density of about 10 mussels per square meter. Initial observations indicate that mussels are maintaining their position within the substrate. To assess survival, reproduction, and recruitment within the bed, the site will be quantitatively monitored over the next few years. In addition, other ecological data will be gathered to determine the preferred habitat of each species. The reintroduction was part of a Service program to reduce or eliminate threats to candidate species before they require listing.

Experimental Population Approved for Rare Catfish

A Federal/State effort to establish an experimental population of the yellowfin madtom *(Noturus flavipinnis),* a rare species of catfish, was approved by the Fish and Wildlife Service in August 1988 (F.R. 8/9/88). Under this rule, the fish will be reintroduced into an unoccupied part of their former range and designated as a "non-essential experimental population."

The yellowfin madtom once occupied many lower gradient streams in the upper Tennessee River basin, but it currently survives in only three locations: Citico Creek (Monroe County, Tennesse), a stretch of the Powell River (Hancock County, Tennessee), and Copper Creek (Scott and Russell Counties, Virginia). It was listed by the Fish and Wildlife Service in 1977 as a Threatened species. Good habitat for the madtom remains in the North Fork of the Holston River (Smyth and Washington Counties, Virginia), and the Service proposed on September 8, 1987, to establish an experimental population in Smyth County (summary in BULLETIN Vol. XII, No. 10-11). Although Smyth County officials subsequently declined to participate, Washington County has agreed to accept the fish.

The Fish and Wildlife Service has been working with the National Park Service for the past several years to reintroduce the yellowfin madtom in Abrams Creek within the Great Smoky Mountains National Park (Blount County, Tennessee). When a sufficient number of fish have been established there, the Service will direct its efforts to the Holston River (probably in 1989 or 1990). The fish for stocking will originate from madtom eggs gathered in Citico Creek. Current plans call for 100 to 200 fish to be introduced annually into one or two pools on the Holston River in Washington County for at least several years, contingent on the availability of funds. The reintroduction effort will be a joint project among the Virginia Commission of Game and Inland Fisheries, the University of Tennessee, the Tennessee Wildlife Resources Agency, the U.S. Forest Service, and the Fish and Wildlife Service.

Under its designation as a "nonessential experimental population," the Washington County yellowfin madtom population will be treated for most purposes of the Endangered Species Act as a species that is *proposed* for listing. The experimental population approach is designed to promote wider public acceptance of endangered species reintroductions by authorizing a greater degree of management flexibility. (See summary in BULLETIN Vol. IX, No. 9.)

Alabama Cavefish Reclassified to Endangered

The Alabama cavefish *(Speoplatyrhinus poulsoni),* a blind, colorless fish known only from Key Cave in Alabama, was listed in 1977 as Threatened. Since then, extensive surveys of other caves in the region have failed to detect the species anywhere else. A 1985 estimate put the sole population at fewer than 100 individuals. Recent information indicates that groundwater pollution, a major threat to the aquatic habitat of Key Cave, threatens the small, restricted population with extinction. Because this species apparently is in greater peril than was previously known, the Service has reclassified it from Threatened to the more critical designation of Endangered (F.R. 9/30/88).

Listing Proposed

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and are shaped like a small snapdragon. Botanists know of seven current *J. cooleyi* sites. Although this species primarily inhabits native hardwood forests, two of the colonies occur in a modified woodland, one is found on a wide highway right-of-way amid a clump of trees, and one is in a cattle pasture. Some of the plants are protected by The Nature Conservancy's Robins Memorial Forest Preserve; however, habitat loss in other areas could imperil the species' survival.

The Brooksville bellflower is found at three sites, two of them on wet ground at the edges of two ponds. A moisture-

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drawing by Anna Lisa King

***Brooksville bellflower* (Campanula robinsiae)**

Listing Proposed

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dependent species, its abundance apparently fluctuates considerably from year to year depending on water levels. Although there appears to be little danger to *C. robinsiae* from direct habitat destruction, runoff from nearby developed areas could modify its habitat by affecting the quantity and quality of its water supply.

Both species already are listed by Florida as endangered and they receive some protection under State law. A Federal listing would complement this protection, especially with regard to any potential Federal actions that could jeopardize the plants. The U.S. Department of Agriculture operates a Subtropical Agricultural Research Station and a Soil Conservation Service facility in the area. Colonies of both species occur on the research station, and the other facility contains *Justicia cooleyi* habitat. Management of these properties has so far not threatened the plants, but the agency will be required to avoid any future impacts if the two species are listed by the Service.

The proposal to list *Campanula robinsiae* and *Justicia cooleyi* as Endangered species was published in the September 12, 1988, *Federal Register.*

The **Florida ziziphus *(Ziziphus celata)*** and the **scrub blazing star *(Liatris ohiingerae)*** are the two other Florida plants proposed by the Service during September for listing as Endangered (F.R. 9/28/88). Both are found only in sand pine scrub vegetation, an unusual type of habitat that is restricted to Florida. Sand pine scrub supports a rich assemblage of endemic species, including 13 taxa (10 plants and 3 animals) that are already federally listed as Endangered or Threatened. This native habitat is rapidly being converted to citrus groves and housing developments.

The scrub blazing star is a perennial, herb in the aster family (Asteraceae) with erect stems reaching up to about 3 feet (one meter) in length and very narrow leaves. Its exceptionally large, bright pinkish-purple flower heads are so attractive that this species has been collected frequently. A 1988 survey found *L. ohlingerae* in 93 sites, 71 of them in Highlands County and the rest in Polk County. This relatively high count is misleading, however; most of the colonies are on small, isolated pockets of scrub habitat, and sites are disappearing very rapidly to development. The only currently protected habitat for this species is on the private Archbold Biological Station, Arbuckle State Forest and Park, and a tract that the State is acquiring at Saddle Blanket Lake. Florida already lists the scrub blazing star under State law as endangered.

The Florida ziziphus, a shrub in the buckthorn family (Rhamnaceae), grows to approximately 5 feet (1.5 m) high. It is distinguished by its small,dark, glossy green leaves borne on conspicuously spiny, zigzag branches. This species is considered one of the rarest shrubs in North America. Currently, despite intensive surveys, only two *Z. celata* populations are known. The better known population consists of about 30 stems, possibly growing from a single rootstock, on approximately 2 acres of scrub habitat in Polk County. A recently discovered population is in Highland County. Both sites are privately owned and neither is protected. Florida has proposed adding *Z. celata* to its own endangered species list.

drawing by Anna-Lisa King

***scrub blazing star* (Liatris ohiingerae)**

Two Woodland Salamanders

Two species of woodland salamanders in the genus *Plethodon* were proposed on September 28, 1988, for Endangered Species Act protection. The **Cheat Mountain salamander *(Plethodon nettingi)*** is known from a small area of the Allegheny Mountains in eastern West Virginia. A related species, the **Shenandoah salamander (*Plethodon shenandoah*)**, occurs on a few mountain slopes in Shenandoah National Park, Virginia.

