

ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Restoration of the Bald Eagle and Gray Whale Marks Progress in Recovery

America's efforts to save rare species reached several important milestones recently. On June 30, the Fish and Wildlife Service (FWS) announced that most bald eagle (*Haliaeetus leucocephalus*) populations have recovered sufficiently to allow a proposed upgrading of its status from "Endan-

gered" to the less critical category of "Threatened" in most of the Nation. This good news follows a June 15 publication in the *Federal Register* formally recognizing the recovery of the California gray whale (*Eschrichtius robustus*) and removing it from the List of Threatened and Endangered Species.

Giving Wing to Hope

In ceremonies at Blackwater National Wildlife Refuge in Maryland, FWS Director Mollie Beattie celebrated the bald eagle's improvement by releasing to the wild a 10-pound adult female nicknamed "Hope." The eagle had been rehabilitated at the Bal-

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Washington Post photo by James Thresher

Fish and Wildlife Service Director Mollie Beattie releases "Hope," a rehabilitated bald eagle, symbolizing the comeback of our national symbol. "The eagle's recovery is a tribute to the success of the Endangered Species Act and other conservation laws, and to the selfless efforts of the many, many people who have worked so hard to bring the eagle back from the brink of extinction," Beattie said.



Regional News

Regional endangered species contacts have reported the following news:

Region 2 - Fish and Wildlife Service (FWS) biologists braved unseasonably

cold weather this spring to seine the Comal River near New Braunfels, Texas, in an effort to collect fish and invertebrate samples for a study of the

Comal River system. Now in its third year and scheduled to continue for at least 2 more years, the study will result in the most in-depth biological information yet compiled about this unique river system.

In response to the March 14 "not warranted" finding issued by the FWS on a petition to remove seven cave-dwelling invertebrate species from the Endangered Species List, Williamson County Commissioners filed a lawsuit against the FWS in the U.S. District Court in Austin, Texas. The suit contends that two of the invertebrates, the Tooth Cave ground beetle (*Rhadine persephone*) and Bone Cave harvestman (*Texella reyesi*), are found at many sites in both Travis County and Williamson County and therefore do not warrant listing as Endangered.

The FWS based its decision not to delist the species on continuing threats to the invertebrates and the caves they inhabit, including: predation by, and competition with, non-native fire ants; habitat destruction and deterioration resulting from activities such as cave-filling and trash-dumping; an increase in impermeable ground-cover; potential contamination from septic effluents, sewer leaks, run-off, and pesticides; and cave vandalism.

Other invertebrate species listed in the petition are the Coffin Cave mold beetle (*Batrissodes texanus*), Tooth Cave spider (*Leptoneta myopica*), Tooth Cave pseudoscorpion (*Microcreagris texana*), Kretschmarr Cave mold beetle (*Texamaurops reddelii*), and Bee Creek Cave harvestman (*Texella reddelii*). As of mid-July, there was no specific date for Federal Court action on the lawsuit.

The FWS Texas Ecological Services Office has assembled eight educational resource trunks stocked with videotapes, slide shows, books, brochures, and flashcards. Four of the eight trunks are devoted to fish and wildlife

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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.

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Administrative Changes Will Make Endangered Species Act More “User-friendly” and Improve Benefits to Species

A series of new policies aimed at improving the Endangered Species Act's effectiveness in recovering listed species, while making it easier for people to work with and understand, were announced June 14 by Interior Secretary Bruce Babbitt and D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere.

Among the changes are policies that minimize the social and economic impact of recovery planning under the Act; provide independent scientific peer review of listing and recovery decisions; require agencies implementing the Act to identify quickly and clearly activities on private lands that may be affected by a listing decision; create cooperative, ecosystem-based approaches to conserve listed and candidate species before crises arise; establish guidelines to ensure that decisions made under the Act represent the best available scientific information; and provide a greater role for State agencies, along with a closer working relationship between Federal and State officials.

In addition, President Clinton has asked the Interior and Commerce departments to convene an interagency working group to recommend additional ways to improve administration of the Act.

“These reforms are a solid step in the right direction,” said Senator Max Baucus (D-Montana), Chairman of the Senate Environment and Public Works Committee. “If implemented properly, this reform package should produce better conservation decisions that cost society less and win more public support.”

“Critics of the Endangered Species Act have often said that listing decisions must be based on sound science,” said Representative Gerry E. Studds (D-Massachusetts), Chairman of the House Merchant Marine and Fisheries Committee. “With today's announcement, the Administration is moving aggressively toward that goal.”

To ensure that the scientific analysis of information used to list and recover species is as comprehensive as possible, a new policy establishes an independent peer review process. The government will solicit expert opinion of three independent specialists to analyze data on which listings are based. The peer review process will also be used during development of recovery plans. In addition, guidelines have been established to guarantee that the information used to implement the Act represents the best data available.

Under another new policy, designed to minimize social and economic effects from recovery planning, the composition of recovery planning teams will be expanded beyond the scientific community to include other areas of expertise. Public input during recovery planning has always been solicited, but including representatives of local interests on recovery teams will ensure that recovery decisions are both scientifically sound *and* sensitive to human needs. The goal is to reduce the likelihood of economic disruption caused by recovery activities, while ensuring species recovery.

Another policy, designed to ease concern about private land uses when one or more listed species is present, requires the government to identify immediately those actions permissible under the Act and those that could be violations. The information would be provided in the final listing rule, along with a Service contact for landowners uncertain about activities not delineated in the rule. This policy will apply to all plants and animals listed after October 1, 1994.

A statement from one of the Nation's largest private timberland owners was presented at the announcement. “We applaud the leadership of Secretary Babbitt and Under Secretary Baker,” said John F. Rasor, Vice-President of the Georgia Pacific Corporation. “Georgia

Pacific stands ready to provide leadership to the much-needed dialogue to make the Endangered Species Act work faster and better.”

In an effort to improve coordination, the Fish and Wildlife Service and the National Marine Fisheries Service will work closely with other Federal agencies, the States, Tribal governments, and private groups to conserve listing candidates before listing is needed. Both agencies will consult States on candidate species identification and conservation; listing decisions; and recovery activities, including development of recovery plans.

The government will also emphasize multi-species listings and recovery plans for species sharing the same ecosystem. “Communities, businesses, and landowners need to plan their futures with reasonable confidence, and that is why we are shifting the focus away from individual species and toward the concept of ecosystems,” Secretary Babbitt said. “By looking at the big picture, by focusing our resources and efforts on ecosystems rather than individual species, we can get away from crisis management where our choices are limited and our costs are high,” added Mollie Beattie, Director of the Fish and Wildlife Service.

The interagency working group established to review the Endangered Species Act and suggest further improvements will seek the participation of all other Federal agencies to identify additional administrative changes. Input from the States, county and local governments, and private citizens will also be sought.

Except as noted above, these new policies became effective upon their publication in the July 1, 1994, *Federal Register*.

Senate Subcommittee Hears Testimony on Administration of the Endangered Species Act

by Denny Lassuy

The improvements in administration of the Endangered Species Act announced by Interior Secretary Babbitt and Commerce Under Secretary Baker on June 14 were presented to Congress the next day in a hearing before the Senate Environment Subcommittee on Clean Water, Fish and Wildlife. This was the first in a series of hearings planned by the Senate Environment Committee on reauthorization of the Endangered Species Act.

Chairman Graham of Florida opened the hearing by applauding the new policies, particularly noting his support for ecosystem-based approaches. He also said while he recognizes species loss is a natural event, he believes the rate of loss has been sharply accelerated by human activity.

Senator Baucus of Montana referred to the Act as "critically important" but cited the "mixed reviews" it has received of late. He pointed out that controversy is the exception rather than the rule under the Act and went on to explain aspects of S. 921, a reauthorization bill he and Senator Chafee have introduced that has been endorsed by the Western Governor's Association.

Senator Chafee of Rhode Island, the subcommittee's ranking Republican, called the Act "a terrific law," referred to its historically strong support in the Senate, and stressed the need to protect the ecosystems upon which Threatened and Endangered species depend.

Senator Kempthorne of Idaho noted that his State has an economy based on resource use and that most of those resources are found on Federal lands. He suggested that implementation of the Act has been based on "inaccurate science" and resulted in "incessant planning."

In his testimony, Secretary Babbitt said the Act is a strong, yet flexible law, and he cited the new policy directives announced the previous day. He briefly explained the new directives and said that he operated on three principles: 1) use comprehensive, unimpeachable science, 2) get involved early, and 3) maintain an ecosystem focus. He noted four specific cases (Pacific Northwest Forest Plan, habitat conservation planning in California, Platte River water use, and working with Georgia-Pacific on red-cockaded woodpeckers) that he had learned from, and which formed much of the basis for the new directives.

Assistant Commerce Secretary Hall said that "Commerce shares the principles cited by Secretary Babbitt," and that the challenge is to reduce the need for species listings by properly implementing other Federal conservation laws. Commerce, through the National Marine Fisheries Service, has jurisdiction under the Act for most marine species.

Senator Chafee referred to the Secretary's accounting of over 118,000 interagency consultations carried out under Section 7 of the Act, with only 33 halting projects, as "an astounding and reassuring statistic." Secretary Babbitt said this clearly shows that the process works, and he suggested that many Federal actions may well have been improved to the mutual benefit of both the project and the species through Section 7.

Dr. E.O. Wilson, the noted authority on biodiversity from Harvard University, also testified at the hearing. He said that all nations have three sources of wealth — material, cultural, and biological — and that the latter was "pathetically unknown." A typical pinch of forest soil, he noted, may contain thousands of species, most of

them unknown. This, Dr. Wilson said, is the "vast nexus of life that is protected when we save an ecosystem." He added that America's aquatic ecosystems are its most endangered, and closed by asking people to "look to the human mind" and realize the psychological and spiritual value of our biological heritage.

