

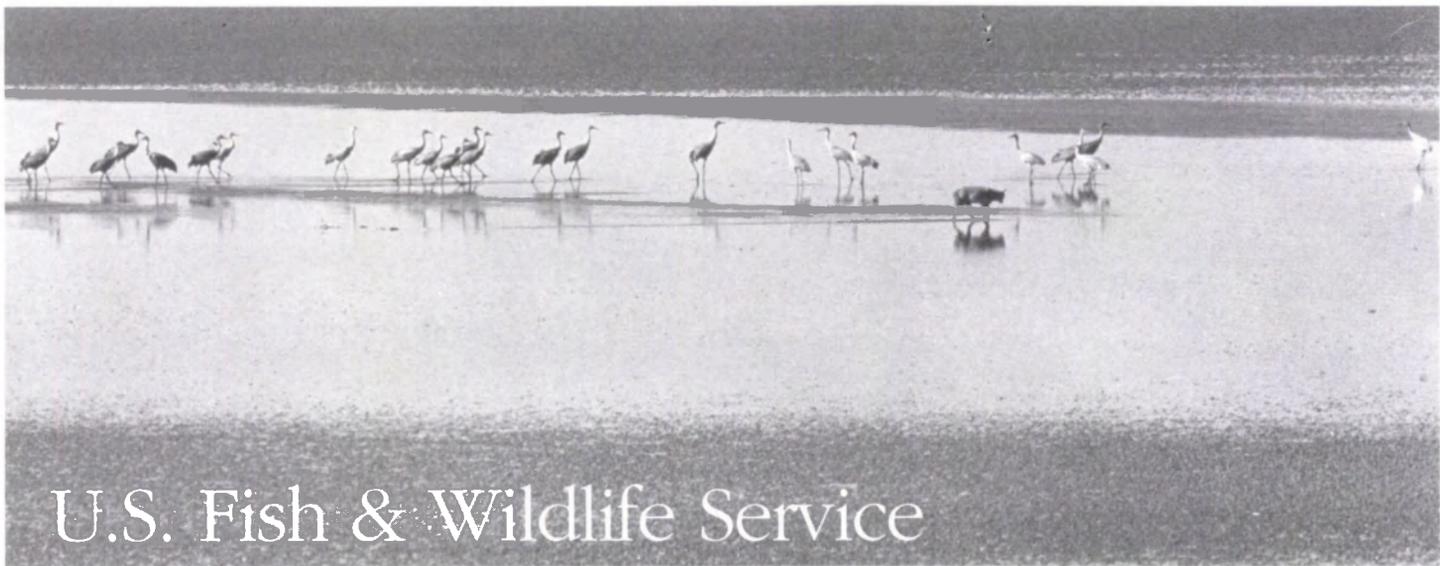
E N D A N G E R E D

Species
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*E*ndangered species indicate threats to the environment we all share, but reacting to the plight of individual species is no longer enough. This issue of the newly designed *Endangered Species Bulletin* highlights a different approach—one that involves the health of entire ecosystems.

The shift to an ecosystem approach reflects our growing awareness of the interrelationships among species and their habitats. As the scope of our conservation effort broadens, so must the ability of governments to form working partnerships with the private sector.

The following articles outline the Fish and Wildlife Service's ecosystem policy, the ethic upon which it is based, and examples of cooperative efforts to restore and protect our Nation's rich ecological heritage.



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On the Cover
Ecological health is essential to the recovery of whooping cranes and other vulnerable wildlife.
**photo by Tom Mangelsen,
Images of Nature**

Our thanks and acknowledgement with this edition to designer Christina Watkins and computer graphics specialist Amanda Summers, with appreciation also to Mary Maruca for her support.

The Endangered Species Bulletin welcomes manuscripts on a wide range of topics relating to endangered species, and may be semi-technical or popular in nature. We are particularly interested in news about recovery, interagency consultation, habitat conservation plans, cooperative ventures, changes in a species' status, and significant new threats.

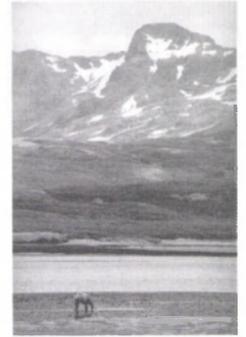
Contact the Editor before preparing a manuscript to determine the proper length, focus, and timing of proposed articles. We cannot guarantee publication.

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A Broader View

As I write this (January 12), I am waiting for a plane to Montana where I will be present for the reintroduction of wolves to Yellowstone National Park. Returning the wolf to Yellowstone replaces a vital piece of the “biotic community” that has been missing for 60 years.

Fifty years ago, after the howl of the wolf was silenced in Yellowstone, naturalist Aldo Leopold wrote of his understanding of the role that the wolf had served:

I have lived to see state after state extirpate its wolves. I have watched the face of many a newly wolfless mountain, and seen the south-facing slopes wrinkly with a maze of new deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death....

Director Mollie Beattie and Interior Secretary Bruce Babbitt (front center) help carry one of the caged wolves taken to Yellowstone National Park in preparation for the release.

**photo by Jim Peaco/
National Park Service**



Leopold's perspective in understanding wolves, and in writing *A Sand County Almanac*, is what we are today calling the "ecosystem approach." It is a way of thinking about natural resources not as individual commodities—wildlife, trees, water, or soil—but as interdependent pieces of a whole. Leopold was not the first to urge us to understand the interconnectedness of the ecosystem, although he may have been the most eloquent. His book was published in 1949; the ecosystem approach is not a new concept.

What *is* new is a broad realization that only the ecosystem approach will allow us to cure the basic ills that affect our wildlife. The problem with our wildlife is a problem with our land and water: the polluted and dying rivers and streams, the degraded wetlands, and the fragmentation and destruction of forests. It is only by thinking about wildlife in the context of the ecosystem that we can, as Leopold said, move from "land doctoring" of symptoms to the "science of land health."

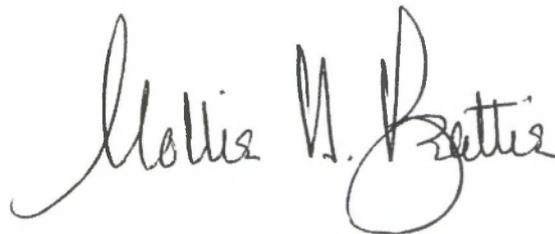
For the Fish and Wildlife Service to adopt an ecosystem approach, we must regard each of our programs and each of our mandates as we now regard individual species; that is, as one element of a system that must be treated as a whole if that element is to succeed. The elements of the Service's managerial ecosystem are other programs within the Service, other agencies within the Federal government, and other land managers and policy makers outside the Federal government (especially states, tribes, and private landowners). If a mission of the national wildlife refuge system is

the conservation of endangered species, refuge managers must work closely with the Service's Ecological Services staffs. If farmers hold the keys to habitat restoration on private lands, we must be close partners with the Department of Agriculture, and with farmers themselves. If we seek to restore fisheries, we must work with those who own the streambanks and with the states that control water use and fishing.

The Service must speak to the public of the importance of biodiversity and the ecosystem-based approach to management. Some obscure, unlovable species with peculiar names may be more important for maintaining the intricate web of life than eagles, wolves, and bears.

Ironically, we must see as our guiding goal the diminishment of the importance of the Endangered Species Act and make whatever efforts we can to avert the need for listings. This means applying a multi-species, ecosystem approach to preventing the decline of species.