The two salamanders are similar in appearance, reaching a maximum length of about 4.5 inches (12 cm) with dark grey to black bellies. The back of *P. nettingi* is dark and usually covered with a heavy sprinkling of brassy or silvery flecks. *Plethodon shenandoah* also has a dark back, but it lacks the heavy covering of flecks. Some individuals exhibit a color phase characterized by a narrow red

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stripe down the back. Woodland salamanders usually are found during the day under rocks and logs or in rock crevices below the ground surface. At night, especially during rainy weather, they forage on the forest floor and occasionally climb trees or other plants in search of mites, springtails, flies, small beetles, and other insects.

The Cheat Mountain salamander occurs in cool, moist, high-elevation red spruce-yellow birch forests in a roughly 19 by 50 mile area of Pendleton, Pocahontas, Randolph, and Tucker Counties in West Virginia. Its range is almost entirely within the proclamation boundaries of the Monongahela National Forest.

During the "timber boom" era in West Virginia (late 1800's to early 1900's), virtually all of the Cheat Mountain salamander's habitat was lost. Since that time, maturing spruce forests have reclaimed about 10 percent of their former extent. This habitat, however, is being affected by logging, coal mining, and the construction of ski resorts, pipelines, and hiking trails. These factors can affect the Cheat Mountain salamander by permanently altering the habitat or by creating drier conditions, which the salamander cannot tolerate.

A 1986 status survey located 54 *P. nettingi* populations, which probably are remnants of a much larger population that was fragmented by habitat loss. The survey also revealed that almost all of the remaining populations have been affected by habitat alteration. Many may no longer be viable, and at least two are known to have been extirpated since the survey. Accordingly, the Fish and Wildlife Service has proposed to list the Cheat Mountain salamander as a Threatened species (F.R. 9/28/88).

The U.S. Forest Service has designated *P. nettingi* as a "management indicator" species in the Monongahela National Forest. When any surface-disturbing activities are planned within the salamander's range, agency guidelines call for surveys to determine if the species is present in the specific project area. Whenever possible, salamander populations are to be avoided. If the species is listed as Threatened, this existing protection would be strengthened by the Endangered Species Act. The Forest Service does not anticipate any major changes in current management.

photo by Mark Watson

***Cheat Mountain salamander* (Plethodon nettingi)**

The future of the Shenandoah salamander is less hopeful. This species is known only from north-facing talus slopes on three mountains in Shenandoah National Park (Madison and Page Counties, Virginia). Within the talus, *P. shenandoah* is confined to a few "islands" of soil and/or vegetative debris where specific moisture conditions favorable to the species are found. Competition with the more widespread red-backed salamander (*Plethodon cinereus*) appears to be a major factor restricting the range of the Shenandoah salamander to the generally dry talus areas. *Plethodon shenandoah* can survive in these areas due to its greater tolerance of dry conditions. These talus slopes, however, are changing as organic matter and the products of erosion accumulate, creating a moister environment. As this trend continues, *P. cinereus* could gain a competitive edge over *P. shenandoah*, eventually displacing it from the last vestiges of its habitat.

The precarious status of the Shenandoah salamander led the Fish and Wildlife Service to propose listing it as Endangered rather than Threatened (F.R. 9/28/88). It is already classified by Virginia under State law as endangered. Because the National Park Service is concerned about the Shenandoah salamander, it prohibits any new human-related activities that could further deteriorate the species' habitat.

photo by C. Kenneth Dodd, Jr.

***Shenandaoah salamander* (Plethodon shenandoah)**

Roanoke Logperch *(Percina rex)*

This fish, which is endemic to Virginia waters, occurs in four widely separated

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populations. Each is vulnerable to extirpation because of water quality problems, relatively low density, and limited range. For this reason, the Service proposed on September 7, 1988, to list the Roanoke logperch as an Endangered species.

Large for a darter, this fish reaches up to approximately 5.5 inches (14 cm) in total length. It is characterized by an almost cylindrical body, conical snout, complete lateral line, and prominent bar markings on the sides. Roanoke logperch commonly live 5 to 6 years. During warm months, adults occupy gravel and cobble runs and riffles, while individuals of all ages apparently stay under large boulders within deep pools in winter. The species feeds primarily on aquatic insect larvae.

The Roanoke logperch occurs in four relatively small, disjunct populations. Three are within sections of the greater Roanoke River drainage (upper Roanoke River, Pigg River, and Smith River) and one is in the Nottoway River. All four are thought to be remnants of a single, much larger population that once occupied Virginia waters. The upper Roanoke River population, largest of the four, is under increasing stress from water pollution associated with urbanization, industrial effluents, and agricultural runoff. Several proposed water projects pose additional threats. The West Roanoke County Water Supply Project, intended to supply projected future water needs in the area, could result in long periods when an important stretch of logperch habitat is drawn down to low levels. Predicted effects of such low river flows include loss of riffle habitat, decreases in dissolved oxygen levels, increased concentration of pollutants, and higher water temperatures; however, recent project modifications should lessen the expected severity of these effects. Another proposed project, this one an Army Corps of Engineers flood control system, would involve channelizing the river within the city limits of Roanoke. Although the Corps has funded studies of the logperch and worked with the Service to reduce impacts, some adverse effects on the fish are expected.

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement 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 engage in interstate or international trafficking in listed animals except by permit for certain conservation purposes. For plants, it is unlawful to collect or maliciously damage any listed species found on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law or in the course of violating a State criminal tresspass law also is illegal under the Act. In addition, some States have their own more restrictive laws specifically against the take of State or federally listed plants.

Photo by Noel M. Burkhead and Robert E. Jenkins

***Roanoke logperch* (Percina rex)**

Nile Crocodiles in Zimbabwe Reclassified to Threatened

Because wild populations of the Nile crocodile *(Crocodylus niloticus)* in Zimbabwe have increased in recent years, these animals have been reclassified under the U.S. Endangered Species Act from Endangered to Threatened (F.R. 9/30/88). This change in the rules will allow noncommercial import of Nile crocodiles (e.g., sport hunting trophies) from wild populations in Zimbabwe into the United States in accordance with Zimbabwe laws and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Commercial import of wild crocodiles remains prohibited, although crocodiles and their skins from "ranched" populations in Zimbabwe can be imported for commercial purposes (see BULLETIN Vol. XII, No. 7).