Testimony was also presented by Michael Bean of the Environmental Defense Fund. He recounted the decline and recovery of the whooping crane, and said its example illustrated three lessons: 1) although steady progress is possible, there is no instant recovery for species on the edge; 2) getting involved in species recovery late is more risky and costly; and 3) while some people use species like the crane to "whoop up controversy and excite fear," there have been very few conflicts under the Act.

Former Senator McClure, speaking for the National Endangered Species Act Reform Coalition, said his organization is not seeking to repeal but to reform the Act by making it "more useful, more economical, and more democratic." He also said he disagreed with a Supreme Court decision that the Act has primacy over other Federal laws, and suggested that Congress had not intended the Act to have such power.

During his questioning of the witnesses, Senator Baucus cited an Environmental Protection Agency risk assessment study that pointed to species loss and ecosystem disruption as greater long-term risks to human activity than particular pollutant risks, and he asked Mr. McClure for his opinion. Mr. McClure suggested "science is ambiguous" and risk assessment "needs work."

Senator Chafee asked Mr. Bean if the fact that no Constitutional takings

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photo by D.W. Rice

California gray whale

Recovery Progress

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timore Zoo and Tri-State Bird Rescue and Research in Newark, Delaware, after suffering a broken wing.

"With the release of this bird, we rejoice in the recovery of not just this eagle, but the recovery of bald eagle populations in most of the Nation," Beattie said. "The recovery of this species is a great success story. This Independence Day we will have additional reason to celebrate with the return of the bird that symbolizes our country's freedom and fierce pride."

Hope's release accompanied an announcement that the FWS would propose to reclassify the Nation's symbol from "Endangered" to Threatened" throughout its listed range (the conterminous 48 States), except in the

Southwest. Bald eagle numbers in the lower 48 States have climbed from about 417 nesting pairs in 1963 to more than 4,000 pairs of adult birds in 1993. In addition, biologists estimate there are 5,000 to 6,000 juvenile bald eagles in this part of North America. Under the proposed rule, the "Threatened" classification will be retained until full recovery is achieved.

Currently, eagles are listed as Endangered in 43 States and as Threatened in Minnesota, Michigan, Oregon, Washington, and Wisconsin. The FWS proposal would reclassify the eagle to "Threatened" throughout the lower 48, except in Arizona, New Mexico, western Texas, and a small portion of southeastern California, where the species' recovery has been slower. The bald eagle would remain listed as Endangered in this area until the

population is more secure. Under the Endangered Species Act, an "Endangered" species is one that is likely to become extinct, while a "Threatened" species is one likely to become Endangered. Eagle populations in Alaska and Canada are considered healthy, and are not listed as Endangered or Threatened.

A Threatened designation more accurately reflects the species' improving status, but does not remove the protection afforded the bald eagle under the Endangered Species Act. The eagle is also protected under the Eagle Protection Act and the Migratory Bird Treaty Act, as well as under various State laws. Its protection under these statutes would not be affected by the reclassification proposal.

Historically, bald eagles nested throughout most of North America, but habitat loss, uncontrolled shooting, and poisoning by the pesticide DDT reduced the species' population to the point that it was listed as Endangered in 1967. Recovery activities carried out since that time have included protecting nesting sites, including other important habitat in the National Wildlife Refuge System, and reintroducing eagles into unoccupied habitat. Many States have reestablished nesting populations by translocating young eagles from areas where populations are healthy, raising them, and releasing them to the wild. When mature, these eagles often return to the area to nest. These ongoing

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Senate Hearing

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of private property under the Act have ever been determined by any court indicated that court action was simply out of the reach of small landowners. Mr. Bean said he imagined some are without the means to go to court, but he added that no claim of such taking had even been filed by any citizen, including large landowners.

Senator Kempthorne asked if the term "ecosystem management" was even in the Act. Mr. Bean indicated that it is not, but that the protection of ecosystems is among the statements of purpose of the Act. The Senator closed by lauding the beauty of his home State of Idaho, to which Dr. Wilson volunteered "and may you lose not a single species." On that note, Chairman Graham adjourned the hearing.

Other subcommittee hearings this summer and fall are to focus on endangered species conservation on private property, implementation of the Act by Federal land management agencies, recovery planning, and preventing endangerment. Reauthorization of the Act is not expected until next year.

Denny Lassuy is a Legislative Specialist with the FWS Office of Legislative Services.

Report Chronicles Progress in Endangered Species Recovery

by Jennifer Heck

Nearly 40 percent of all species listed federally as Threatened or Endangered are now stable or improving, according to a report recently released by the U.S. Fish and Wildlife Service (FWS). *Endangered and Threatened Species Recovery Program - Report to Congress*, the second such report prepared in compliance with the 1988 amendments to the Endangered Species Act, provides information on population status and recovery plan development for the 711

¹ Federal species listings through September 1992 totaled 728 but 17 of these are under primary jurisdiction of the National Marine Fisheries Service of the Department of Commerce.

species listed in the United States as of September 30, 1992, that are under FWS jurisdiction.¹

As a result of recovery efforts, 10 percent of the 711 species are reported as improving and an additional 28 percent are considered stable. The number of species considered to be in decline is 33 percent. The percentage of species whose status is unknown is 27 percent, and the remaining 2 percent of the 711 listed species are believed to have gone extinct prior to listing.

It is FWS policy to prepare a recovery outline within 60 days of listing a species, a draft plan within 1 year of listing, and a final recovery plan within

2.5 years of the date of listing. Recovery plans also are reviewed and revised every 5 years or more often if necessary. Because recovery efforts are carried out under a fixed budget, the FWS employs a priority system when allocating funds for species recovery. Under this system, each species is assigned a priority rank based on its degree of threat, recovery potential, taxonomy, and degree of conflict with development activities.

According to the 1992 Recovery Report, 58 percent of the 711 species had final recovery plans and an additional

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More than half of the species listed as Endangered or Threatened are plants. In recent years, cooperative management efforts involving Federal, State, local, and private partners have resulted in notable progress in plant recovery. Between September 1992 and June 1994, three plant species have been delisted and one has been reclassified from Endangered to Threatened. Delisted plant species include the Tumamoc globeberry (*Tumamoca macdougalii*), spineless hedgehog cactus (*Echinocereus triglochidiatus inermis*), and McKittrick pennyroyal (*Hedeoma apiculatum*). The Siler pincushion cactus (*Pediocactus sileri*), reclassified to Threatened in 1993, is one of several cactus species showing improvement in the southwestern United States. Four additional plant species have been proposed for reclassification — the Loch Lomond coyote thistle (*Eryngium constancei*), small whorled pogonia (*Isotria medeoloides*), Virginia round-leaf birch (*Betula uber*), and MacFarlane's four-o'clock (*Mirabilis macfarlanei*).



photo by Peggy O'Neil

Cooperative recovery efforts involving the Bureau of Land Management, Fish and Wildlife Service, New Mexico Department of Game and Fish, and The Nature Conservancy have improved the status of the Knowlton cactus (*Pediocactus knowltonii*), a small species with a very restricted range.

The FWS faced a challenge in the case of the Peter's Mountain mallow

(*Iliamna corei*), a plant that occurs naturally at only one known site in southwest Virginia. Only three individuals of this species remained when it was listed in 1986, and they were not producing seeds. Botanists from Virginia Tech University recovered viable seeds from leaf litter at the site and succeeded in producing many healthy plants and thousands of seeds, allowing for additional research on the germination process of this species. It was determined by botanists at the University of Kentucky that, under natural conditions, the seed coats were broken by the heat from fires. Fire suppression had therefore contributed to the decline of this species. Its site is now owned and protected by The Nature Conservancy. Prescribed burning is being used successfully by the Virginia Department of Conservation and Recreation, in cooperation with the U.S. Fish and Wildlife Service, U.S. Forest Service, and Virginia Department of Agriculture and Consumer Services, to further promote the species' recovery.

Report Chronicles Recovery

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8 percent had draft plans as of September 30, 1992. Most of the remaining species without recovery plans had been listed for less than 3 years and recovery plans for these species were under development. By September 1996, the FWS plans to eliminate the backlog of species listed longer than 2.5 years that lack recovery plans. Recognizing that several listed species may share geographic locations and/or face common threats, the FWS will continue to seek opportunities to combine several listed, proposed, and/or candidate species in one recovery plan. This approach, known as the "multi-species" or "ecosystem" approach, can improve the rate, fiscal efficiency, and effectiveness of recovery planning.

The Recovery Report documents recovery achievements in each of the 50 States. These achievements extend across taxonomic lines to include plants, mammals, birds, fish, insects and other invertebrates, reptiles, and amphibians. The Aleutian Canada goose (*Branta canadensis leucopareia*) was reclassified from Endangered to the less critical category of Threatened in 1990. The FWS is considering upgrading the classification of several other species, including the American peregrine falcon (*Falco peregrinus anatum*), Columbian white-tailed deer (*Odocoileus virginianus leucurus*), and the bald eagle (*Haliaeetus leucocephalus*). The Threatened greenback cutthroat trout (*Oncorhynchus clarki stomias*), first listed as Endangered in 1967, is nearing its recovery goals and could be delisted by the year 2000.

Other species, though not under formal consideration for reclassification or delisting, have improved notably since publication of the first Recovery Report in 1990. As detailed in the 1992 Recovery Report, the grizzly bear (*Ursus arctos horribilis*), red wolf (*Canis rufus*), black-footed ferret (*Mustela nigripes*), least Bell's vireo (*Vireo bellii*)

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photo by Chris Lucash



After a close brush with extinction in the early 1970's, the red wolf is well on the way toward recovery.

The following information was provided by Gary Henry, FWS Red Wolf Recovery Coordinator in Asheville, North Carolina.