We know this is far more likely to preclude the need for additional listings under the Endangered Species Act than dealing with one species at a time. For example, we cannot effectively deal with the decline of freshwater mussels independent of a decline in fish populations if they live in the same ecosystem and are affected by the same contaminants and degradation of habitat. It makes more sense, both biologically and economically, to take a broader view of conservation by restoring the entire ecosystem.



Policies for Comment

Notices of Availability were published in the December 21, 1994, Federal Register for the following draft policies:

Endangered Species

Consultation Handbook— a guide to the process under which Federal agencies are required to consult with the FWS (or the National Marine Fisheries Service, where appropriate) if their activities may affect listed species.

Habitat Conservation Planning and incidental Take Permit Processing— clarifies and streamlines the process for obtaining incidental take permits under the Endangered Species Act (ESA) in accordance with approved habitat conservation plans.

Petition Management— internal FWS guidance for management of petitions to list, reclassify, or delist species under the ESA.

Candidate Species— guidance for identifying listing candidates, assessing and monitoring their status, and promoting their stabilization and recovery.

Recognition of Distinct Vertebrate Population Segments—draft policy to clarify the phrase "distinct population segment of any species of vertebrate fish and wildlife" for the purpose of listing, delisting, or reclassification.

Copies are available from the FWS Regional Offices (see page 2 for addresses). Comment by April 7, 1995, to: FWS, Division of Endangered Species, 4401 N. Fairfax Drive, Rm. 452, Arlington, VA 22203.

Taking an Ecosystem Approach

Opposite page

"Thinking like a mountain" is a phrase coined by naturalist Aldo Leopold to describe the belief that a healthy ecosystem is one that retains all of its parts, including predators such as bears and wolves. photo by Galen Rowell/ Mountain Light

Change is coming to the U.S. Fish and Wildlife Service (FWS). In response to better scientific understanding about how ecological systems work, the FWS has adopted an "ecosystem approach" to fish and wildlife conservation. This somewhat new approach is helping the FWS better achieve its mission to conserve and enhance fish and wildlife, and their habitats, for the continuing benefit of the American people. It is based on a growing awareness that successful natural resource management must incorporate larger, broader ecological timeframes and scales.

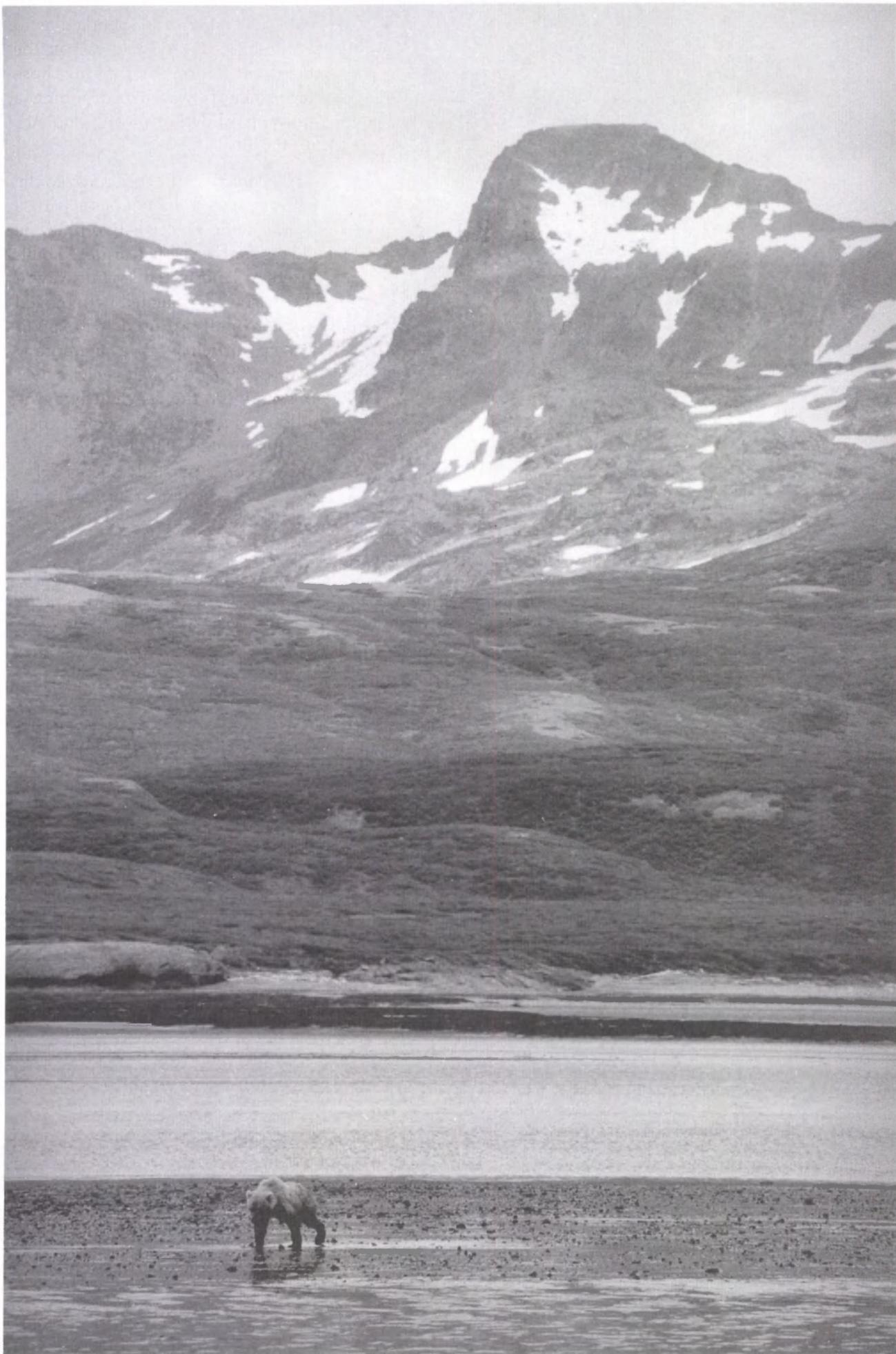
An ecosystem approach essentially is a philosophy that considers the entire environment within a geographic area. It involves maintaining ecological and evolutionary processes and viable populations of all native species. This is not a new concept. It was central to Aldo Leopold's eloquent discourses on conservation biology and the need for a "land ethic." Even earlier, writers such as Henry Thoreau and John Muir stressed taking a holistic view of nature.

Adopting an ecosystem-based approach to wildlife conservation means significantly changing the way the agency thinks, acts, and solves problems. The FWS is increasing its efforts to think and act in terms of systems, relationships, and processes to recognize that, in some way, all things are connected. Because plants and animals are inseparable from their environment and their relationships with each other, species will be addressed as components of the systems within which they are found.

Humans, who play a pivotal role in ecosystem dynamics, will play an increasingly important role in sustaining ecosystem processes and health.

Partnerships are probably the most critical element of an ecosystem approach because, by increasing cooperation and pooling resources, they can enable the participants to accomplish more with fewer dollars. To be the most effective, however, the FWS must collaborate with all interests that share responsibility for ecosystem health. In implementing an ecosystem approach, the FWS will participate as a member of a diverse management team including other Federal agencies, the States, Native American tribes, communities, corporate and individual landowners, and organizations. The FWS role will vary from one ecosystem to the next.