The Nile crocodile historically occurred throughout much of Africa but was eliminated from many areas because of habitat loss, potential threats to people, and uncontrolled commercial hunting for the hide industry. After wholesale slaughter of Nile crocodiles for their skins took place in the 1950's, many accessible populations were seriously threatened with extinction. With subsequent protection by Zimbabwe and import restrictions by the U.S. (under the Endangered Species Act), crocodiles in that part of Africa began to increase. In some areas, including Zimbabwe, the damming of swift-flowing rivers created impoundments that provided additional

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Prospects Believed to be Improving for the Short-tailed Albatross

Michael Amaral
Alaska Regional Office

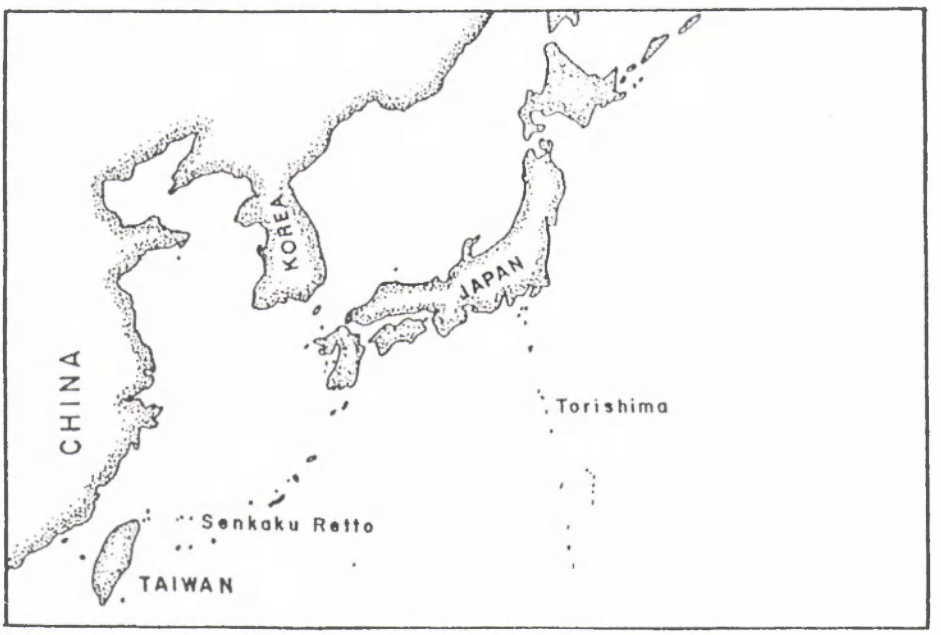
Dr. Hiroshi Hasegawa of Toho University in Chiba, Japan, is the world's leading researcher on the Endangered short-tailed albatross *(Diomedea albatrus)*. Since 1976, he has monitored the status of short-tails on Torishima Island, south of Japan, and since 1979 has banded all nestlings produced there with color-coded leg bands. Dr. Hasegawa's efforts have led to several observations of banded short-tails within the waters of Alaska and the Hawaiian Islands. In this way, he has contributed greatly to our understanding of the movements of this species away from its breeding grounds in Japan. In April 1988, Dr. Hasegawa was able to confirm a second breeding location for the species on Minami-kojima in the Senkaku Islands. At least seven nestings were observed.

After a lengthy correspondence, Fish and Wildlife Service endangered species staff in Anchorage arranged for Dr. Hasegawa to visit Alaska in September, where he presented a seminar on his albatross work and joined a cruise of the Service's research vessel, the Tiglax. After more than a decade of studying this seabird in Japan, Dr. Hasegawa was finally able to observe first-hand the waters of the eastern Aleutians and northern Gulf of Alaska where this species was historically an abundant and important member of the marine bird community.

The status of the short-tailed albatross is slowly improving. Sightings of this species in Alaska waters were scarce in the decades prior to 1980 but, while still considered rare, have increased significantly since then. On Torishima, Dr. Hasegawa reported that in 1976 he observed about 100 adults and 15 chicks, whereas 84 pairs nested and produced 64 fledglings in 1987. He estimates the total world population to be 400 birds. While the prognosis for the albatross seems cautiously favorable, Torishima is an active volcano with a history of violent eruptions. Rats have been introduced to the island and are another potential threat to eggs and young chicks. Lastly, Dr. Hasegawa reports that plastic particles are appearing with greater frequency in the food delivered to nestlings. Floating plastic can resemble the natural prey of the albatross, such as squid or large crustaceans, and can cause death when ingested.

photo by Hiroshi Hasegawa

short-tailed albatross



Current breeding range of the short-tailed albatross on Torishima and the Senkaku Retto Islands, off Japan. Figure adapted from Hasegawa and DeGange, American Birds, 1982.

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threats, they will constitute a major step towards recovery of the species.

The study also confirmed the inhibiting effects of cheatgrass *(Bromus tectorum)* on the recovery of the wire lettuce. Study plots in the field showed significantly reduced wire lettuce seed production when surrounded by dense stands of the aggressive, non-native grass. Given the widespread occurrence of cheatgrass in the west, it will be a formidable task to control this competitive species.

The Boise Field Station is compiling the study results for dissemination in the near future.

* * *

Region 2 — Biologists banded 17 whooping crane *(Grus americana)* chicks at Wood Buffalo National Park in the Northwest Territories, Canada, this summer. They believe that the summer 1988 production was 20 to 22 chicks. Canadian Wildlife Service biologist Ernie Kuyt documented the first record of a 3-year-old female producing fertile eggs; he previously had recorded several instances of 3-year-old males pairing with older females and producing fertile eggs. Heavy summer rains created excellent water conditions at Wood Buffalo and prospects are favorable for good nesting conditions again in 1989.

Only 2 of the 10 chicks that hatched last spring at Grays Lake National Wildlife Refuge in Idaho could be found for banding in August. Habitat conditions there have been the worst in the past 20 years. No surface water remains in the cattail and bulrush marshes on the 22,000-acre refuge. The only water is in small ponds within the marsh. Water is being pumped from a well at the headquarters into a previously dry pond near refuge grain fields so that the cranes will have drinking water. One of the whooping crane chicks was seriously underweight. Grain and pelleted food were placed in the marsh near the two surviving whooping crane chicks.