The red wolf is one of the most significant success stories of the endangered species recovery program. When the Endangered Species Act became law in 1973, the red wolf was on the verge of extinction, with an estimated population of 100 animals or fewer. These wolves were being genetically swamped by interbreeding with the coyote (*Canis latrans*) in their last habitat in southwestern Louisiana and southeastern Texas. To prevent extinction of the last few red wolves, a decision was made to remove them from the wild, place them in captivity for breeding purposes, and later reintroduce them to historic habitats. After capturing as many as possible and screening them for genetic purity, a founder population of 14 red

wolves began the long process of recovery.

Recovery goals were established at 550 animals, with 330 in captivity in at least 30 breeding facilities and 220 animals in the wild in at least 3 populations. At the close of 1993, the red wolf population had recovered to 233-247 animals, with 187 in 31 captive breeding facilities and 2 island propagation projects, and 46-60 in the wild in 2 populations. The Red Wolf Recovery Program is now more than halfway to its captive breeding goal and over one-fourth of the way to its wild population goal.

In addition, the methodology and techniques used in this recovery effort have been adopted by recovery programs for a variety of species including the California condor (*Gymnogyps californianus*), black-footed ferret, Mexican wolf (*Canis lupus baileyi*), and Rocky Mountain wolf (*Canis lupus irremotus*).

Recovery Progress

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programs (many of them funded through Section 6 of the Endangered Species Act), coupled with the 1972 ban on DDT, have helped boost eagle numbers in much of the species' range. Vigorous law enforcement and public awareness campaigns to reduce illegal shooting of eagles also have contributed. Many private groups have dedicated themselves to rehabilitating injured eagles so that they can be released to the wild again.

The reclassification proposal was published in the July 12, 1994, *Federal Register*, and a final decision will be made by the FWS within one year. Public comments on the reclassification proposal are welcome, and should be sent by October 11, 1994, to the Chief, Division of Endangered Species, U.S. Fish and Wildlife Service, Bishop Henry Whipple Federal Building, One Federal Drive, Fort Snelling, Minnesota 55111-4056.

Report Chronicles Recovery

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pusillus), and Smoky madtom (*Noturus baileyi*) have responded favorably to management efforts. Progress has also been made in the recovery of plant species. Between 1989 and 1992, 79 percent of species added to the List of Endangered and Threatened Species were plants. Corresponding increases in plant research and recovery planning have produced encouraging results.

Much of this progress would not have been possible without the help of partnerships between the FWS and other Federal, State, and local governments and private organizations. The 1992 Recovery Report provides examples of many successful partnerships. In Michigan, cooperative efforts involving the U.S. Forest Service, Michigan De-

California Gray Whale

The California or eastern North Pacific population of the gray whale was officially removed from the List of Threatened and Endangered Species on June 15. A 1992 review by the National Oceanic and Atmospheric Administration (an agency of the Department of Commerce) showed that the population has increased from fewer than 10,000 animals in the late 1930's to about 21,000 animals, and is estimated to be about as large as in pre-whaling days.

"This is a great success story and a cause for celebration," said Commerce Secretary Ronald H. Brown. "Two tough Federal laws from the 1970's — the Marine Mammal Protection Act and the Endangered Species Act — have helped bring this animal back from a critically low population." Although the gray whale is no longer considered in danger of extinction, it will remain safeguarded by the Marine

Mammal Protection Act. In addition, both the Mexican government, which has jurisdiction over the species' breeding area, and the International Whaling Commission have instituted protective policies.

Each winter, the California gray whale migrates 13,000 miles (20,900 kilometers) down the North American coast from its feeding grounds in the Bering Sea off Alaska to its breeding and calving ground grounds off Baja California, Mexico. It returns north in the spring at a rate of about 50 miles (80 km) per day.

Like other great whale species, the gray whale was extensively hunted for its oil, meat, hide, and baleen. The European population may have disappeared as early as 500 A.D., and the western Atlantic population probably survived no longer than the early 1700's. A geographically isolated population in the western North Pacific remains in serious peril and will remain listed as Endangered.

partment of Natural Resources, and Michigan Audubon Society resulted in a 1992 increase in the Kirtland's warbler (*Dendroica kirtlandii*) population by 14 percent over the previous year, yielding the largest population of this species since 1961.

A similar partnership is paving the way for recovery of the Knowlton cactus (*Pediocactus knowltonii*) in New Mexico. The Bureau of Land Management, the New Mexico Department of Game and Fish, and The Nature Conservancy have worked with the FWS to reduce the threats of habitat loss and over-collection to this species by reintroducing two populations in the area surrounding its 10-acre (4-hectare) natural range. Another successful partnership formed in 1993 when the Georgia-Pacific Corporation entered an agreement with the Department of the

Interior to protect Endangered red-cockaded woodpeckers (*Picooides borealis*) on over 4 million acres (1.6 million ha) of southern timberland. According to FWS Director Mollie Beattie, continued formation of partnerships will be critical to successful implementation of the ecosystem approach to fish and wildlife conservation.

Copies of the 279-page illustrated report (stock number 024-01000703-6) are available for \$17.00 through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Credit card orders may be placed by calling 202/783-3238.

Jennifer Heck, a biologist with the FWS Endangered Species Division in Washington, D.C., is Associate Editor of the Endangered Species Technical Bulletin.

Plant Conservation Blossoms

With Creation of Native Plant Conservation Committee

by Joan E. Canfield

Most of our Nation's Endangered and Threatened species are plants, and the prospects for their survival brightened recently. On May 25, 1994, representatives of seven Federal agencies joined in Washington, D.C., to announce a new partnership to conserve native plants and their habitats.

The partnership, formalized under a Memorandum of Understanding, created the Federal Native Plant Conservation Committee (Committee). Interior Department agencies included in the partnership are the Fish and Wildlife Service, National Biological Survey, Bureau of Land Management, and National Park Service. The Department of Agriculture's Agricultural Research Service, Forest Service, and Soil Conservation Service also joined.

Recognizing the esthetic, ecological, educational, recreational, and scientific value of native plants, the signatories agreed "...to conserve and protect our native plant heritage by ensuring that, to the greatest extent feasible, native plant species and communities are maintained, enhanced, restored, or established on public lands, and that such activities are promoted on private lands."

To help accomplish this ambitious goal, the Committee will work with State and local organizations to identify and address key conservation needs for native plants and their habitats. It will also encourage education on the importance of plant resources, coordinate research, and provide a mechanism to share information among cooperating interests.

Why single out the plant kingdom? "The future of our public lands depends on native plants and plant communities," Fish and Wildlife Service Director Mollie Beattie said the day of the signing ceremony. "Plant



photo by Joan Canfield

Lehua makanoe (Lysimachia daphnoides), a rare primrose with burgundy petals, is known only from bogs on the Hawaiian island of Kaua'i. Cooperative protection agreements developed as a result of the Memorandum may keep this miniature shrub, and many of the other 1,900 U.S. plants that are candidates for listing, from needing Endangered Species Act protection.

biodiversity is the basis for healthy ecosystems, upon which all life depends. By working in a cooperative spirit, we can better manage these resources and avoid future conflicts."

"Healthy ecosystems and sustainable development depend on native plants and plant communities," added Bureau of Land Management Acting Director Mike Dombeck. "The conservation and recovery of threatened

and endangered species is a tremendous challenge. This partnership offers exciting opportunities for recovering species. We can work to prevent species from becoming threatened and endangered, which will provide great fiscal savings."

U.S. Senator Daniel K. Akaka of Hawaii, who hosted the May 25 ceremony, also praised the new program. "The agreement represents an important commitment to preserving our rich, living heritage of native plants for future generations. Because all the major Federal land managers will be party to this document, we can do a better job of preventing threatened native species from falling through the cracks." The enthusiastic audience of over 200 expressed delight at the strongly proactive role the Federal agencies took by signing this agreement.

Partnerships

Other Federal agencies with land or resource management responsibilities are expected to join the Committee in the near future. The Memorandum also encourages non-Federal organizations, whether State or private groups, to become official cooperators. Five organizations signed on at the May 25 ceremony: the Center for Plant Conservation, National Association of Conservation Districts, Soil and Water Conservation Society, Society for Ecological Restoration, and The Nature Conservancy. The Garden Club of America became a cooperator on June 30 at the Committee's second meeting, and many more such groups are expected to join in the near future. Cooperator status will provide a network through which organizations interested in plant conservation can pool and access plant databases, learn

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Heads of all seven Federal agencies voiced full support for the Memorandum of Understanding and its goals for native plant conservation. Seated, from left: John Reynolds, National Park Service; Jack Ward Thomas, Forest Service; Mike Dombek, Bureau of Land Management; Mike Spear, Fish and Wildlife Service; Essex Finney, Jr., Agricultural Research Service. Standing, from left: Jeffrey Cooper-Smith, U.S. Botanic Garden (host); Agatha Hughes, Society for Ecological Restoration; Gerald Talbert, National Association of Conservation Districts; Norman Berg, Soil and Water Conservation Society; Paul Johnson, Soil Conservation Service; Bill Truslow, Center for Plant Conservation; Deborah Jensen, The Nature Conservancy; and Ron Pulliam, National Biological Survey.

Plant Conservation Blossoms

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how to duplicate locally successful projects, and discover new potential funding sources.

The initial goals of the Committee are to bring in additional partners, develop a strategic plan, and help set up regional task forces and national working groups. Regional groups will be the focal point for developing a prioritized list of sites for concerted plant conservation efforts. National working groups will focus on the four major program areas: conservation actions, databases/information exchange, education/public outreach, and research.

The Memorandum of Understanding was drafted at the North American Native Plant Conservation Strategy Workshop, held in March 1994 in Phoenix, Arizona. Over 80 participants from 34 organizations attended the highly successful meeting. They envisioned the creation of a public/private partnership to mobilize agencies,

organizations, scientists, native plant societies, garden clubs, and amateur botanists throughout North America into a cohesive force to support local, national, and international habitat conservation efforts for plants. In that respect, the hope is to do for plants what the successful Partners in Flight program is doing for neotropical migratory birds.