Traditionally, many FWS programs and initiatives have made significant contributions to the conservation of ecosystems and biological diversity. Most obvious are actions that have led

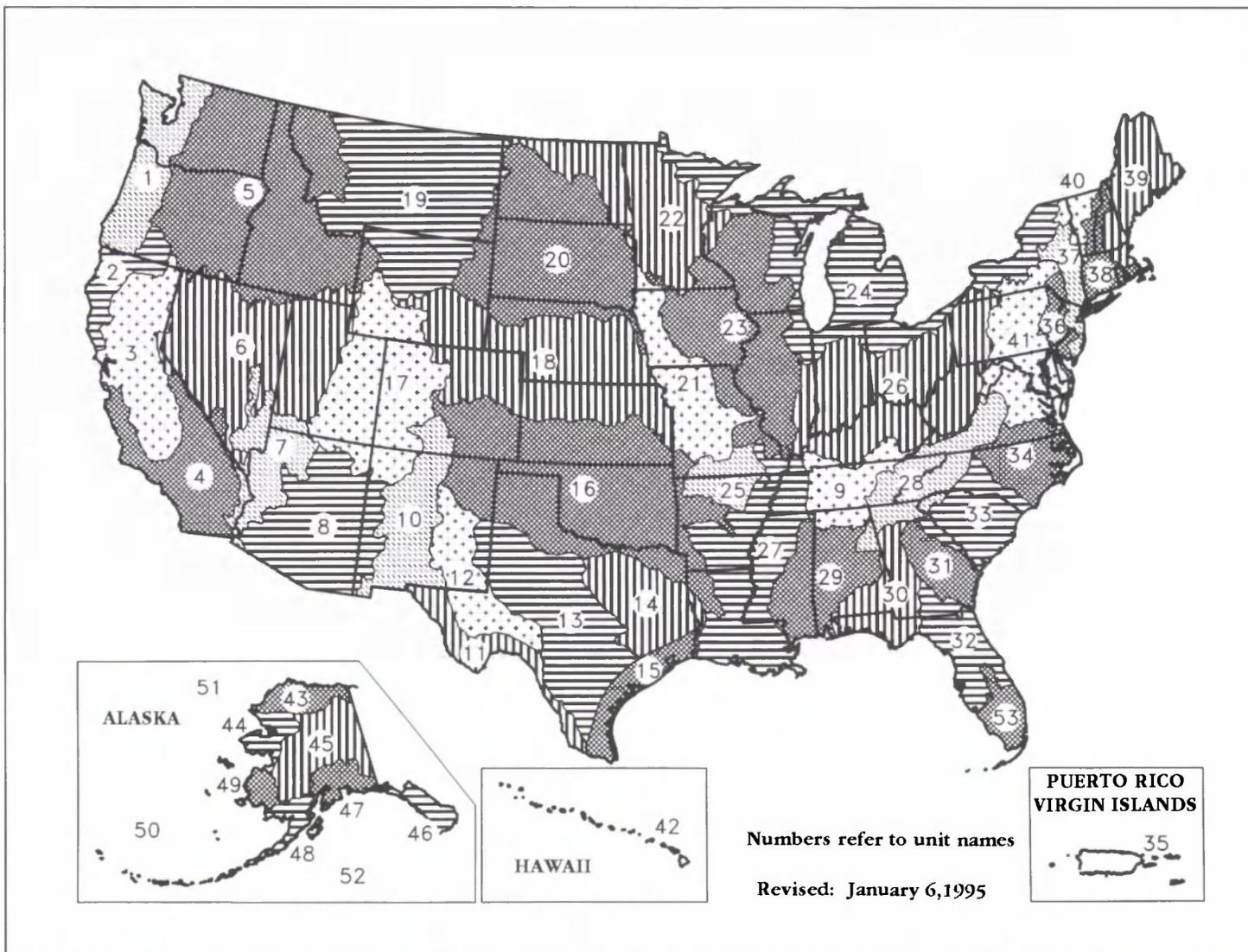


Map represents the FWS watershed-based ecosystem units. These units are identified by grouping or, in some cases, segmenting watershed units. Vegetative cover types, physiography, and optimum size were considered in the grouping

to the acquisition and protection of habitat and the recovery of imperiled wildlife and plant populations. Less obvious, but equally significant, are actions that have helped to restore important habitats, reduce environmental degradation and contamination, monitor the health of natural systems, regulate the harvest of migratory birds, and provide technical assistance to private landowners. Through an ecosystem approach, the FWS is expanding its outlook by addressing the

work to delineate ecosystems or areas of the landscape. The FWS chose watersheds, as identified by the U.S. Geological Survey's Hydrologic Unit Map, as the basic units for organizing agency programs and implementing ecosystem-based projects.

Watersheds were chosen for several reasons: (1) They are discrete physical units that provide widely-recognized and well-defined physical boundaries; (2) They are the best known focus for aquatic, coastal, and estuarine habitats



of watersheds. Within each ecosystem unit, focus areas or "hot spots" are identified to localize attention and activity, based on the importance of the resources present.

needs of larger, natural systems rather than concentrating on individual species or small parcels of habitat.

In every ecosystem-based project, one of the first steps is to define the geographic area to be addressed. Because no single mapping system meets all needs, the FWS considered several options in selecting a frame-

(approximately 45 percent of the Nation's Threatened and Endangered species depend on these habitats); (3) They are consistent with the philosophy underlying the ecosystem approach in that any activity within a watershed potentially has an impact on the entire watershed; and (4) They are hierarchical by nature (watersheds are

made up of smaller river systems) and therefore offer flexibility of scale, which is necessary in implementing a realistic and effective ecosystem approach.

It is important to note that the delineation of watersheds does not mean that every resource issue will be confined to a watershed analysis. All problems and issues will be analyzed over as broad a geographic area as is dictated by good science. The map will remain flexible to reflect continuing discussions and collective decisions of all involved parties about individual watersheds or ecosystems.

Ecosystem teams for each of the watershed-based units identified on the map have been formed. The teams include personnel from all FWS programs and are the vehicle by which ecosystem approach activities will be accomplished. Members already are setting goals and objectives, deciding on action strategies, establishing priorities, identifying budget needs, and implementing collaborative projects within the agency and with partners.

In the FWS Washington Office, a cross-program team of managers has been established to assist with national implementation and coordination of the ecosystem approach. Policies are established by the FWS Directorate, while Regional Offices provide guidance and oversight for the ecosystem teams, and consolidate goals, priorities, and budgets at the regional level.

To ensure that FWS employees, non-biologists as well as biologists, have a common understanding of the ecosystem approach, the agency is providing training courses and seminars. These training opportunities are being made available to all FWS employees and interested individuals from outside the agency. Courses on topics such as team building, team effectiveness, transition management, outreach and education, developing effective partnerships, conducting effective meetings, and managing change are being offered through the FWS National Education and Training Center. For information on

these courses, contact the Center's registrar at Route 3, Box 49, Kearneysville, West Virginia 25430; telephone 304/725-8461.

In addition to training, the FWS is increasing the diversity of its workforce, both professionally and culturally. A variety of expertise from ecologists, hydrologists, geologists, landscape architects, and social scientists is needed to fully implement an ecosystem approach. Broadening the cultural diversity of FWS employees will increase the agency's ability to better understand its various constituencies, which have expanded from people interested predominantly in hunting, fishing and nature-watching to include urban dwellers that may not have close contact with wildlife. Looking to other Federal and State agencies and the private sector to obtain expertise not readily available within the FWS is another way to more effectively meet the diverse needs of ecosystem-based management.