* * *

Personnel at Grays Lake National Wildlife Refuge observed an adult male whooping crane with an injured wing. It was captured and shipped by air to Chicago, where veterinarian Josh Dien of the Service's National Wildlife Health Center picked it up and took it by truck to the Center's lab in Madison, Wisconsin. The bone was too severely broken to repair and veterinarians amputated the outer wing on September 19. The bird seems to be recovering satisfactorily and will be retained in captivity. The male had been under observation all summer and was flying 2 days before the injury was noted. Field personnel believe the bird hit a fence because that was the only aerial

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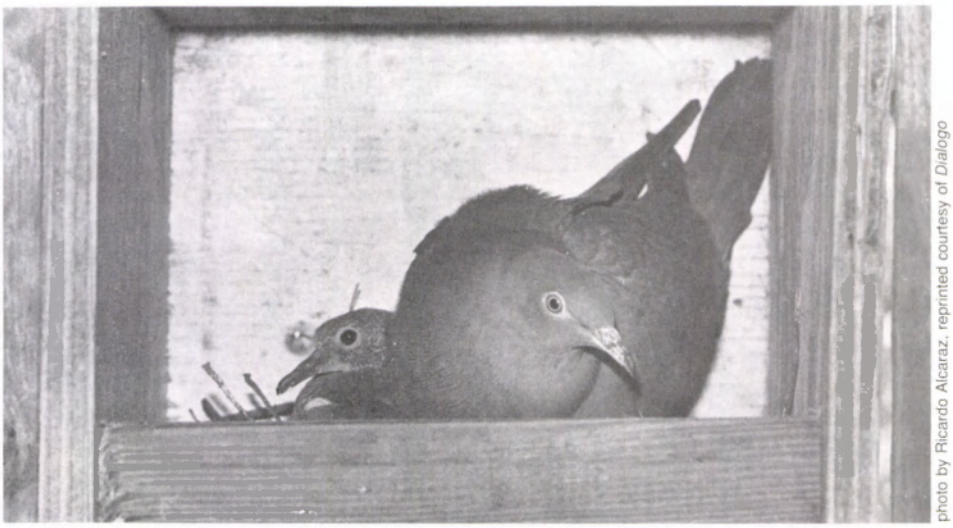

photo by Ricardo Alcaraz, reprinted courtesy of *Dialogo*

Buitre, an adult Puerto Rican plain pigeon, helped to incubate and raise his squab, Gulliver. This was the first time in the captive breeding program that a squab of this Endangered species has been hatched and cared for by its natural parents.

Break-through in Recovery of Puerto Rican Plain Pigeon

Hilda Diaz-Soltero
Caribbean Field Office
Boqueron, Puerto Rico

April 22, 1988, marked a day of quiet celebration on the Humacao Campus of the University of Puerto Rico. A Puerto Rican plain pigeon *(Columba inornata wetmorei)* squab, later christened "Gulliver," hatched from an egg incubated by a 4-year-old pair of these rare pigeons. Although other plain pigeon squabs have been hatched and foster-raised by domestic ringed dove *(Streptopelia risoria)* surrogates or hand raised by aviary staff, Gulliver is the first Puerto Rican plain pigeon squab in the captive propagation program to be incubated and subsequently raised by his own parents—a necessary step in the long process toward reintroduction of this Endangered species into the wild. Gulliver has since fledged, and another pair of pigeons has begun the incubation process (as of September 1988). "I think we have solved our biggest problem," stated program Director Raul A. Perez-Rivera, "as birds imprinted on surrogates or humans are not good candidates for reintroduction. Now we can start mass production for the eventual release of large numbers of plain pigeons into the Rio Abajo Forest."

Although little has been reported about the historical range and abundance of the Puerto Rican plain pigeon, its status declined as birds were shot and the habitat was extensively altered. The species was listed by the Fish and Wildlife Service in 1970 as Endangered. A single wild population exists in the Commonwealth of Puerto Rico between the municipalities of Cidra and Cayey. Its numbers have been reduced to fewer than 150 birds according to the latest census (April 1988). A captive breeding program was started in 1983 under a cooperative agreement among the University of Puerto Rico, Puerto Rico's Department of Natural Resources, and the Service. The modest aviary facilities, located on the Humacao Campus of the University of Puerto Rico, are soon to be replaced by a modern facility constructed with $50,000 from the Service and additional funds from the University.

The first plain pigeon squab in the captive breeding program was produced at the end of 1984. Laid by an 11-month-old female, the egg was artificially incubated and the resulting squab was hand raised. Domestic rock doves (*Columba livia* var.) provided the pigeon "milk" for all hand-raised birds, and ringed doves were later used as surrogate incubators and foster parents for the squabs. Another "first" this spring has been the captive production of second-generation plain pigeons. Surrogate ring doves successfully incubated two eggs and both squabs have fledged. A total of 47 squabs have been captive bred to date (September 1988), showing phenomenal success in the first 4 years of the program.

The next step will be to release captive-produced birds when a sufficient number are available. The chosen release site is within the Rio Abajo Commonwealth Forest. Located near the center of the island, this forest once sustained populations of the pigeon and the even more imperiled Puerto Rican parrot *(Amazona vittata)*. Attempts will be made to eventually establish new populations of both of these unique, endemic species with captive-produced birds. The success achieved by Professor Perez-Rivera makes this recovery action an ever closer reality for the Puerto Rican plain pigeon.

Peregrine Falcon Restoration Advances in the Southern Appalachians

V. Gary Henry
Asheville, North Carolina, Field Office

Nineteen eighty-eight was the first year in which the southern Appalachian States received the majority of peregrine falcons *(Falco peregrinus)* released in the eastern peregrine falcon recovery program. Last year, the revised Eastern Peregrine Falcon Recovery Plan consolidated the 11 previously defined recovery regions for this bird into a total of five. For the purposes of the plan, the boundary of the southern Appalachians recovery region was changed to include parts of nine States: Alabama, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. It includes the Appalachian and Blue Ridge Mountains from the Maryland-Pennsylvania State line to the southern terminus in Georgia, as well as the Cumberland Plateau of Alabama, Tennessee, and Kentucky. The Appalachian region had been the third priority region for receiving birds. However, because recovery objectives are now being met in the mid-Atlantic and northern New York New England regions, the emphasis has shifted to the southern Appalachian Mountains.