Celebrating Wildflowers

The Memorandum was signed at a reception sponsored by the National Park Foundation at the U.S. Botanic Garden to celebrate National Wildflower Week (May 23 to May 29, 1994). Jack Ward Thomas, Chief of the Forest Service, said "The Forest Service is proud of our role as stewards of much of the nation's best wildflower habitat on Federal lands. We are anxious to convey to the public the special wonder and beauty of our plant resources, and the importance of native plant conservation to our overall mis-

sion of applying ecosystem management on National Forest System lands."

Already, several agencies have joined under the banner "Celebrating Wildflowers" to enhance public appreciation and knowledge of native plants. During National Park Week (May 23-May 29), National Park Service Director Roger Kennedy said "I can't think of a better way to celebrate the diversity of our park lands than through 'Celebrating Wildflowers.' To conserve the diversity within the 365 units of the National Park System, it will take a concerted effort of managing ecosystems,

building partnerships, and sharing information and resources; exactly the things that are incorporated into this Memorandum of Understanding. We are proud to have played a part in making this happen."

The Committee looks forward to working with the growing number of partners. For details, including information on how to join as a cooperating organization, please contact the Federal Native Plant Conservation Committee. Write or call Ken Berg, Wildlife-Fisheries Division, Bureau of Land Management, Washington, D.C. 20240 (telephone 202/452-7764), or Joan Canfield, Division of Endangered Species, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 452, Arlington, Virginia 22203 (telephone 703/358-2105).

Dr. Canfield, the Fish and Wildlife Service's representative on the Federal Native Plant Conservation Committee, is a biologist with the Division of Endangered Species.

Every Species Counts: Endangered Species in the National Forests and Grasslands

by Valerie C. Guardia

When Threatened and Endangered species and the U.S. Forest Service come to mind, many people think of spotted owls (*Strix occidentalis*) and the forest management controversy in the Pacific Northwest. But behind the headlines, the Forest Service has an important and growing conservation program — *Every Species Counts* — that reaches throughout the agency and is increasing its responsiveness to the needs of rare animals and plants.

Established in 1905, the Forest Service is a multiple-use agency within the U.S. Department of Agriculture. The agency manages 191 million acres (77 million hectares) of public land throughout the U.S. and its territories on 156 national forests and 20 national grasslands. The diversity of life and habitats found on these lands is incredible, ranging from subarctic tundra to tropical rainforest. Approximately 3,000 species of animals and 10,000 species of plants are known to live on these lands. Of those, more than 260 are federally listed as Threatened or Endangered. Approximately one-third of all federally listed species in the United States have at least some habitat on national forests and grasslands.

Program Overview

The *Every Species Counts* program was established in 1990. It brings together the resources and commitment of the Forest Service, other Federal and State agencies, private organizations, and concerned individuals to ensure that the habitats of Threatened, Endangered, and "sensitive" species on National Forest System lands are managed to enhance species conservation and recovery. "Sensitive" is a Forest Service term for species whose population viability is a concern and those that are official candidates for Federal listing under the Endangered Species Act.



With the help of the *Every Species Counts* program, the numbers of bald eagles (*Haliaeetus leucocephalus*), grizzly bears (*Ursus arctos horribilis*), peregrine falcons (*Falco peregrinus*), and many other species on national forests and grasslands have increased significantly in recent years. Partnerships with The Nature Conservancy, State Natural Heritage Inventory Programs, the Garden Clubs of America, the World Wildlife Fund, and other organizations and individuals across the country are making possible hundreds of projects to inventory, monitor, and restore rare species and their habitats, and to conserve rare ecosystems.

Plant conservation is one of three areas of emphasis under the *Every Species Counts* program. (See article in this edition of the *Bulletin* by Christopher Topik.) Nearly 100 federally listed and about 1,600 sensitive plants are found on national forest lands.

Another priority of *Every Species Counts* is aquatic wildlife, including rare fishes, amphibians, and aquatic reptiles, mollusks, and insects. Recent events, such as the listing of several

Columbia and Snake River salmon (*Oncorhynchus* spp.) runs, have emphasized the importance and growing public awareness of rare fishes. Habitat for over 150 listed or sensitive fish species is managed by the Forest Service.

Terrestrial species comprise the third priority. This section of the program evolved around a relatively few well-known species, such as the spotted owl, grizzly bear, gray wolf (*Canis lupus*), and red-cockaded woodpecker (*Picoides borealis*). However, hundreds of other species have important needs as well, including the sandhill crane (*Grus canadensis*), wolverine (*Gulo gulo luscus*), and Uncompahgre fritillary butterfly (*Boloria acrocivena*). The *Every Species Counts* program is expanding to conserve these lesser known rare species.

Recovery

Recovery of listed species is a primary concern of the *Every Species Counts* program. The Forest Service works with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to develop and carry out recovery plans for species occurring on national forests and grasslands. In the Pacific Northwest, for example, a recovery plan for the marbled murrelet (*Brachyramphus marmoratus*) is now being completed. Efforts to restore the grizzly bear and gray wolf continue in selected recovery areas of the western U.S. In the Southeast, recovery of the red-cockaded woodpecker is being attempted through such practices as the installation of artificial nest cavities and improved habitat management.

In a major shift, however, the Forest Service is joining the Fish and Wildlife Service in moving from an emphasis on single species towards a practice of

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Conserving the Oregon Silverspot Butterfly on Siuslaw National Forest

by Michael D. Clady

The Oregon silverspot butterfly (*Speyeria zerene hippolyta*) is restricted to cool, wet, marine grasslands along the Pacific Ocean from southern Washington to northern California. Aspects of the species' one-year life cycle, in particular a prolonged adult stage from June to September, help it adapt to persistent foggy and windy weather. Some adults emerge during periods of sunny, relatively calm weather. The females lay their eggs on or near common blue violet plants (*Viola adunca*), which are the sole food source for the larvae.

The habitat of this butterfly and its foodplant, which must include low-growing, patchy grasses that do not crowd out the violets, is disappearing along the coast. Vegetational succession has turned many sites to brushy shrub and forest land, while others have been destroyed for homesites, towns, and tourist and recreational facilities.

By 1980, when it was listed by the Fish and Wildlife Service as a Threatened species, the silverspot was known only from one site, which was located on the Siuslaw National Forest along the central Oregon Coast. Since then, the species has been found at six other small sites on Federal, State, and private land. The butterfly is not abundant anywhere, and in a typical year there are fewer than 4,000 individuals distributed along 350 miles (560 kilometers) of coastline.

In 1983, the National Forest began to restore about 100 acres (40 hectares) of meadow habitat. In consultation with the Fish and Wildlife Service, we tried burning, introducing violet seeds and plants, mowing grass thatch, and removing invading trees and shrubs by machine or hand. A cautious approach was used. Treatments were confined to small plots outside of



photo by Paul Opler

Oregon silverspot butterfly

prime habitat where there was little risk of killing butterfly larvae.

Mowing several times a year (every fourth or fifth year), particularly after the initial surge of growth in late spring or early summer, reduces grass thatch and often produces spectacular stands of blooming blue violets. Removing scattered stands of invading woody plants and maintaining shelter areas in the forest fringe has been relatively easy, and has opened up more areas for mowing. At present, burning is restricted largely to removing mowing residue and to clearing steep slopes where mowing is impossible.

Although efforts have not always been successful, results so far have exceeded our expectations. Adult

silverspots heavily use many of the renovated areas, and three populations now are reasonably secure on the Siuslaw National Forest. A fourth, introduced population has maintained itself at a low level for 4 years. Overall, it seems that the species is on the way to recovery in Oregon.

Recent proposals for improving management of national forests in the region should promote biodiversity by perpetuating grasslands that support not only the butterfly but many other scarce animals and plants.

Michael D. Clady is the Forest Fisheries Biologist and Silverspot Butterfly Coordinator for the Siuslaw National Forest in Corvallis, Oregon.

Every Species Counts

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managing by groups of species and/or communities. Addressing ecosystem conservation on a broad basis is being aided by a new Forest Service tool, the Habitat Conservation Assessment. Teams of researchers and managers

compile information on a species' population status and trends, its habitat requirements, limiting factors, and effects of Forest Service activities on the species. This concept builds on the successes achieved with similar efforts, such as the Interagency Grizzly Bear Committee.

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Red-cockaded Woodpecker Management on Southern National Forests

by Dennis L. Krusac

Historically, red-cockaded woodpeckers (*Picoides borealis*) could be found throughout the pine forests of the southeastern United States from southern Oklahoma, Kentucky, and Maryland southward to Florida and westward to eastern Texas. Due to widespread habitat loss, however, the bird's range has been reduced primarily to public lands (mainly national forests) in the southern United States.

Although National Forest System lands comprise only about 6 percent of the forested lands in the South, 80 percent of the recovery objectives identified for this species are planned for Forest Service lands. Because this habitat is so critical, the Forest Service has developed a specific red-cockaded woodpecker management strategy for the southern national forests.

Habitat management first involves delineating areas that encompass the desired future area for a red-cockaded woodpecker population at a landscape scale. The intent is to manage an area large enough to avoid or overcome the adverse effects of habitat fragmentation and to reduce the risks inherent with small populations. The average size of such a habitat management area is 74,475 acres (30,140 hectares). These habitat management areas may total more than 3 million acres (1.2 million ha).

Small, widely dispersed populations are more susceptible to extirpation than large populations. For this reason, red-cockaded woodpecker populations with fewer than 40 potential breeding pairs receive more intensive management on national forests, and their habitat receives greater protection from competing uses (such as logging). Populations with more than 400 potential breeding pairs are considered secure. They receive less intensive management, and there are fewer restrictions on other activities.



photo © John and Karen Hollingsworth

Red-cockaded woodpecker

One example of habitat management for the red-cockaded woodpecker is the use of prescribed burning. When naturally occurring wildfires are suppressed, a dense hardwood midstory can develop, altering the more open habitat conditions favored by the woodpecker. The recovery plan emphasizes prescribed burning for midstory control every 3 to 5 years. This mimics the natural fire regime and improves habitat conditions.