The FWS ecosystem approach to fish and wildlife conservation will continue to evolve over time. There is much to learn from exploring new methods, evaluating agency activities, and working with partners. Although change does not come easily or quickly, by working diligently with others, the FWS hopes to provide future generations of natural resource managers with more effective tools to protect our biological heritage.

Our society places great value on wildlife and the ecosystems upon which all species, including humans, depend. To restore and protect ecosystems, we now realize that we need to nurture the land, not exploit it relentlessly. Helping people understand the connection between human prosperity and healthy, functioning ecosystems is no small challenge, but one in which the FWS is proud to play a role.

Denise Henne is a program specialist in the FWS Division of Habitat Conservation in Washington, D.C.

WATERSHED BASED ECOSYSTEM UNITS

- 1. North Pacific Coast**
- 2. Klamath/Ctl. Pacific Coast**
- 3. Central Valley of California/ San Francisco Bay**
- 4. South Pacific Coast**
- 5. Columbia River Basin**
- 6. Interior Basins**
- 7. Lower Colorado River**
- 8. Gila/Salt/Verde River**
- 9. Southern Appalachia**
- 10. Middle and Upper Rio Grande**
- 11. Lower Rio Grande**
- 12. Pecos River**
- 13. Edwards Plateau**
- 14. East Texas**
- 15. Texas Gulf Coast**
- 16. Arkansas/Red Rivers**
- 17. Upper Colorado River**
- 18. Platte/Kansas Rivers**
- 19. Upper Missouri/Yellowstone Rivers**
- 20. Main Stem Missouri River**
- 21. Lower Missouri River**
- 22. Mississippi Headwaters/ Tallgrass Prairie**
- 23. Upper Mississippi River/ Tallgrass Prairie**
- 24. Great Lakes**
- 25. Ozark Watersheds**
- 26. Ohio River Valley**
- 27. Lower Mississippi River**
- 28. Tennessee/Cumberiand River**
- 29. Central Gulf Watersheds**
- 30. Florida Panhandle Watersheds**
- 31. Altamaha/Suwanee Rivers**
- 32. Peninsular Florida**
- 33. Savannah/Santee/Pee Dee Rivers**
- 34. Roanoke/Tar/Neuse/Cape Fear Rivers**
- 35. Caribbean**
- 36. Delaware River/Delmarva Coastal Area**
- 37. Hudson River/New York Bight**
- 38. Connecticut River/Long Island Sound**
- 39. Gulf of Maine Rivers**
- 40. Lake Champlain**
- 41. Chesapeake Bay/ Susquehanna River**
- 42. Pacific Islands**
- 43. Arctic Alaska**
- 44. Northwest Alaska**
- 45. Interior Alaska**
- 46. Southeast Alaska**
- 47. South Central Alaska**
- 48. Bristol Bay/Kodiak**
- 49. Yukon-Kuskokwim Delta**
- 50. Bering Sea/Aleutian Islands**
- 51. Beaufort/Chukchi Seas**
- 52. North Pacific/Gulf of Alaska**
- 53. South Florida**

by Jim Clark

Rediscovering the Land Ethic



Protecting our natural heritage into the next century requires us to stop looking through the rear-view mirror. We know where we have been. We now must look ahead, expand our knowledge, improve our expertise, and anticipate the strategies needed to sustain our ecological resources for future generations.



Aldo Leopold
photo by Robert McCabe,
courtesy of University of
Wisconsin at Madison—
Archives (#x25 1307)

The evolution of a modern Land Ethic advanced in 1933 when pioneering conservationist Aldo Leopold published *Game Management*, the first attempt to mesh ecological theory with “on the ground” conservation strategies. Although his book emphasized game species, Leopold stressed the importance of protecting a diversity of native plants and animals. He was already moving beyond the traditional concepts of game management to a more holistic view of conservation, a concept not fully embraced by others in the natural resource field at that time.

Two years later, Leopold journeyed to Europe to study Germany’s forest management program. While touring the German forests, he quickly saw that the ecological concepts he advocated were missing there. Germany had instituted, over a course of centuries, an intensive forest management program geared to maximum output of trees and deer. The desired results were achieved, but they were accomplished at a very high cost to other ecological resources that depended on a diverse and dynamic forest ecosystem.

Leopold saw very little natural diversity occurring within the intensively managed plantations. He noticed the absence of plant diversity in the understory and a shortage of mammalian predators, raptors, cavity-nesting birds, and other typical forest species within these manicured stands. Leopold wrote that the German forests were “deprived of a certain exuberance which arises from a rich variety of plants fighting with each other for a place in the sun.”

Apparent to Leopold was the eventual failure of such an artificial and highly manipulated system. He feared the same could happen to the forests in America, and upon returning to Wisconsin, he expressed his concern: “We yearn for more deer and pines, and we shall probably get them. But do we realize that to get them, as the Germans have, at the expense of their wild environment and their wild enemies, is to get very little indeed?”

From the start of his career in 1909 to his death in 1948, Leopold continually evolved his thinking and awareness of ecology. Although in his early years he advocated controlling predators as “vermin,” he later came to believe that the key to the health of all natural communities depends on maintaining natural diversity and system dynamics. The evolution of Leopold’s thinking over many years culminated in his vision of “thinking like a mountain,” otherwise known as the Land Ethic.

This view may have been ahead of its time; for years, it was not widely incorporated into resource management. But we now are revisiting Leopold’s basic theory of ecological conservation. We know that every component of the system, large or small, plays a role in preserving the integrity of an ecosystem. Like Leopold did in his short career, we have started expanding our focus of the natural world from single species management to strategies to protect the full array of native plants and animals. Most recently, the importance of system dynamics in maintaining ecosystems is being recognized as well. In essence, we are rediscovering Leopold’s Land Ethic.

Developing strategies to protect our ecological resources begins with the basic premises of that ethic. Although some adaptation to today’s world may be required, it remains as viable and important as it was 50 years ago. It involves:

✎ *recognizing the dynamic nature of an ecosystem.* When developing and implementing management actions, we must incorporate considerations for ecosystem resiliency, and develop strategies that can accommodate unexpected events or natural disturbance regimes. Forget about trying to simplify complex ecosystems.

This does not negate the need for management, but it calls for us to heed Leopold's advice that the land "should be modified as gently and as little as possible." Although he once held the traditional game management views of his time, Leopold later advocated restoring and protecting native communities, instead of creating or enhancing artificial habitats for a few high-interest species.

✎ *constantly monitoring both the resources and management actions so that any needed adjustments can be made.* This approach involves continual experimentation with management strategies and approaches, with the understanding that decisions may at times have to be made with less than perfect knowledge. Management approaches and techniques must remain adaptable to change, both natural and societal.

✎ *striving to maintain existing native plant and animal populations, and restoring those that have suffered drastic declines due to human interference.* We need to accept the fact that we induce failure when we try to control natural variation of a system. Adapt management practices to a system, not the other way around. To the extent practical, allow natural processes to operate unimpeded.