The recovery objective for downlisting the eastern peregrine falcon to Threatened was defined in the revised recovery plan as a minimum of 20 to 25 nesting pairs in each of the 5 recovery regions. A minimum of 175 to 200 falcons (an estimated 50 percent of the historical population) is the objective for full recovery and delisting of the eastern peregrine falcon. The number of historical pairs in the southern Appalachians was unknown, but the southern Appalachian's goal is a minimum of 20 pairs for downlisting and 25 pairs for delisting.

Following the initial hacking of eight birds in 1984 at two sites in North Carolina and Tennessee, the number of birds released each year has gradually increased (with the exception of 1986). In 1985, 33 birds were hacked at 6 sites. These sites include the original two sites, one new site each in North Carolina and South Carolina, and two new sites in Virginia. In 1986, 28 birds were released at 7 sites in these 4 States. The reduced number of birds released in 1986 can be attnbuted to initial reproduction problems at the captive propagation facilities in Boise, Idaho, following transfer of the breeders from the previously used Cornell University facilities.

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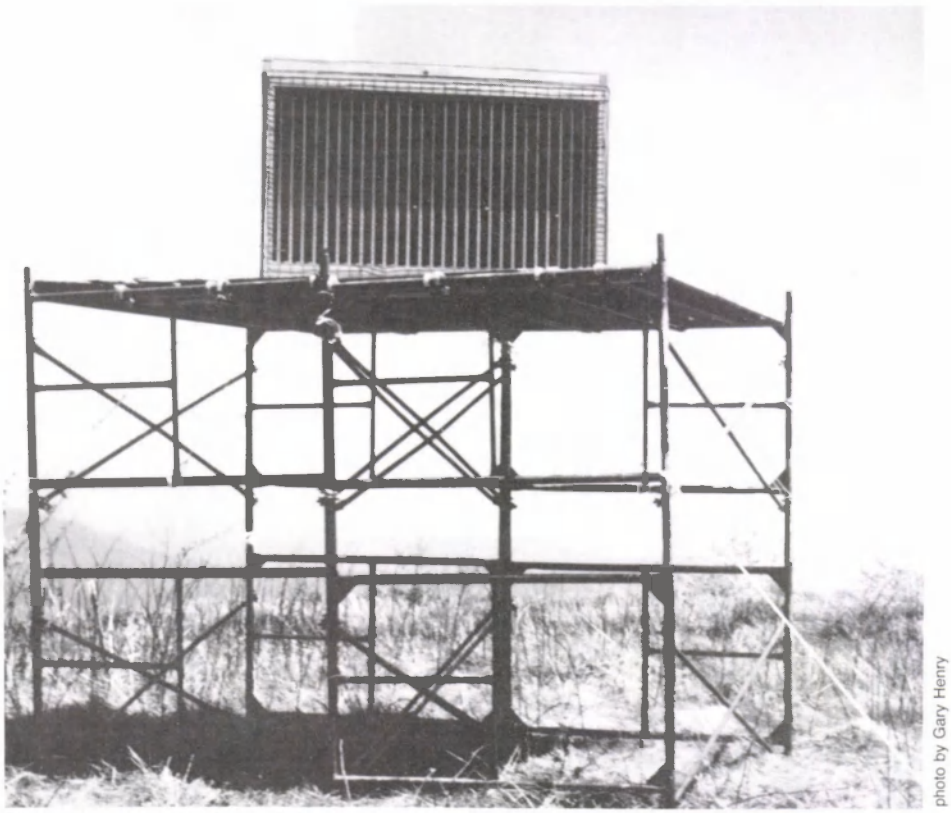

photo by Gary Henry

The placement of hack boxes on construction scaffolding is proving to be a quick and effective technique for preparing hack sites.

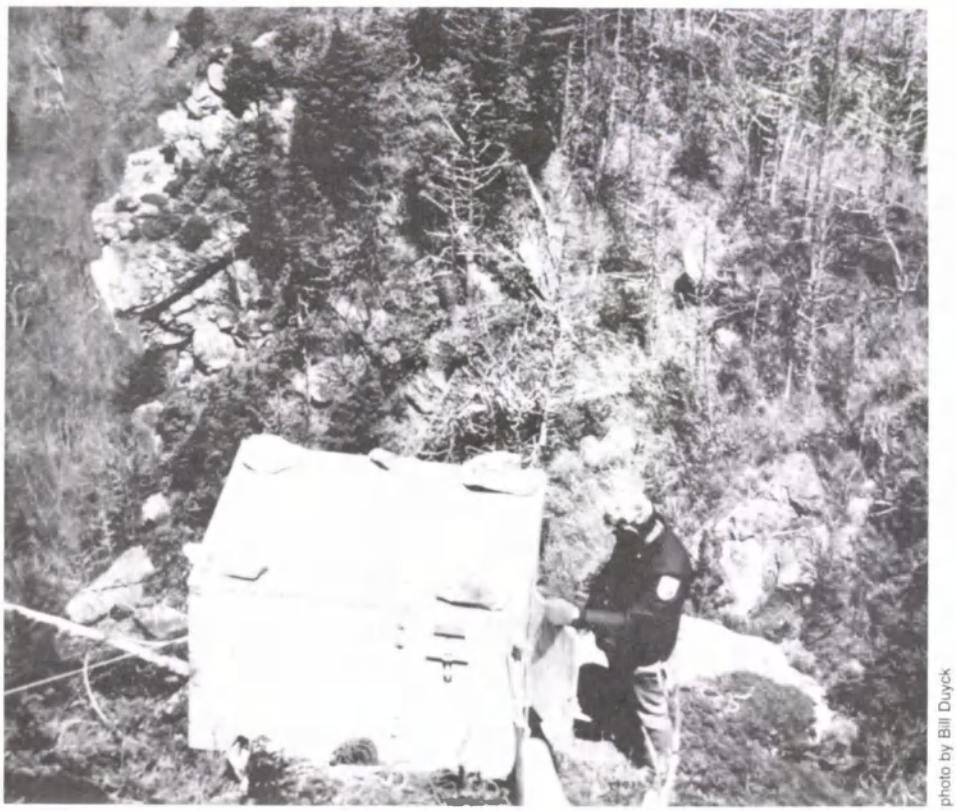

photo by Bill Duyck

peregrine faicon hack site on Grandfather Mountain, North Carolina

Peregrine Falcon

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In 1987, 40 birds were hacked at 10 sites. Georgia and West Virginia hacked their first birds at one site in each State. In addition, there were three new sites in North Carolina, one new site in Tennessee, and one old site each in North Carolina, Tennessee, and Virginia. At the tenth site, a chick was fostered into a natural eyrie in North Carolina. Again, in 1988, 10 sites in the southern Appalachians were used for hacking but the total number of released birds increased to 68. These 10 sites included 2 old sites in North Carolina; one old site each in South Carolina, Tennessee, and Virginia; 2 new sites in both Virginia and West Virginia; and one new site in Georgia. In 5 years of hacking, 177 birds have been released at 21 different sites in the southern Appalachians; 151 (85 percent) fledged successfully.