Habitat management at a landscape scale with a more natural disturbance regime will not only help the woodpecker, but should have benefits to

overall biological diversity. Another 167 Threatened, Endangered, or sensitive plant and animal species should benefit from the proposed management strategy. Its implementation could preclude the need to list some of these species.

Extended timber harvest rotation cycles in southern forests also can benefit the woodpecker. The recovery strategy sets a 120-year rotation for longleaf and shortleaf pine, and a 100-year rotation for loblolly and slash pines. These extended rotations are based on the bird's preference for older trees in which to excavate nesting cavities. It is essential that proper rotations be implemented and a balanced tree age/size class distribution achieved to provide adequate habitat in the future.

Providing artificial nesting cavities will be used to increase the number of potential breeding sites and to stimulate colonization of unoccupied habitat. Artificial cavities have also proven effective in stabilizing populations following nesting tree loss from natural causes, such as hurricanes.

Another form of intensive management involves the translocation of juvenile birds to create potential breeding pairs. Translocations have been successful, but they must be used in conjunction with artificial cavities and midstory control to be truly effective.

These actions, as outlined in the red-cockaded woodpecker management strategy, are a substantial contribution to the recovery of the longleaf pine ecosystem and other southern pine-dominated ecosystem types.

Dennis L. Krusac is an Endangered Species Specialist with the Forest Service at its Southern Regional Office in Atlanta, Georgia.

Recovering Citico Creek Fishes in the Cherokee National Forest

by Jim Herrig

The Southern Appalachian Mountains are widely known for their ecological diversity. The phrase "...the greatest variety of plants in North America occurs in these mountains..." is often cited by authors to emphasize the richness of species that occur here. Frequently, however, the equally diverse aquatic fauna goes unrecognized.

Citico Creek is a moderately sized, but biologically rich, stream in the mountains of eastern Tennessee. At least 51 species of fish have been collected from its watershed. These, plus the many salamander, frog, insect, and mussel species, are enough to keep aquatic ecologists busy for years.

With all of these species competing in the same body of water, ecological niches are very narrow. Consequently, habitat for many of the species is limited. Five of these species have such restricted habitat requirements in Citico Creek and throughout their range that they are federally listed as Threatened or Endangered. Two of these species are catfish, the Smoky madtom (*Noturus baileyi*) and yellowfin madtom (*Noturus flavipinnis*).

Since the early 1980's, biologists with the Cherokee National Forest have studied and monitored the populations of these fish in cooperation with the University of Tennessee, Tennessee Wildlife Resources Agency, U.S. Fish and Wildlife Service, Great Smoky Mountains National Park, and a private organization, Conservation Fisheries, Inc. Research on the life histories of both species was funded by these cooperators. Annual population monitoring began in 1986. Collection of nests with eggs, followed by captive propagation in aquariums, came next.

Both catfish are tiny, nocturnal bottom-dwellers that spend most of their lives under rocks. They spawn during June in excavated cavities. Males



snorkling for madtoms in Citico Creek

guard the eggs and provide some protection from scavenging crayfish, salamanders, and other fish. The guarding instinct is so strong that when the slab rock is lifted for inspection of the nest, the male does not leave the area. This trait enables biologists to collect both the nest and the male madtom.

Although successful spawning in aquariums has not yet been achieved, wild-collected eggs of both species have hatched in captivity, and fry have been reared to a size large enough for release. The fry are being stocked into Abrams Creek in the Great Smoky Mountains, another stream in which both species are believed to have occurred. If populations can be established in Abrams Creek, these species will be brought a step back from the brink of extinction.

Intensive surveys of the yellowfin and Smoky madtoms are expensive and might be detrimental to the fish. Therefore, careful surveys with minimum potential for adverse impacts are

conducted. These surveys take place under low flow conditions at night using snorkel gear and spotlights.

In 1990, the population trend for the yellowfin madtom appeared to be steeply downward. The cooperators therefore decided 1) to take only one yellowfin nest from Citico Creek in 1991, 2) to stock all of the juveniles that were reared back into Citico Creek (68 total), and 3) not take any nests from Citico Creek in 1992.

In 1993, the yellowfin madtom population index suggested a strong upward trend. Two nests were collected, and all 113 of the juveniles produced were released back into Citico Creek. The 1994 survey has begun, and the number of yellowfins looks promising.

Because Citico Creek holds the only known Smoky madtom population, it is imperative to reestablish this species in another stream within its historic range. Since the Smoky madtom population trend from 1990 through

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The National Forest System Rare Plant Conservation Program

by Christopher Topik

From forests to grasslands, the National Forest System contains some of America's best habitats for wildflowers and other plants. We estimate these lands support more than 10,000 species of vascular plants and untold numbers of non-vascular plants.

Nearly 100 of these plants are listed federally as Endangered or Threatened, and more than 1,700 others have been designated by the Forest Service as sensitive. Over half the Threatened and Endangered plant species we manage are found within our southeastern region, which ranges from Virginia to Texas, and includes the Caribbean National Forest in Puerto Rico. Although most of the national forests in this region are small, their importance is magnified by the fact that they comprise a large proportion of the public

land in the southeast that is managed for conservation purposes.

The National Forest Management Act commits our agency to maintaining a diversity of plant and animal communities throughout the National Forest System. In recent years, the National Forest Service's rare plant program has grown tremendously. Over 120 full-time botanists in the agency are now involved primarily with plant conservation, and they provide a wealth of local field botany expertise. We work closely with other Federal and State agencies, and collaborate extensively with State natural heritage programs and The Nature Conservancy on survey and data management. Cooperation with volunteer groups (such as the Garden Club of America) and botanical gardens associ-

ated with the Center for Plant Conservation also increases our ability to inventory and conserve rare plants. We welcome conservation partnerships with others interested in plant conservation.

Because conservation efforts are more effective when they are launched before species become Endangered or Threatened, the Forest Service is compiling habitat management strategies for sensitive species. Over 100 such plant conservation strategies have been completed or are well under way. This number will increase as we work with fellow Federal agencies to implement a Memorandum of Understanding (MOU) signed January 25 by agency heads of the Forest Service, Bureau of Land Management, Fish and Wildlife

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Recovering Citico Creek Fishes

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1994 appeared stable to upward, the cooperators decided to continue with attempts to restore the species to

Abrams Creek in the Great Smoky Mountains National Park. Aquarium-reared fry were released each year from 1990 to 1992. Night snorkeling surveys in Abrams Creek located a few

surviving Smoky madtoms in 1990 and 1991, but none were observed in 1992. No evidence of natural reproduction has been documented. Once successful spawning occurs, the likelihood of finding individual Smoky madtoms will increase greatly.

During 1989-1991, when the yellowfin madtom population index was so low, it was comforting to know that some individuals were being held in an experimental captive breeding program. Because of the success in rearing these fish in captivity, we were able to contribute significantly to the status of the Citico Creek population. Full recovery of this species and several others in the southern Appalachian Mountains will be assured only by habitat restoration, successful captive breeding programs, and the establishment of reintroduced populations.

Jim Herrig is the Forest Biologist for the Cherokee National Forest in Cleveland, Tennessee.



photo by J.R. Shute, Conservation Fisheries, Inc.

yellowfin madtom

Rare Plant Conservation

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Service, National Park Service and National Marine Fisheries Service. Its purpose is to address the needs of vulnerable species — animals as well as plants — in time to secure sustainable populations, thereby making Endangered Species Act protection unnecessary.

Recently, the Forest Service joined a number of Federal agencies in another conservation effort, this time to develop an integrated strategy aimed specifically at native plants. The agreement was formalized by creation of the Federal Native Plant Conservation Committee. The Committee will promote the sharing of expertise and resources, assist in the development of consistent scientific methodologies, encourage collaborative training programs, and support new ecosystem management efforts.

Plant conservation on the national forests and grasslands can include many different kinds of activities:

- **Inventories** — Although botanists conduct species inventories on the National Forest System for specific project areas, they also participate in integrated searches of larger ecosystem or management jurisdictions. New species are still found every year, and range extensions are not uncommon. For instance, two of our regional botanists, Duane Atwood from Ogden, Utah, and Jim Shevock from San Francisco, have discovered numerous new species, and they each have seven species named in their honor.



photo by Paula Brooks

The status of MacFarlane's four-o'clock, a wildflower native to parts of Idaho and Oregon, is now more secure because of Forest Service changes in habitat management and recovery efforts carried out in cooperation with the Bureau of Land Management and the Fish and Wildlife Service.

- **Recovery** — Implementing recovery plans for listed species is an important part of the Forest Service rare plant program. For example, our botanists have conducted prescribed burns to create open habitat needed by the mountain golden heather (*Hudsonia montana*) in North Carolina, and reintroduced Mead's milkweed (*Asclepias meadii*) in southern Illinois. Working with several other agencies, we have helped secure MacFarlane's four-o'clock (*Mirabilis macfarlanei*), enabling the Fish and Wildlife Service to propose reclassifying this wildflower from Endangered to the less critical category of Threatened.

- **Resource coordination** — Forest Service botanists are now participating on interdisciplinary teams to guide

such activities as timber harvest, livestock grazing, mining, road building, forage or wildlife habitat enhancement, land exchanges, and recreational development. By becoming involved early in the process, the needs of plants and rare habitats can usually be accommodated.

- **Restoration and rehabilitation** — On Earth Day 1994, President Clinton called for use of regionally native species in Federal landscaping and restoration projects. We are collaborating with native plant experts, such as the Redwood City Seed Company in California and the Soil Conservation Service, to develop local stock for planting in damaged areas. As we move forward with ecosystem management, watershed restoration will be a growing role for the Forest Service, and the use of native species for rehabilitation will increase.