✎ *setting clear goals and objectives, including targets that can be measured to monitor ecosystem condition (what Leopold referred to as "land health").*

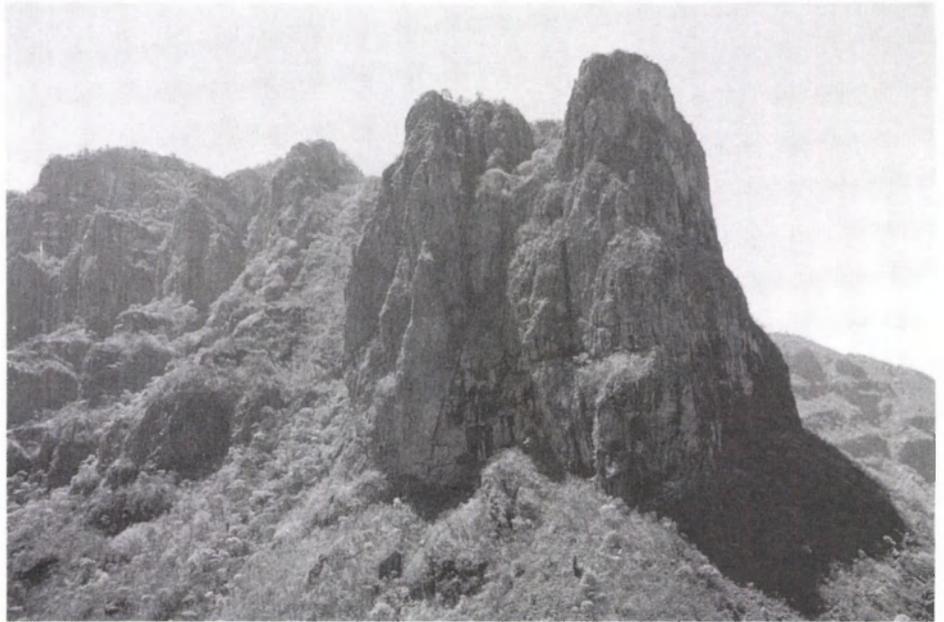
✎ *incorporating aesthetic concerns and amenity values into our management approaches.* Both elements are important to preserving the natural integrity and appearance of an area.

✎ *involving the public as an informed, active participant in the process.* This means we must develop approaches that meet the needs and interests of the various groups within our culturally diverse society. Generic public outreach and environmental education programs are no longer effective in today's world.

✎ *developing partnerships.* Successful partnerships are essential, but challenging. They require adaptability, risk-taking, innovation, a shared vision, active participation, and commitment by all parties involved.

Jim Clark is Section Leader of the Wildlife Training Program at the FWS National Education and Training Center in Leetown, West Virginia.

While hunting in Mexico's Sierra Madre, Leopold observed a working ecosystem with all the native flora and fauna components, where natural processes were permitted to run their course unimpaired. He observed



that in spite of a healthy population of mountain lions and wolves, the deer population was in much better condition than what he observed in Germany and even in the U.S., where predators, large and small, were targets for annihilation. The health of the Sierra Madre ecosystem rested not only on having the natural distribution, composition and abundance of native species, but by also allowing natural processes to perform their roles without interference.
photo by Michael Bender

Partnerships for Habitat on Private Land

*E*ndangered and Threatened species, like other animals and plants, do not recognize boundaries between public and private lands. As a result, many government agencies are seeking voluntary partnerships with private landowners, other citizens, and communities to help achieve mutual conservation goals. The U.S. Fish and Wildlife Service (FWS) has taken action with private landowners and others to benefit wildlife through its Partners for Wildlife initiative.

Since its inception in 1987, Partners for Wildlife has provided significant benefits to wildlife through habitat restoration and wetland conservation activities. The initiative works to

conserve biological diversity by carefully selecting, designing, and implementing restoration projects to benefit native species, especially those of national interest.

Partners for Wildlife projects often begin during a casual conversation at the kitchen table or while leaning on the hood of a farmer's truck. These settings foster mutually agreeable solutions to problems experienced by both parties. In fact, this is how many low, wet areas in the corners of farm fields, which usually are not productive enough to pay for planting costs, become restored wetlands producing wildlife and other benefits for landowners and society.

Conserving a Stronghold of Aquatic Wildlife

by Bridgett Estel Costanzo



The Upper Tennessee River Basin (Basin) of southwest Virginia and northeast Tennessee, with its karst caverns, sinks, and underground streams, supports an unusually rich diversity of aquatic animals. The Clinch, Powell, and Holston Rivers, which comprise the Basin, once harbored over 60 species of mussels. Unfortunately, many of these mollusks no longer survive in the Basin, and 26 species now are considered rare. Fourteen of the Basin's mussels, along with four fish species, are listed by

the Fish and Wildlife Service (FWS) as Threatened or Endangered. Another nine mussel and three fish species are candidates for listing. Although the number of endemic mussel species in the Basin has declined by almost half, and populations of those remaining declined by 50 percent between 1979 and 1988, the Basin remains one of the world's last strongholds for freshwater mussels.

Most of the problems that led to the decline of aquatic species in the Basin are associated with certain land use changes and the resulting

degradation of water quality. Urban and agricultural run-off continue to increase sediment and nutrient loading. Industrial pollution has created some serious impacts, with several chemical spills occurring over the past few decades and a Superfund site located on one of the waterways. Coal mining, a major part of this southern Appalachian region's economy, also is a major contributor to its pollution problems.

In response, concerned citizens and organizations have come together to create the Basin Initiative, a multi-faceted effort to address the natural

resource issues in this watershed and conserve its globally significant ecosystem. The initiative is a partnership of over 60 Federal, State, and local agencies and organizations interested in preserving the natural and cultural diversity of the region. Partnership activities include scientific research, community outreach, and restoration of degraded habitats.

The FWS is involved in all of these activities, but particularly noteworthy are those conducted under the Partners for Wildlife habitat restoration program. In 1990, the FWS and The Nature Conservancy launched a habitat

Partners for Wildlife aims to restore and protect the habitat of Federal trust species (primarily species listed as Endangered or Threatened, listing candidates, and migratory birds) on private lands and easement/transfer properties of the Consolidated Farm Services Agency (CFSA), a Department of Agriculture bureau formerly known as the Farmers Home Administration. This objective is accomplished through cooperative efforts with local governments, State wildlife agencies, and private organizations, such as Soil and Water Conservation Districts, Ducks Unlimited, the National Audubon Society, Pheasants Forever, The Nature Conservancy, and Trout Unlimited. The FWS relies on the assistance of such partners to help implement the program and share the cost of habitat restoration projects on private lands.

Targeting the Results

The FWS issued Partners for Wildlife policy in 1992 that sets priorities for restoration and directs most funding to habitat restoration work. Those projects that would conserve federally listed

species, listing candidates, and other declining species or habitats are of high priority. The greatest emphasis is on projects that: (1) restore habitats that collectively benefit wildlife populations on National Wildlife Refuges (e.g., water quality improvements and wildlife dispersal corridors); or (2) occur on CFSA conservation easements or fee title transfer properties administered by the FWS or State wildlife agencies.

Partners for Wildlife projects aim to provide the broadest array of wetland and wildlife benefits. To the extent technically feasible, they will reestablish the original natural community or a successional sequence of natural communities, with the goal of eventually restoring the original natural community on at least 70 percent of the project site.

Funding is not used to purchase land rights, fee title, easement, rent, or incentive payments. At least 70 percent of the restoration funds are used for "on-the-ground" restoration activities. The remaining funds cover technical support for planning restorations, formulating agreements, monitoring,

restoration program for private landowners. Since its inception, the Partners for Wildlife program has restored almost 10 miles (16 kilometers) of riparian habitat in the Basin. Many other partners have joined the effort, including the U.S. Department of Agriculture, Virginia Department of Game and Inland Fisheries, Virginia Department Conservation and Recreation, U.S. Environmental Protection Agency, and Tennessee Valley Authority.