Several firsts were recorded in 1988. Not only was this the first year that the southern Appalachians received the majority of the released birds for the Eastern Peregrine Falcon Recovery Program, it was also the first year that two hack boxes were used at some of the sites. A concept of clustering sites was emphasized in the southern Appalachian region in order to saturate an area with released birds before returning birds establish territories and eliminate the area from further use as a release site. From 1984 through 1987, release sites were clustered in the southern end of the southern Appalachians. During 1988, a second cluster of release sites was started in the extreme northern end of the southern Appalachians with four sites in Virginia and West Virginia.

The success achieved so far in the southern Appalachians has exceeded our initial expectations. A model, based on the results achieved in the recovery program through 1985, was used to predict survival, territorial pairs, breeding pairs, and breeding success of peregrines in the southern Appalachians. Based on this model, the first returning pairs were expected in 1988 and the first breeding in 1989. The actual results, however, are 2 years ahead of the predictions with our first pair recorded in 1986 and first breeding attempt in 1987. In 1988, five territorial pairs were confirmed, and three of the five nested. Unfortunately, one pair was unsuccessful, and the other two pairs only produced one chick each. However, it does represent the first successful breeding in the southern Appalachians since pre-DDT days in the 1950s.

Another point of interest in the southern Appalachian releases is the use of construction scaffolding to build hacking towers. This technique has been used successfully by Tennessee Wildlife Resources Agency personnel for 2 successive years. Using this method, a tower can be built in approximately one-half hour. In about 2 hours, a tower, platform, and hack box can be completed. The Tennessee site is believed to be the only site using construction scaffolding.

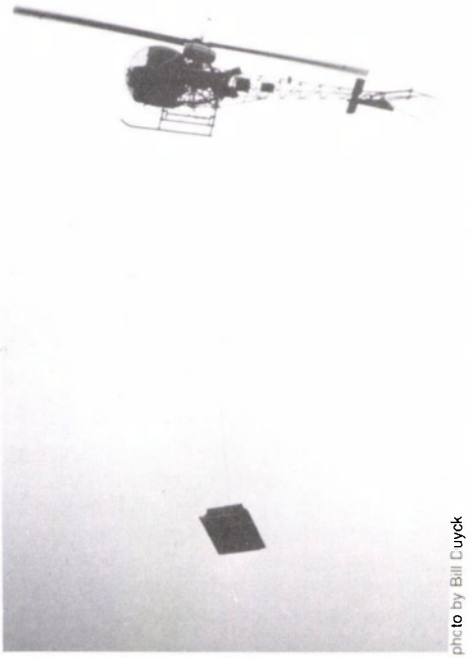

photo by Bill Cuyck

A Tennessee Valley Authority helicopter airlifted supplies to the remote peregrine falcon hack site on Grandfather Mountain, North Carolina.

Nile Crocodiles

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Nile crocodile habitat. Currently, the Service estimates that there are about 50,000 crocodiles in Zimbabwe, which is now managing the species as an economic resource.

Although the crocodile's status in Zimbabwe has improved, some threats remain and the Service does not believe that this animal is completely out of danger. Therefore, instead of removing it from protection under the Act, the Service reclassified the Nile crocodile in Zimbabwe from Endangered to Threatened. All other populations remain classified by the Service as Endangered, and import of Nile crocodiles (both wild and ranched) from any countries other than Zimbabwe is generally prohibited.

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obstruction in his daily area of movement. That fence and some others have since been removed from the refuge.

* * *

Five female whoopers at the Patuxent Wildlife Research Center in Maryland produced 15 eggs this year. Two of the eggs were broken by the cranes, seven hatched, and the others were infertile or the embryos died before hatching. Four chicks subsequently died of exposure, enteritis, and other problems. Another 15 eggs were shipped to Patuxent from Wood Buffalo National Park. Six of those eggs were infertile or contained dead embryos and one was a sandhill crane egg *(Grus canadensis)*, the first record of "dump-nesting" by cranes. The other eight whooping crane eggs hatched, with seven chicks surviving.

* * *

Several new populations of the threatened Navajo sedge *(Carex specuicola)* were located in August. Previously, this sedge was known from only two canyons within a large canyon complex. Some of the newly discovered populations are inaccessible to livestock, one of the species' threats.

* * *

Thirty-eight of the Kearney's blue star *(Amsonia kearneyana)* plants transplanted in April survived the spring drought (with some supplemental water) and put on some summer growth. A contractor has been monitoring the transplants since their planting. These early results indicate that the attempt to establish a second population may be a success. An additional 30 to 50 plants will be added to this new population in February.

* * *

Ongoing surveys for Tumamoc globeberry *(Tumamoca macdougalii)* are refining our understanding of the distribution of this Endangered desert vine, previously known in the United States only from Pima and Pinal Counties, Arizona. Two new discoveries in Arizona have been made, one in Maricopa County and another on Organ Pipe Cactus National Monument, now considered to be the westernmost U.S. population. The Tumamoc globeberry also occurs at a few sites in the state of Sonora, Mexico.

* * *

A total of 29 Sanborn's long-nosed bats *(Leptonycteris sanborni)* were netted and released in one night at Ramsey Canyon in the Huachuca Mountains of Arizona by personnel from The Nature Conservancy, Arizona Game & Fish Department, and U.S. Fish and Wildlife Service, along with interested individuals. These nectar-feeding Endangered bats fly into the Conservancy's preserve to raid hummingbird feeders put out for the seven species of

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hummingbirds that are reported from Ramsey Canyon. The bats easily drain accessible feeders before dawn. Their usual foods is agave and cactus nectar (along with pollen from those plants).

* * *

A study has been initiated to determine the status of six Arizona land snail species. Five of the snails are known to live in areas of localized talus in the Pinaleno Mountains in Graham County, Arizona. They include the Clark Peak talussnail (*Sonorella christenseni*), Pinaleno talussnail (*Sonorella grahamensis*), mimic talussnail (*Sonorella imitator*), Wet Canyon talussnail (*Sonorella macrophallus*), and Pinaleno mountainsnail (*Oreohelix grahamensis*). The sixth snail is the San Xavier talussnail (*Sonorella eremita*), which is known only from a small area of talus on a hill near Tucson. These highly endemic species are typical of the southwestern mountains' "sky islands" ecosystems. Extensive mining may threaten their habitat.