- **Special forest products** — The collection of forest botanical products for personal and commercial uses is increasing, and in some areas could play a large role in rural economic diversification. A surprisingly long list of vascular plants, bryophytes, and fungi have high economic value. It is imperative that development of this industry be preceded by resource inventories and estimates of sustainable harvest levels. Monitoring plant population impacts and potential plant misidentifications also will be important roles for botanists.

- **Exotic species control** — The introduction and spread of non-native plants and animals is emerging as one of the greatest threats to the integrity of national forest and grassland ecosystems. Forest Service botanists are increasingly being called upon to assist

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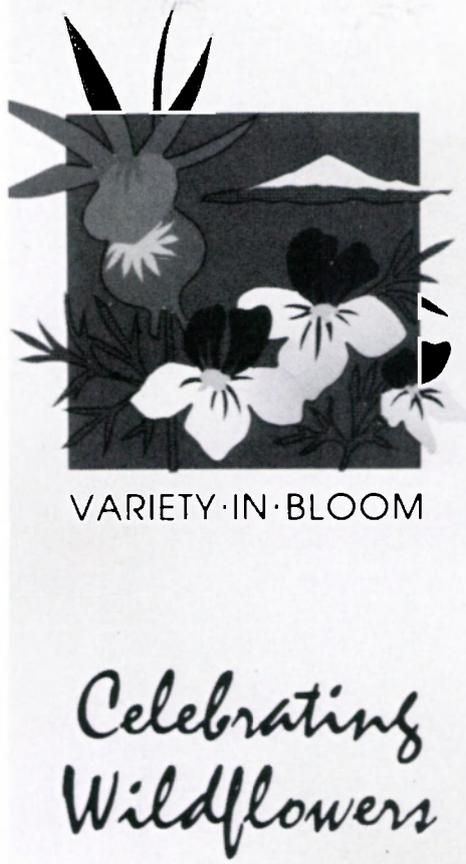
Rare Plant Conservation

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other resource managers with identifying problem areas and planning treatments.

- **Public education, recreation, and outreach** — Two years ago, the Forest Service's Pacific Northwest Region created a new event, "Celebrating Wildflowers - Wildflower Week," as an umbrella to foster appreciation for native plants and the role of public lands in their conservation. This effort has now gone national, with the Bureau of Land Management and National Park Service as full partners. Several hundred activities — from hikes to classroom presentations, festivals, restoration projects, and displays — took place this spring and summer. We look forward to continued growth in this effort as we welcome new partners.

- **Ecosystem management planning** — With the shift toward ecosystem management, Forest Service botanists



are becoming involved in a variety of planning projects, ranging from evaluating natural communities to prioritizing the special needs of unique habitats. At the San Bernardino National Forest in California, for example, we collaborated with The Nature Conservancy to protect the rare "pebble plains" habitat in the Big Bear Lake area. These unusual, shallow-soil prairies are home to more than 10 endemic plants.

Although there may be many definitions of "ecosystem management," its success will be measured by how well the soil, water, and populations of native plants and animals are conserved for future generations to use and enjoy.

Dr. Topik is Leader of the Forest Service's National Botany Program, USDA-Forest Service, P.O. Box 96090, Washington, D.C. 20090-6090.

Endangered Species Information Now Available Through Internet

The Fish and Wildlife Service recently placed several electronic information items on its Information Resources Management Library Server, which makes these items accessible to users of Internet and the Service's Wide Area Network. These items include:

- The List of Threatened and Endangered Species (entitled, "Endangered and Threatened Wildlife and Plants"), current as of June 30, 1994, and to be updated monthly;
- The Plant Notice of Review (entitled "Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review"), as published September 30, 1993;
- The Endangered Species Act of 1973, as amended through the 100th Congress;
- Species Maps that indicate listed species and proposed species by state and territory, current as of June 1, 1994;
- Species Maps that indicate Category 1 listing candidates and candidate species by state and territory, current as of December 31, 1993.

The Library Server can be accessed through cc:mail within the Service and through Internet E-mail software from outside the Service. If you address a new cc:mail message to R9IRMLIB (the Library Server's cc:mail address), type the retrieval command — Send ES Instructions — on the subject line and send the message, you will receive the complete list of "send" messages (retrieval commands) available on the Library Server for the Endangered Species Program. This list will change over time as more information is added to the Library Server. For example, the new Animal Notice of Review will be added once it has been published in the *Federal Register*.

Those from outside the Service with Internet E-mail capabilities should use R9IRMLIB@mail.fws.gov (the Library Server's Internet address) to access the above information.

Every Species Counts

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Preventing the Need to List

Habitat Conservation Assessments are being completed for such species as the bull trout (*Salvelinus confluentus*); the inland cutthroat trout (*Oncorhynchus* spp.); the northern goshawk (*Accipiter gentilis*); the great gray owl (*Strix nebulosa*), flammulated owl (*Otus flammeolus*), and boreal owl (*Aegolius funereus*); and carnivores such as the fisher (*Martes pennanti pacifica*), pine marten (*Martes americana*), lynx (*Felis lynx canadensis*), and wolverine. By acting early and adapting land management activities when necessary, we hope to foster secure populations of these species, avoiding the need to list them as Endangered or Threatened.

Conserving species before they decline to the point of needing Endangered Species Act protection is a major goal of *Every Species Counts*. The Forest Service addresses this goal through its sensitive species program, which began in 1982. By identifying sensitive species and taking voluntary actions to reduce impacts to their habitat, we can reduce the number of future listings. National forest lands provide habitat for 2,344 species designated as sensitive.

In some situations, large-scale habitat management policies are adopted. The case of the northern goshawk (*Accipiter gentilis*) provides a good example. This raptor is designated as a sensitive species in five of the Forest Service's nine regions, and is considered a Category 2 listing candidate by the Fish and Wildlife Service. Because of continued threats to goshawks and their habitat in the southwest (Arizona and New Mexico), the Forest Service established an interim management policy to protect known nesting sites and provide management guidelines for a 6,000-acre (2,430-ha) area around each site. An environmental impact statement is being completed to formally adopt this policy and amend forest management plans regionwide. In addition, the Forest Service is a member of the Goshawk Interagency Implementation Team,

which is developing policy for managing the species on all Federal lands.

In January 1994, the Forest Service joined four other Federal agencies (Bureau of Land Management, Fish and Wildlife Service, National Park Service, and National Marine Fisheries Service) in signing a Memorandum of Understanding on vulnerable wildlife. All five agencies agreed to cooperate in managing these species to prevent the need for listing them under the Endangered Species Act. Specific conservation agreements have been developed for such animals as the Coeur d'Alene salamander (*Plethodon idahoensis*), northern bog lemming (*Synaptomys borealis sphagniaola*), bull trout, and Wet Canyon talussnail (*Sonorellax macrophallus*). The Forest Service is also helping to develop a new strategy for conserving North America's native plants. (See the article in this edition of the *Bulletin* by Joan Canfield.)

Research

Forest Service scientists are conducting research on more than 75 Threatened, Endangered, and sensitive species in aquatic and terrestrial systems. For example, agency scientists have worked with the Fish and Wildlife Service to study the Puerto Rican parrot (*Amazona vittata*) and factors related to its nesting success, competition, predation, pair formation, and genetics. In addition, they helped develop techniques for artificial cavities to improve nesting habitat. In 1968, the Forest Service also started research on the red-cockaded woodpecker. Research on artificial nesting cavities led to their use as an intensive management tool in red-cockaded woodpecker recovery. These structures have been key to a significant increase in the species' population after it was devastated by Hurricane Hugo.

Learning From Controversy

Despite the efforts of the *Every Species Counts* program, controversy surrounding the management of

some listed and sensitive species continues. Fortunately, this challenge often results in improved policies and management. The situation in the Pacific Northwest is an example. Public concern for old-growth forests and the species they support, including the northern spotted owl, generated a great deal of forest research. The findings confirmed that the spotted owl is only one of many species dependent on old-growth forests.

This research on the northern spotted owl enabled the Clinton Administration and the Forest Service to propose far-reaching changes in the management of national forests in this region. These proposed changes are embodied in the "Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl," otherwise known as "The President's Northwest Forest Plan." What began as a set of guidelines for a single species was expanded to address the needs of over 1,000 species associated with old-growth forests.

A Challenging Future

Knowledge of many vulnerable species and ecosystems on lands managed by the Forest Service is still limited. Our emphasis in coming years will be on completing much-needed inventories, research studies, and population and habitat monitoring. This new information will enable us to focus on recovery and restoration in 14 major ecological areas, from the Great Basin to the tropical forests of Puerto Rico. Many new partnerships will be forged and strengthened between the *Every Species Counts* program and other agencies, conservation organizations, civic groups, and individuals as we shift to an ecosystem-based approach to conservation.

Valerie C. Guardia is Assistant National Program Manager for the Forest Service's Threatened, Endangered, and Sensitive Species Program in Washington, D.C.