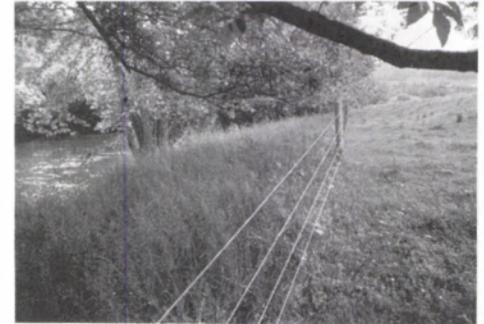
The program is completely voluntary. Private landowners, mostly farmers, are offered technical assistance in developing a comprehensive

plan for improving water quality and wildlife habitat on their property. Once a plan is agreed upon, the involved agencies pool their resources to back up the technical assistance with an offer of financial assistance for the landowner. Projects are selected based on the benefits to water quality, the downstream proximity of viable mussel beds, and the conservation ethic of the landowner. Most of the restoration work focuses on excluding livestock from the waterways by erecting fences and installing alternative watering systems. Landowners are responsible for maintaining the conservation practices, and the projects are

monitored on a regular basis.

With each passing year, the Partners for Wildlife program is growing in popularity in the local communities of the Basin. Everyone has been encouraged by the successes achieved thus far in conserving the regions' natural resources, including Threatened and Endangered species, while preserving the economic stability of local farms.

Bridgett Costanzo is the Partners for Wildlife coordinator for Virginia, and is located in the FWS White Marsh, Virginia, Field Office.



Opposite page Libby Herland (FWS Partners for Wildlife Coordinator, Region 5) and Don Gowan (The Nature Conservancy) visit a site on the Clinch River planned for restoration.

Above Installation of a fence promoted vegetative recovery. Sediments and livestock wastes now are filtered before entering the river and cows are prevented from trampling mussel beds. FWS photos

Protecting Cave Resources in Oklahoma

by Erich Langer and Steve Hensley

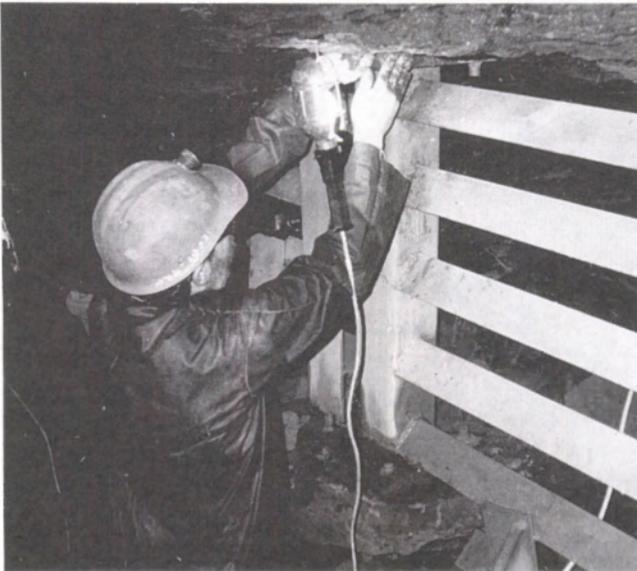
Caves and the animals that live within them are all too often misunderstood. To most people, they represent an alien world of darkness, inaccessible to humans and inhabited by strange creatures. Popular impressions of many cave animals are based on myth and superstition. Only in recent years has scientific information begun to shed light on the true nature and importance of these organisms. Once given the facts about caves and cave species, landowners and

of critically important cave habitat through human disturbance and vandalism is the most serious threat to most cave species. Additionally, many caves and associated habitats have been damaged by urban and industrial development, reservoirs, highway and utility rights-of-way construction, dumping, and cave commercialization. Aquatic cave species, such as the threatened Ozark cavefish (*Amblyopsis rosae*) and a number of cave invertebrates, are extremely sensitive to ground water quality deterioration from pesticides and other contaminants within cave recharge areas. Collection of cave wildlife also has had an effect on some populations of cave animals.

The Partners for Wildlife

program is an excellent vehicle for protecting privately-owned cave resources from disturbance. Thanks to the program, two caves important to the survival of two endangered species—the Ozark

big-eared bat (*Plecotus townsendii ingens*) and gray bat (*Myotis grisescens*)—soon will have added protection. The U.S. Fish and Wildlife Service's (FWS) Oklahoma State Office is using the program to develop agreements between land



the general public have shown considerable support for the protection of these resources.

Many cave animals, particularly species that are rare or depend on specific environmental conditions for breeding and hibernation, are imperiled at least in part by their vulnerability to disturbance. The loss

maintenance, and other such activities associated with restoration projects.

In 1994, through voluntary partnerships with private landowners and restoration work on CFSA inventory properties, 54,739 acres (22,526 hectares) of wetlands habitat, 10,518 acres (4,328 ha) of associated upland and native prairie habitat, 189.5 miles (305 kilometers) of riparian habitat, and 9 miles (14.5 km) of in-stream habitat were restored. A total of \$8,878,000 in Congressionally appropriated funds were involved in completing this restoration work under 1,619 voluntary landowner agreements and on 249 CFSA tracts. Private landowners and other partners matched FWS funds for restoration projects dollar-for-dollar. In Fiscal Year 1995, approximately \$10,303,000 are available to the FWS for habitat restoration activities. Since 1987, the Partners in Wildlife initiative has restored over 256,000 acres (105,350 ha) of wetlands and associated habitats, involving over 12,300 private landowners.

How to Participate

Technical assistance for habitat restoration is available to anyone contacting Partners for Wildlife coordinators. No minimum cost-share is required for funding assistance, although the FWS encourages cost-sharing whenever possible to extend the Federal funds available to the program. Nationwide, the initiative seeks an average cost-share from non-FWS sources of 40 percent. The activities are not necessarily expensive; in some cases, only a few hundred dollars of Partners for Wildlife funds are needed to complete a restoration project. Sometimes the FWS is asked by another project sponsor to become a partner. If the project meets FWS criteria, Partners for Wildlife funds can help.

The Partners for Wildlife program is being implemented in every State through a network of FWS Private Lands Coordinators. For more information about the program, contact the coordinator for your region (see list).

Today, as farmers, ranchers, and other private landowners face highly complex land use decisions in a changing economic environment, public-private partnerships for conservation are working effectively. The conservation of our wildlife legacy depends largely on our ability to provide effective technical and financial assistance to private landowners who are willing to provide space for wildlife habitat on their land. The assistance provided through the Partners for Wildlife initiative helps to ensure this legacy by encouraging voluntary habitat restoration on private lands.

Ron Crete is a biologist with the Partners for Wildlife program in the FWS Division of Habitat Conservation, Washington, D.C.

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Above
gray bat photo by Merlin D. Tuttle
Bat Conservation International
Opposite Page
photo by Steve Hensley

owners and a private caving club (Tulsa Regional Oklahoma Grotto).

By the construction of appropriately designed gates within cave entrances, approximately 2,000 feet (610 meters) of mapped passage at one cave and 1,500 feet (460 m) at the other will be protected. The gates are designed by engineers and biologists to allow access by bats and will be monitored to ensure that they function properly. If the gates are not accepted by the bats, they will be modified.

The Partners for Wildlife Program agreement stipulates that participating land owners will allow grotto members and FWS personnel access to the caves on their property, and will agree to protect the caves and the new gates. The grotto will acquire materials, construct the gates, and monitor bat use after construction. As a partner in the project, the FWS is providing \$3,000 to purchase gate construction material and is assisting with bat monitoring.