* * *

The bodies of two Endangered Mount Graham red squirrels *(Tamiasciurus hudsonicus grahamensis)* were salvaged from the Pinaleno Mountains in Arizona last July. An adult male was found hit by a car and a radio-collared juvenile was found dead of unknown causes. Both specimens are being transferred to the University of New Mexico in Albuquerque, where they will become part of a species-wide red squirrel study.

* * *

The field season on the Kemp's ridley sea turtle *(Lepidochelys kempii)* nesting beach at Rancho Nuevo, Tamaulipas, Mexico, resulted in some 826 nests being transplanted and protected in corrals for incubation. This was the highest number of nests collected at the project area since 1981, and we hope that it turns out to be a trend. It is too early to know if the increased nest production is natural variation or the result of recruitment to the female population. The hatch rate is running 70 to 75 percent in the corral nests. Meanwhile, in Texas, an excellent hatch rate of 92 percent was obtained at Padre Island National Seashore for the 1,000 eggs that were collected for imprinting and headstarting.

The Kemp's ridley nesting beach at Rancho Nuevo was battered this fall by Hurricane Gilbert. The hurricane moved ashore slowly, causing flooding well inland. The combination of wind, rain, and storm surge obliterated the foredune on much of the beach, but what effect this ultimately will have on the Kemp's ridley is unclear. The ridley's favorite nesting site on the beach is at the base or top of the foredune. Luckily, no adult turtles or nests were affected by the hurricane because the nesting and hatching season had just ended. Whether or not the turtles returning to nest next year will be affected, and how long it will take to reestablish a "normal" beach profile, are matters of conjecture.

Alarmist articles about these beach changes were published in some newspapers after the storm. Although we are concerned about how the changed beach will affect protection of the turtles and eggs, we are not too concerned about the turtles finding places to lay eggs. Beaches are basically ephemeral structures, periodically moving, changing, and being created or destroyed. Sea turtles have existed for many millions of years and they have probably evolved strategies for responding to these natural changes. Our major concern is that the remnant population may not be as able to absorb catastrophic changes to its habitat as its large, ancestral populations. We may have to consider modifying our protection strategies to accommodate whatever behavioral shifts, if any, the turtles make.

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A Kemp's ridley and a loggerhead sea turtle *(Caretta caretta)* also nested at Mustang Island, Texas, this year and their progeny were released there after incubation at Padre Island National Seashore.

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Region 3 — Kirtland's warbler *(Dendroica kirtlandii)* biologists and managers have long debated the significance of occasionals bird found outside the "traditional" nesting areas in the northern part of Michigan's lower peninsula during the breeding season. Perhaps these birds are rare strays who have missed their natal areas on their spring migration from the Bahama Islands. Or perhaps they represent individuals genetically programmed to disperse in search of distant habitats. The latter explanation might call for a change in recovery efforts for the species.

In an effort to learn more about these "stray" individuals, the Service contracted with the Wisconsin Department of Natural Resources to carry out a search for Kirtland's warblers in the jack pine areas of Wisconsin. This search proved to be very successful — eight male Kirtland's warblers were located by State biologists and volunteers assisting in the spring survey. None of these males gave any hints of having a mate, but observations were very limited. Two of the birds were subsequently mist-netted and color banded to aid in their future identification. Because of this success, a larger survey will be run in Wisconsin in 1989, and the Minnesota Department of Natural Resources is planning a similar search in suitable jack pine areas of that State.

* * *

Region 6 — Five young peregrine falcons released July 13, 1988, in downtown Denver, Colorado, captured the attention of the city. By fall, the young birds were continuing to do well. They have been rescued from several urban perils and are learning to hunt pigeons.

* * *

Possible sightings of the Endangered black-footed ferret *(Mustela nigripes)* have been reported from Columbian ground squirrel colonies found in Waterton Lakes National Park, Alberta, Canada. Park officials report that sightings have occurred in this area since 1983 and that the frequency of sightings has increased this year.

In an effort to confirm the presence of black-footed ferrets, Canadian park and wildlife officials have arranged to investigate the sighting reports and to conduct surveys in the area from which the ferrets were reported. U.S. Fish and Wildlife Service biologists with experience in the methods used to find black-footed ferrets were invited to attend a planning meeting and assist with initial surveys. Results from the first survey efforts revealed some possible evidence of ferrets, but no sightings have been confirmed.

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Region 7 — The listing last spring of the Aleutian shield-fern *(Polystichum aleuticum)* as Endangered marked the first addition of an Alaskan plant to the Endangered species list. Despite surveys in each of the past four years, one population consisting of six plants comprised the current known world population for the species at the time of listing. The plants occupied an area of 100 square feet high on Mt. Reed on Adak Island. In July and August of this year, three teams of botanists attempted to find additional populations of the shield-fern on several Aleutian Islands. Although no additional specimens were found on Attu, Kagalaska, Atka, or Unalaska, close to 100 shield-ferns were found on Adak Island in the same general area as the previously known site. Many of the plants contained fronds with spores.

The highly restricted range exhibited by the shield-fern is puzzling because the alpine environment where it grows is essentially undisturbed. *Polystichum aleuticum* may well be a relict species from a pre-glacial era when the climate and flora of the Aleutians was markedly different.

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Recovery activities within the breeding grounds of the Endangered Aleutian Can-

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ada goose *(Branta canadensis leucopareia)* have been completed for the 1988 field season. Biologists surveying Agattu Island, where Aleutian geese were recently reintroduced, found 25 pairs attempting to nest. A survey of Nizki Island also confirmed that a small number of Aleutian geese have been reestablished there; two nesting pairs and about ten non-breeders were observed.

In the annual trap and transplant effort, family groups consisting of 128 Aleutian geese were captured on Buldir Island; 116 were released on nearby Little Kiska Island and 12 were released on Nizki Island.

* * *

Region 8 — Staff from Patuxent Wildlife Research Center's Hawaii Field Station assisted biologists from the State of Hawaii's Department of Land and Natural Resources in conducting the yearly breeding season census of the Endangered palila *(Loxioides bailleui)*. The census was conducted July 25–28 in the mamane-naio woodland of Mauna Kea on the island of Hawai'i. A total of 150 palila were recorded on 17 permanent transects in palila critical habitat that ranged from 1,972 to 3,042 meters in elevation. The population was estimated to be 3,124 birds, with a 95 percent confidence interval of 2,169 to 4,079 birds. This is a slight decrease (13 percent) from the 3,624 birds estimated during the same period last year.