Listing Proposals — April/May 1994

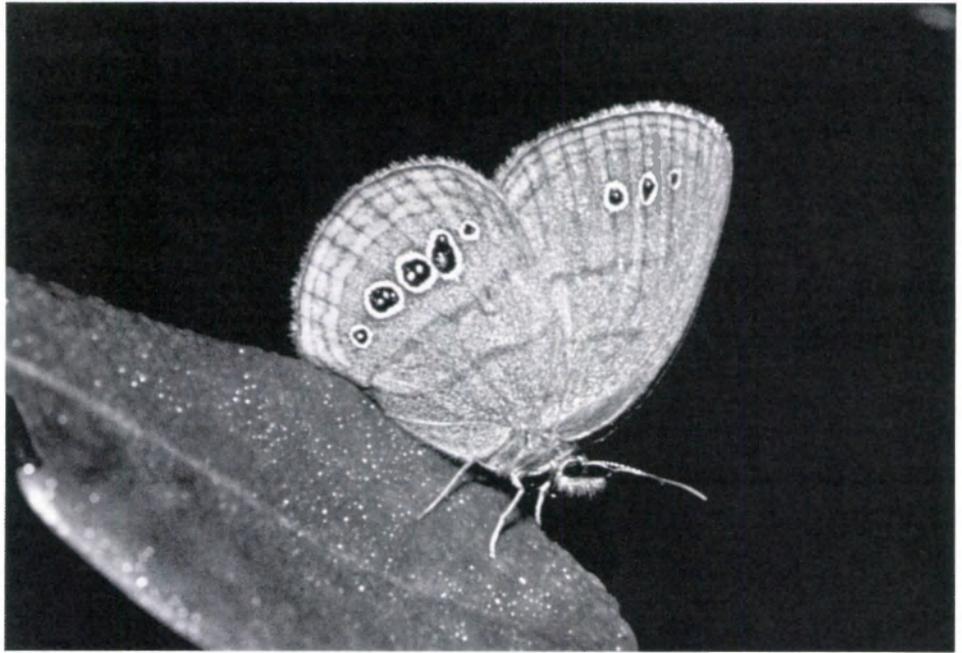
Eleven species — five animals and six plants — were proposed by the Fish and Wildlife Service (FWS) during April and May 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Saint Francis' Satyr (*Neonympha mitchellii francisci*)

One of the rarest butterflies in North America, the Saint Francis' satyr is endemic to the sandhills region of North Carolina. After this subspecies was described in 1989, collectors flocked to the site where it was first found, and the satyr was soon reported to be extinct. Fortunately, a small population was found recently. Because of its low numbers, restricted range, and continuing vulnerability to collection, the Saint Francis' satyr was proposed April 18 for listing as Endangered. The potential threat posed by collectors, including commercial dealers, is so severe that the FWS also issued an emergency rule giving the butterfly immediate protection for a period of 240 days, during which the FWS will seek permanent protection for the species. Biologists hope this unusual action will enable the satyr to survive its 1994 flight season.

Saint Francis' satyr habitat consists of open, wet meadows dominated by sedges. This butterfly likely had a broader distribution before widespread environmental changes in the southern coastal plain altered or destroyed much of the habitat. Its northern relative, Mitchell's satyr (*Neonympha mitchellii mitchellii*), was listed in 1992 as Endangered, also because of over-collection and habitat loss.

Periodic fires associated with silvicultural practices, wildlife habitat management, and other activities are the main reason the Saint Francis' satyr survives in this area. No serious conflicts with existing land use practices are expected.



Saint Francis' satyr is a fairly small, dark brown butterfly with conspicuous "eyespots" on the lower surfaces of the wings. The spots are dark maroon brown in the center, surrounded by a straw yellow band.



The Virgin spinedace is a small fish up to 5 inches (2 centimeters) in length, with a broad, flat, silvery body.

Virgin Spinedace (*Lepidomeda mollispinis mollispinis*)

The Virgin spinedace is a small fish in the minnow family. As its common name suggests, this subspecies is endemic to the Virgin River system, which drains parts of southwestern Utah, northwestern Arizona, and southeastern Nevada. Widespread habitat fragmentation, introductions of non-native fish species, and dewatering due to agriculture, mining, and urbanization have eliminated the Virgin spinedace from approximately 40 percent of its historical habitat. Because these factors pose continuing threats,

the FWS proposed May 18 to list the spinedace as Threatened.

Although its habitat preferences may vary, the Virgin spinedace is usually found in clear, cool, free-flowing streams that are interspersed with pools, runs, and riffles. Much of this habitat has been fragmented or destroyed by impoundments. Diversion structures have removed most or all of the water from some other areas. Livestock and mining operations in floodplains and riparian zones can further degrade the habitat by contaminating surface water.

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Listing Proposals

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Predation and competition from introduced non-native fishes is a significant threat to several fish species in the Virgin River system, including the spinedace. Control of harmful exotic species is expected to play an important part in its restoration, along with rehabilitating and protecting important habitat.

Three California Insects

Three species of insects limited to a small portion of the Santa Cruz Mountains in Santa Cruz County, California, were proposed May 10 for listing as Endangered:

- **Mount Hermon June beetle** (*Polyphylla barbata*) - a small scarab beetle with a black head, dark blackish-brown front wings clothed with scattered long hair, and a striped body.



FWS photo

Mount Hermon June beetle

- **Zayante band-winged grasshopper** (*Trimerotropis infantilis*) - a small grasshopper with a pale gray to light-brown body, and dark crossbands on the forewings.

- **Santa Cruz rain beetle** (*Pleocoma conjugens conjugens*) - a large beetle that is reddish-brown to black in color, with long hairs on the ventral surface.

All three insects are restricted to small, pockets of a unique habitat type — ponderosa pine sand parklands — that are scattered within a 20-square-mile (52-square-kilometer) area. Because of their disjunct distribution, these areas have been referred to as “biological islands.” The amount of habitat historically occupied by the three insects totalled only about 500 acres (200 hectares). By 1992, how-

ever, human activities in the Santa Cruz Mountains had reduced the range to less than 100 acres (40 ha).

Urbanization, off-road vehicle use, recreational development, sand mining, certain agricultural practices, and alteration of natural fire regimes have contributed to the degradation or destruction of the insects’ habitat, and pose continuing threats.

Five California Plants

Five plant taxa native to the foothills of the central Sierra Nevada were proposed April 20 for Endangered Species Act protection. Listing as Endangered was proposed for the four in most immediate danger:

- **Stebbins’ morning-glory** (*Calystegia stebbinsi*) - a perennial herb in the family Convolvulaceae with white flowers and distinctively lobed leaves.

- **Pine Hill ceanothus** (*Ceanothus roderickii*) - a prostrate evergreen shrub in the buckthorn family (Rhamnaceae) that has whitish flowers tinged with blue.

- **Pine Hill flannelbush** (*Fremontodendron californicum* ssp. *decumbens*) - a spreading shrub in the cacao family (Sterculiaceae) with light orange to reddish flowers.

- **El Dorado bedstraw** (*Galium californicum* ssp. *sierrae*) - a small perennial herb in the coffee family (Rubiaceae) with pale yellow flowers clustered at the tips of its stems.

Because the situation facing the fifth plant is not as critical, it was proposed for the classification of Threatened:

- **Layne’s butterweed** (*Senecio layneae*) - a perennial herb in the aster family (Asteraceae) with several yellow flower heads, each having 5 to 8 ray flowers.

All five plants are found primarily on gabbro or serpentine soils within chaparral or oak woodlands in western El Dorado County. There are also a few isolated locations in Nevada and Tuolumne Counties. The primary threat facing these plants is continuing habitat loss. Many sites have been fragmented, damaged, or even de-

stroyed by one or more of the following: urbanization, road construction and maintenance, off-road vehicle use, land clearing, and mining. El Dorado County, which has a projected growth rate of over 50 percent between 1990 and 2005, is one of the most rapidly growing counties in California.

Fire suppression, which accompanies development, has altered natural ecological processes within a number of plant communities in California. It poses a threat to four of the proposed plants, which evolved within fire-adapted habitat. Periodic fire is important for germination of their seeds and eliminates shading from competing vegetation. In a study of controlled burning at a site in El Dorado County, fire caused a 22-fold increase in germination of the Pine Hill ceanothus. In addition, the growth rate of seedlings was greater in the burned site than in a nearby unburned area.

Golden Paintbrush (*Castilleja levisecta*)

Brilliant golden yellow flower bracts give this perennial herb its common name. A member of the snapdragon family (Scrophulariaceae), the golden paintbrush grows to a height of about 20 inches (0.5 meter). It occurs in low-elevation grasslands on glacially derived soils of the Puget Trough.

Historically, the plant could be found from the Willamette Valley in Oregon north to Vancouver Island in British Columbia. Only 10 disjunct populations remain, some of them very small, and the species is now extirpated in Oregon. On May 10, the FWS proposed to list the golden paintbrush as Endangered.

Although some paintbrush sites were destroyed by urbanization or agricultural conversion, the loss of grassland habitat to encroachment by native and exotic woody plants is the main reason for the decline. Open coastal prairies once were maintained by periodic

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Final Listing Rule Approved for Two Aquatic Snails

Two species of freshwater snails were listed April 15, 1994, as Endangered. The royal snail (*Pyrgulopsis ogmophaphe*) is known only from two spring runs within the Sequatchie River system in Marion County, Tennessee. It is small, usually less than 0.25 inch (5 millimeters) in length, has

a conical shell, and is dark brown to black in color. Two small populations of Anthony's riversnail (*Athearnia anthonyi*) occur at sites in the Sequatchie River (also in Marion County) and Limestone Creek in Limestone County, Alabama. This species once had considerably wider range.

Both species are vulnerable to habitat degradation. Threats to water quality include siltation; road construction; logging; cattle grazing; and pollution from agricultural, municipal, and industrial runoff.



photo by John Gamon/Washington Natural Heritage Program

The golden paintbrush is named for its brilliant golden yellow flower bracts.

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wildfires, but fire suppression has allowed the spread of invasive shrubs that shade the golden paintbrush and compete for space and nutrients. Efforts to remove competing vegetation mechanically or by hand have been attempted, but these methods have proven expensive and labor intensive.

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from being jeopardized by Federal activities; restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take

conservation actions; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments with cooperative endangered species agreements. Listing also lends greater recognition to a species' precarious status, encouraging other conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an

agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable and prudent alternatives," such as project modifications or rescheduling, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by Section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to possess, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law, or in the course of violating a State criminal trespass law, also is illegal under the Act. In addition, some States have more restrictive laws specifically against the take of State or federally listed plants and animals.