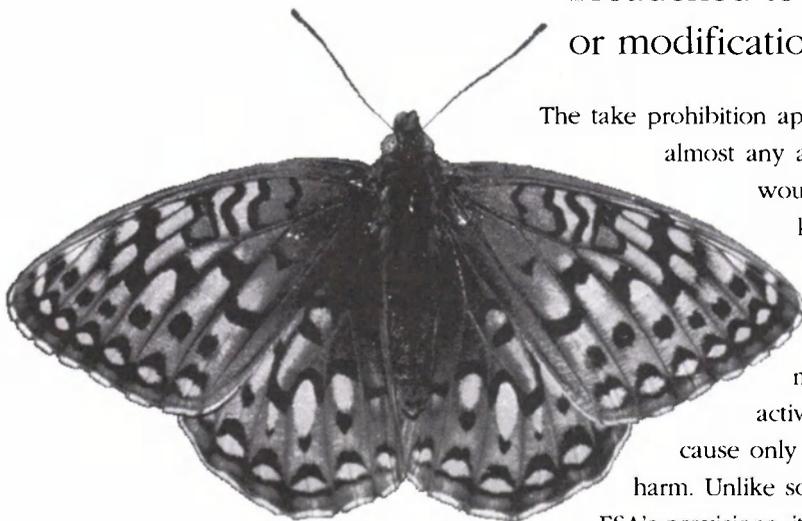
In addition to preserving habitat for imperiled bats, the project will further an ecosystem approach to management by protecting a number of other biological and geological cave resources.

Erich Langer is a public outreach specialist in the FWS Tulsa, Oklahoma, State Office. Steve Hensley, a biologist in the Tulsa Office, specializes in cave species and habitats.

Reconciling Conflicts Through Habitat Conservation Planning



The increasing use of habitat conservation planning to resolve issues involving the “take” of Endangered species and to promote their recovery shows that wildlife conservation and other social needs are not incompatible. Of the various protections in the Endangered Species Act (ESA), the prohibition against take is one of the most fundamental. The ESA defines take as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” any species¹ federally listed as Endangered or Threatened. Under Federal regulation, this definition is further broadened to include, in certain cases, destruction or modification of endangered species habitat.



The take prohibition applies to almost any activity that would directly kill or harm a listed species, as well as many activities that cause only indirect harm. Unlike some of the ESA's provisions, it also applies to virtually *everyone*—Federal and State agencies, local governments, private landowners, corporations, and individual citizens. It is this inclusive nature that makes the

take prohibition so important to endangered species protection.

However, in some cases it may be necessary, even beneficial, to allow limited taking of a Threatened or Endangered species. For example, recovery efforts may require that some members of a species be captured and held in zoos for captive breeding purposes; the California condor (*Gymnogyps californianus*), whooping crane (*Grus americana*), and black-footed ferret (*Mustela nigripes*) are good examples. For conservation and other purposes, Congress has enacted provisions under section 10 of the ESA authorizing the Fish and Wildlife Service

to grant “exemptions” or permits for take of federally listed species.

Until 1982, however, no mechanism existed under the ESA to permit take that might occur *inadvertently* during development or similar activities by private landowners. Federal agencies could obtain such authorization through the ESA interagency consultation process, but non-Federal entities, including State and local governments, had no equivalent option. Thus, housing developments, road construction, timber harvest, water projects—in short, many activities essential to economic development—could be halted because of the take prohibition.

In response to this problem, in 1982 Congress amended section 10(a)(1)(B) of the ESA to allow issuance of “incidental take” permits. (The ESA defines incidental take as take that “is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.”) This change led to one of the most important and ambitious programs under the ESA—the habitat conservation planning process.

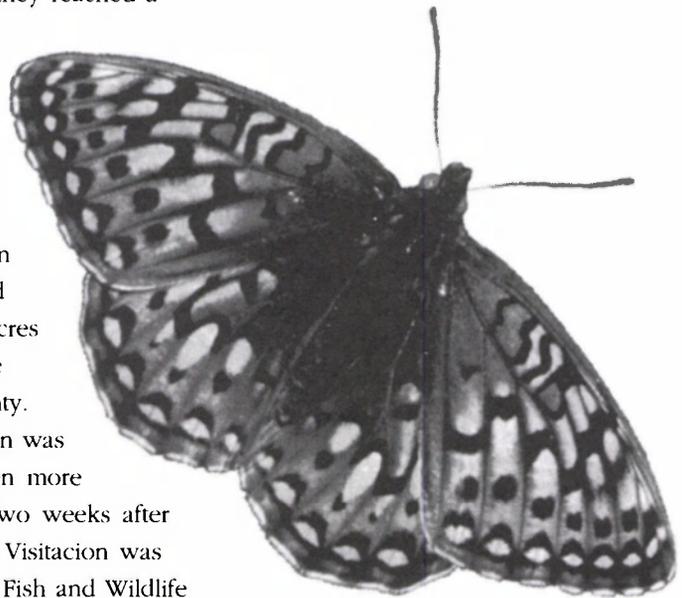
To be granted an incidental take permit, an applicant must first prepare and submit a “conservation plan” detailing, among other things, what the effects of the taking on the species will be and how those effects will be, how they will be mitigated, and how the species will benefit. Now called Habitat Conservation Plans or simply “HCPs,” these plans are central to the entire section 10(a)(1)(B) process. HCPs have come to symbolize a fundamental approach to resolving endangered species issues on non-Federal lands, and it may be instructive to review a little of their history.

Congress patterned the HCP process after an unusual set of events that began in the San Francisco Bay area in the mid-1970’s. In 1975, Visitacion Associates, a joint-venture development company, proposed to construct 8,500 homes and 2 million square feet of commercial space on San Bruno Mountain, a prominent and relatively

undisturbed mountain just south of San Francisco in San Mateo County, California. At the time, San Bruno Mountain was an oasis in a sea of suburban sprawl, containing steep ridgesides, deep ravines, and some 3,400 acres (1,375 hectares) of undeveloped land. In 1976, the San Mateo County board of supervisors adopted a general plan allowing only 2,235 homes to be constructed on the mountain. Visitacion Associates contested the plan in court.

San Mateo County and Visitacion disputed the matter for several years until, in 1980, they reached a settlement that allowed development of one-third of the mountain, in return for which Visitacion donated or sold almost 2,000 acres (810 ha) to the State and County. But the situation was to become even more complicated. Two weeks after the settlement, Visitacion was advised by the Fish and Wildlife Service of a pending proposal to list the calippe silverspot butterfly (*Speyeria callippe callippe*), which inhabited San Bruno Mountain, as Endangered. In fact, two other listed butterflies—the mission blue (*Icaricia icarioides missionensis*) and San Bruno elfin (*Callophrys mossii bayensis*)—also inhabited San Bruno Mountain, but their classification as Endangered in 1976 had gone unnoticed by the County and Visitacion. It was a classic land-use conflict: economic development versus open space, endangered species versus homes for people, millions of dollars at stake—and Visitacion was prepared for an all-out battle to save its project.

Then a remarkable thing happened. Under the leadership of a San Mateo County official, the stakeholders in this conflict—the County, Visitacion Associates, the Fish and Wildlife Service, the



Callippe silverspot butterfly
Original photo by Richard Arnold

Saving the Scrub

by Dawn Zattau

A unique type of scrub habitat is restricted to coastal dunes on the Atlantic and Gulf coasts of Florida and Alabama, and relict dunes on central Florida's Lake Wales Ridge. The dry, nutrient-poor soils support shrubby vegetation with a sand pine (*Pinus clausa*) canopy. Scrub provides habitat for a number of unusual plant and animal species, including some listed species and listing candidates, but much has been lost to development.