* * *

As of early September, 57 Kirtland's warblers had been caught in mist nets and banded on their summer range in Michigan (this number includes some recaptures). In 1988, Patuxent biologists studying the Kirtland's warbler in Michigan have had a 24 percent return rate of 1987 hatching-year birds that were leg-banded in 1987 and an 8 percent return rate of those that carried radio transmitters in addition to leg bands. Due to concern that the radio transmitters may be causing mortality, biologists do not intend to place any transmitters on birds in 1988 as originally scheduled.

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Patuxent Wildlife Research Center researchers conducted a high-tide count of light-footed clapper rails *(Rallus longirostris levipes)* at Seal Beach National Wildlife Refuge in southern California. A minimum of eight adults and one suspected hatchling were counted. Of 13 known rail nesting attempts, only one pair is believed to have produced young; red fox depredation has been implicated or suspected in all nest failures. Color mark-

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Protection Planning Committees as an Approach to Interagency Cooperation

John J. Pulliam, III
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Several southeastern States have formed protection planning committees in recent years as a means of facilitating interagency conservation planning. The first such committee was initiated in 1979 by the Tennessee Natural Heritage Program to compensate for the lack of government funds, prevent the duplication of actions by different agencies, and utilize private actions and funds. In 1986, the Arkansas Natural Heritage Commission put together the Arkansas Protection Planning Committee, an effort that has produced some notable successes.

The interaction and cooperation among more than 20 State, Federal, and private agencies in Arkansas has been gratifying. For the purposes of the Arkansas Committee, protection is defined as the stated intent and effort of an individual or organization to manage a species or its habitat in a manner that will perpetuate that feature's existence in a natural state. The various methods include landowner notifications, purchases or donations of land, easements from landowners, landowner management agreements, leases, environmental reviews, and designations of public lands as protected areas. Protection methods vary from the "hands-off" approach to intensive management.

There are four major reasons for the Arkansas Committee's success. First, the Committee is composed of mid-level representatives who have a personal interest in conservation, a technical knowledge of natural resource management, and a measure of authority to represent their agencies. A second reason is that the Committee defers to higher authorities on controversial issues, thereby increasing the freedom of Committee participants. Third, the Committee does not supersede the processes or goals of the individual agencies. Finally, there is a strong sense of comraderie among the participants.

The Arkansas Protection Planning Committee meets once each quarter. It does not vote on the issues brought before the Committee but does attempt to achieve a consensus. Although the Committee does not take any action in its own name, it does encourage individual agencies to take specific actions. A typical Committee meeting consists of one or more presentations of general interest and a discussion of old and new sites for possible protection. Any member agency may present a site for consideration by the Committee, and the group determines whether or not to add it to the list of sites to be considered for protection. Once a site is placed on the list, the progress toward its protection is discussed and updated at every meeting. One or more conservation actions are recommended, and those responsible report at the next meeting concerning the implementation of those actions.

At the initial meeting in December 1986, the Arkansas Protection Planning Committee established an agenda of about 15 sites in need of increased or enhanced conservation. Some of the sites were already partially protected, while others were entirely unprotected. Staff members from as many as 12 different agencies were able to offer direct actions in response to the needs identified by the group. This activity ranged from landowner contact to cave gating assistance to the development of long-term natural areas inventory plans. No participating agency was asked to undertake activities not in keeping with the charter of the agency or its ability to commit time. As of June 3, 1988, the Arkansas Committee had a list of about 60 sites on its agenda. As sites reach the desired level of protection, they are moved to the "Managed Areas List." The Arkansas Committee, in particular, has been considering stewardship or management issues even after the initial protection phase is completed.

Edgemon Cave is one example of the Arkansas Committee's success. This cave is located on privately-owned property adjacent to land owned by the National Park Service that was considered surplus and therefore subject to sale. However, when the agency was informed of the significance of the cave as an Indiana bat *(Myotis sodalis)* hibernaculum and the importance of its property as a buffer zone for the cave's protection, the Park Service withdrew the property from sale. Negotiations also are underway for protection of the property that contains the cave itself. Other examples of the Committee's efforts include the development of management agreements between the State of Arkansas, the U.S. Army Corps of Engineers, and Weyerhaeuser Company for the protection of two nationally significant areas.

The success of the Tennessee and Arkansas Protection Planning Committees has been outstanding. As a result, the State of Mississippi has taken note and formed its own group. Approximately 20 agencies are involved in the Mississippi Committee, which has developed a list of at least 12 sites for protection.

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ing of adult rails to assess movements and habitat preferences will be conducted, but because of a shortage of juvenile rails, attempts to use radio telemetry to evaluate juvenile rail movements and dispersal rates will be severely handicapped.

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The reward program for the black-footed ferret has been well publicized throughout the western United States. Most States have experienced an increase in ferret sighting reports due to the $5,000 reward offered by Wildlife Conservation International. Unfortunately, the increase is in quantity, not necessarily quality. No photograph or information has been provided to lead to the confirmation of another wild population.

Eight of the 12 eligible States are participating in the reward program, along with the Navajo Nation (consisting of over 17 million acres in Arizona and New Mexico). Arizona, North Dakota, and Kansas do not offer a reward, but all three States have inventoried black-footed ferret habitat and are undertaking spotlight searches when appropriate. During summer 1988, search teams from the Service's National Ecology Research Center in Colorado responded to sighting reports in South Dakota, Colorado, Utah, and Alberta, Canada. Winter searches for tracks and the characteristic diggings of ferrets may be conducted when snow conditions are optimal.

BOX SCORE OF LISTINGS AND 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 WITH PLANS
Mammals	31	19	240	5	2	23	320	24
Birds	61	15	145	7	3	0	231	57
Reptiles	8	7	59	14	4	14	106	22
Amphibians	5	0	8	4	0	0	17	5
Fishes	45	2	11	24	6	0	88	47
Snails	3	0	1	5	0	0	9	7
Clams	31	0	2	0	0	0	33	22
Crustaceans	8	0	0	1	0	0	9	4
Insects	10	0	0	7	0	0	17	12
Arachnids	3	0	0	0	0	0	3	0
Plants	149	6	1	40	6	2	204	84
TOTAL	354	49	467	107	21	39	1037	284 **

Total U.S. Endangered **403**
Total U.S. Threatened **128**
Total U.S. Listed **531**

Recovery Plans approved: 242

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

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
January 3, 1989 36 plants

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ENDANGERED SPECIES

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