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conservation — that is, they illustrate the importance of wetlands and highlight the enjoyment of outdoor activities such as hunting, fishing, and birding. Through “hands-on” items, including a coffee filter and a sponge, these trunks help show how wetlands absorb pollutants and prevent floods, benefitting the environment and its inhabitants, including people.

The other four trunks show the need to protect Endangered species, demonstrating their appeal through such specimens as ocelot (*Felis pardalis*) pelts and mounted hawksbill sea turtles (*Eretmochelys imbricata*). Provided by the FWS Forensics Laboratory in Ashland, Oregon, these wildlife articles were confiscated after being involved in violations. “Recycled,” they have become valuable teaching aids.

Like “Project Wild,” another educational program, these resource trunks are funded through Federal Aid accounts. The trunks are designed for use by students in grades K through 12, and are available to teachers in public, private, and parochial schools, as well as home-schoolers and youth conservation organizations. For more information, contact Dorothy Deas in the FWS Austin Office, 300 F. 8th Street, Room G-167, Austin, Texas 78701 (telephone 512/482-5454).

The Houston toad (*Bufo houstonensis*) was the subject of a Population and Habitat Viability Analysis Workshop held May 23-25, 1994, in Austin, Texas. The 3-day seminar involved public and private organizations in consensus-building to promote the survival and recovery of this Endangered species. Participants included the National Fish and Wildlife Foundation, the Lower Colorado River Authority, and the FWS, among others. The result was a revised recovery plan that will lay the biological

groundwork for habitat conservation planning for this species.

The FWS Austin Office recently conducted two public meetings in Bastrop County, Texas, to discuss ways protect the toad while allowing development of a growing community.

Region 3 - Officials at Crab Orchard National Wildlife Refuge in Illinois plan to turn two World War II era munitions bunkers into artificial bat caves. Plans include altering the surface on the bunker ceilings and walls to give them a more “attachable” surface for roosting bats. Temperature regulation in the bunkers may enable them to provide breeding and wintering habitat for the little brown bat (*Myotis lucifugus*), the Endangered gray bat (*Myotis grisescens*), and the Endangered Indiana bat (*Myotis sodalis*).

The Rock Island, Illinois, and the Twin Cities, Minnesota, Field Offices have worked together to reformulate a Higgins' eye pearly mussel (*Lampsilis higginsii*) recovery team. The team will revise the 1978 recovery plan and help develop a multi-year study to determine the distribution, abundance, and status of this Endangered species. Impacts of the 1993 flood and the impending spread of a harmful non-native species, the zebra mussel (*Dreissena polymorpha*), will be investigated.

A public hearing on the proposed listing of the northern copperbelly water snake (*Nerodia erythrogaster neglecta*) was held April 5 in Indianapolis, Indiana. About 25 people attended. Opposition to listing was voiced by the Western Kentucky Coal Association, although its representative offered to work cooperatively with the FWS if the snake is listed. Others in attendance were concerned that snake research activities may negatively affect snake populations. Most people, how-

ever, were in favor of listing this non-venomous snake as Threatened.

The FWS Columbia, Missouri, Field Office teamed up with the Missouri Department of Conservation to monitor sites of the federally listed Missouri bladderpod (*Lesquerella filiformis*) and geocarpon (*Geocarpon minimum*) in southwestern Missouri. The team also collected tissue samples of another plant, the Ozark wake robin (*Trillium pusillum* var. *ozarkanum*), which is a candidate for listing protection. Genetic analyses will help researchers determine if it is distinct from other varieties of *T. pusillum*.

The Ozark wake robin is rare in both Missouri and Arkansas. Unfortunately, the six known sites in Missouri are not protected, and a few sites have experienced further degradation since the last time they were monitored.

The City of Dayton, Ohio, is working with the FWS Reynoldsburg, Ohio, Field Office and the Ohio Division of Natural Areas and Preserves to explore protection for Ohio's second largest population of eastern prairie fringed orchids (*Platanthera leucophaea*). The orchids are growing on land owned by the City of Dayton, which plans to install water pumps that could lower the water table at the site and eliminate the orchids.

FWS personnel from the FWS Twin Cities Regional Office and Green Bay, Wisconsin, Field Office attended a taxonomy and field ecology workshop hosted by the Ottawa National Forest. The central focus of the workshop was those species of *Botrychium*, or moonworts, known to occur in the Great Lakes area. Several species of these small ferns are candidates for listing under the Endangered Species Act, and more needs to be learned about their biology and ranges. This sum-

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mer, through funds provided to the States under Section 6 of the Endangered Species Act, the Minnesota Department of Natural Resources will invite biologists to visit several Minnesota and Wisconsin sites of *B. mormo*, a category 2 listing candidate.

Region 4 - A new population of the striped newt (*Notophthalmus perstriatus*), a listing candidate, was found in Baker County, Georgia. The site is approximately 70 miles west of the nearest population in that State and about the same distance north of the nearest historical location in Florida. A 2-year survey (1991-1993) verified only three other populations of the striped newt in Georgia. University of Florida researchers report striped newts from 27 localities in Florida, all in the vicinity of Tallahassee and peninsular Florida on or near Trail Ridge.

Striped newts are restricted to dry longleaf pine forests of the southeastern coastal plain in Georgia and Florida. They share their habitat with two listing candidates, the gopher frog (*Rana areolata*) and the eastern population of the gopher tortoise (*Gopherus polyphemus*). Little is known of the striped newt's natural history because it is secretive and unlikely to be encountered far from the small, shallow, grassy ponds in which it breeds. These ponds may have an open canopy, composed primarily of pond cypress, slash pine, and blackgum, or they may be depressions totally devoid of trees. The ponds usually fill in late autumn or early winter and dry completely by May or June. Threats to the species appear to be loss of habitat through forest conversion to agriculture and real estate development, destruction of wetland breeding sites, and intensive silvicultural practices.

The FWS Asheville, North Carolina, Field Office worked with the staff of Chimney Rock Park in the mountains of western North Carolina to design a boardwalk around a population of rock gnome lichen (*Gymnoderma lineare*), a plant that was proposed recently for listing as Endangered. This privately owned park, operated as a commercial recreational facility, is visited by thousands of people each year. Two Endangered species, the peregrine falcon (*Falco peregrinus*) and white irisette (*Sisyrinchium dichotomum*), along with a candidate plant (*Monotropsis odorata*), thrive at this site due to the protection and management provided by park personnel.

Biologists from the North Carolina Arboretum and the FWS Asheville Office have collected cuttings and a seedling from the largest surviving Florida torreya (*Torreya taxifolia*) tree. This tree, planted on a North Carolina farm in the 1800's, is well outside the species' native range, which is limited to three counties in the Florida panhandle (Gadsden, Liberty, Jackson) and Decatur County, Georgia. All of these wild populations have been decimated by a fungal disease. The North Carolina tree is one of the few disease-free specimens left. Although there are no other specimens within several hundred miles, the North Carolina tree has produced fertile seeds at least once, and seedlings are now growing around it. The seedling collected from this tree has been planted in a disease-free environment on the Arboretum grounds. The cuttings will be rooted and cultivated at the Arboretum to preserve the tree's genetic material.

Region 5 - In May, the National Biological Survey sponsored a 2-day workshop in Leetown, West Virginia, on the status of freshwater mussels of the Atlantic slope and Ohio-Tennessee

River drainages. About 70 biologists representing State and Federal agencies (including many FWS representatives from Regions 4 and 5), conservation organizations, and the academic community participated. The informal and interactive workshop included discussion on the status, current research, threats, and conservation activities centered on freshwater mussels.

Increasing concern for the future of freshwater mussels was voiced throughout both days. Some of the main topics discussed were water quality, habitat alteration, water regulation, and the impacts of beavers on small streams containing mussels. The group also discussed the potential of newly identified threats, including use of the poison Rotenone, toxic ammonia concentrations from periodic Asiatic clam (*Corbiculata fluminea*) die-offs, impacts to host fish species from introduced fish species, and the invasion of the zebra mussel.

There was some good news. Dick Neves of the Virginia Cooperative Fish and Wildlife Research Unit presented a progress report on research the unit at Virginia Tech University is conducting. Dr. Neves is exploring the development of techniques for the creation of artificial mussel refuges (holding ponds) and propagation sites. In addition, the Leetown Science Center is offering to serve as a central repository of mussel tissues. These tissues would be available to geneticists and other researchers.

A number of biologists are investigating the breeding of freshwater mussels in laboratories. Research is focused on developing culture media that would enable glochidea (mussel larvae) to skip the host fish stage of mussel reproduction. This would possibly allow biologists to raise mussels for future reintroduction as habitat is restored.

Throughout the meeting, a watershed approach to conservation, rather

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than single species management, was stressed. Many participants felt that because of the successful information exchange and unexpectedly large interest, more workshops for freshwater mussels should be organized.

The recovery plan for the Plymouth redbelly turtle (*Pseudemys rubriventris*) was revised recently. A limited number of copies are available from the FWS New England Field Offices at 22 Bridge Street, Concord, New Hampshire 03301 (Attn: Michael Amaral), or from the Fish and Wildlife Reference Service at 5430 Grosvenor Lane, Suite 110, Bethesda, Maryland 20814.

BOX SCORE LISTINGS AND RECOVERY PLANS

Category	ENDANGERED		THREATENED		LISTED SPECIES TOTAL	SPECIES WITH PLANS
	U.S.	Foreign Only	U.S.	Foreign Only		
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	16	63	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	63	11	38	0	112	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	388	1	83	2	474	184
TOTAL	700	494	195	38	1,427*	483**
Total U.S. Endangered	700		(312 animals, 388 plants)			
Total U.S. Threatened	195		(112 animals, 83 plants)			
Total U.S. Listed	895		(424 animals, 471 plants)			

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

** There are 386 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

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