In December 1992, the Brevard County (Florida) Board of County Commissioners voted to pursue development of a county-wide scrub habitat conservation plan in an effort to resolve mounting conflicts between development activities and the conservation of rare wildlife. A six-member Steering Committee was selected and met for the first time in April 1993. A separate Scientific Advisory Committee (SAC) was appointed by the Brevard County Commissioners to provide technical support to the Steering Committee.

The resulting Brevard County Scrub Conservation and Development Plan is nearly finished. When in place, it will preserve much of the remaining scrub ecosystem in Brevard County while freeing other land for

(continuation from previous page)
State of California, and environmental groups—decided to sit down and negotiate a solution that would balance all competing interests on San Bruno Mountain. After 2 years of hard bargaining, the result was the San Bruno Mountain Habitat Conservation Plan, approved by the Fish and Wildlife Service in March 1983. Today, travelers driving south on U.S. Route 101 from San Francisco can see San Bruno Mountain in much the same condition it was in 20 years ago. Under the HCP, 80 percent of the mountain and 90 percent of the butterfly habitat is protected, Visitacion has the right to develop the rest, and all parties have assurances that the agreements they reached will be honored.

San Bruno Mountain exemplifies the fundamental HCP approach—negotiation, compromise, and implicit recognition of the interests of all participants. The HCP process is grounded solidly in science and real-world pragmatism, depending not only on good biology but also hard-nosed bargaining. Essentially, the process is a trade-off in which each party pursues its own interests but balances them against the benefits of a successful HCP. It depends on the belief that compromise and accommodation are preferable to gridlock and litigation.

Congress was so impressed with the San Bruno Mountain HCP that it codified the process in the 1982 ESA amendments, stating in its Conference Report that HCPs would “encourage creative partnerships between public and private sectors and among governmental agencies in the interest of species and habitat conservation.” Thus, the HCP process is more than just a permitting mechanism, but a program that, at its best, can integrate development activities with endangered species conservation, provide a framework for broad-based conservation planning, and foster partnership and cooperation.

Has the HCP process lived up to its promise? After 1983, the program got off to a slow start. Between 1983 and

1989, only two other HCPs were approved. The Coachella Valley HCP involved the entire range of the Coachella Valley fringe-toed lizard (*Uma inornata*), a species endemic to dune habitat in the Palm Springs area of southern California. It was another considerable success, resolving intense development pressures in the lizard's key habitat areas. This was followed in 1989 by the Delano Prison HCP in Kern County, California, a smaller plan that successfully resolved endangered species issues on the site of a badly needed State prison.

Between 1990 and 1992, the HCP process began picking up steam, and it is accelerating rapidly. In 1990 and 1991, two short-term permits were issued in Riverside County, California, and Clark County, Nevada, to allow some development in endangered species habitat while protecting other important habitat and promoting research; in the meantime, work proceeded on longer-term HCPs. In 1992, the Simpson Timber Company HCP was approved, allowing timber harvest in 380,000 acres (153,785 ha) of northern spotted owl (*Strix occidentalis caurina*) habitat in northern California while protecting areas critical to the owl. In 1993, the number of permits issued tripled over the previous year, and in 1994 it doubled again. The International Paper HCP was approved in 1993 for 30,000 acres (12,140 ha) of Red Hills salamander range in Alabama, resulting in the protection of 4,500 acres (1,820 ha) of optimal salamander habitat. As of September 1994, the Fish and Wildlife Service had issued 36 permits and 13 permit amendments. In addition, approximately 150 HCPs are in various stages of development, including the South Carolina Forestry Commission HCP, with a plan area of 2 million acres (809,000 ha), the 10,000-acre (4,050-ha) Brevard County HCP in Florida (see accompanying article), the 135,000-acre (54,635-ha) Washington County HCP in Utah, and the 2 million-acre Kern County HCP in California.

One of the keys to the HCP process is its flexibility. HCPs vary enormously in size and scope. Of the 36 permits issued to date, 22 have been for relatively small projects, while the rest have been for regional-scale planning efforts. Another key is creativity. The ESA and its regulations establish basic biological and procedural standards for the program but otherwise allow the creative potential of willing HCP participants to flourish. This is resulting in many innovative approaches to balancing economic activity and wildlife protection. For example, in several HCPs, participants are developing ways to create a financial benefit for land-owners who contribute to endangered species recovery. In another, a market-based conservation strategy is being developed that would replace the traditional methods of regulating land-use activity within the habitats of endangered species.

The benefits of a successful HCP effort far outweigh the costs, and the Fish and Wildlife Service is attempting to improve and streamline permit processing requirements. Not surprisingly, the HCP process is beginning to get a lot of attention. Public agencies and the private sector throughout the country are turning increasingly to the HCP process as a means of conserving endangered species habitat in their areas while meeting their growing social and economic needs.

William Lehman coordinates habitat conservation planning issues for the FWS Division of Endangered Species in Washington, D.C.

¹For the purposes of this article, the term "species" will apply only to animals. The prohibitions against take of listed plants are limited under the ESA to (1) the collection or malicious destruction of Endangered plants on Federal land and (2) removal or damage to listed plants on private or State lands in knowing violation of State law, or in the course of violating a State criminal trespass law.



Florida Scrub Jay.
Painting by Luis Agassiz
Fuertes.

development. The plan uses the Florida scrub jay (*Aphelocoma coerulescens coerulescens*), a Threatened bird, as an indicator species; its presence has helped identify important scrub habitat to include within a series of reserves. The protected habitat will protect not only the jay but 20 other species imperiled because of habitat loss.

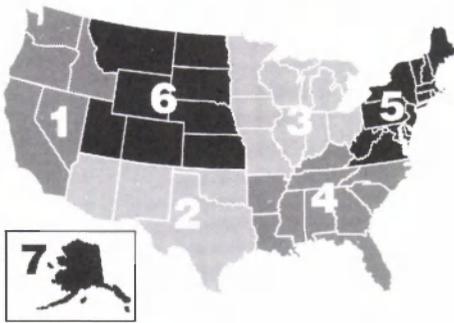
After examining over 1,000 scrub patches in Brevard County, the SAC developed four alternative reserve designs. All four are biologically equivalent to one another, with each maximizing a particular characteristic. Common to every alternative is a "core" of the most ecologically valuable scrub patches remaining in the county, comprising about 8,000 acres (3,240 ha) of habitat.

The "connectivity" alternative consists of the core habitat with small patches added to maximize

the ability of jays to disperse through each subpopulation. The "habitat quality" alternative consists of the core with small habitat patches added to maximize the quality of preserved scrub patches and scrub jay productivity. The "restoration" alternative consists of the core with patches added to minimize restoration costs. The "comprehensive" alternative enhances all three elements of the individual reserves, and is the recommended choice of the SAC. This alternative includes buffers to minimize impacts of stochastic events.

After an economic analysis of each alternative design is complete, the Steering Committee will decide which alternative to place in the county's final Endangered Species Act/Section 10(a)(1)(B) permit application. We expect a submittal to the Fish and Wildlife Service in 1995. Once an approved plan is in place, growth in Brevard County can proceed with greater certainty, and the scrub ecosystem will have an excellent chance of long-term survival.

Dawn Zattau is the Habitat Conservation Plan coordinator in the Service's Jacksonville, Florida, Field Office.



Region 1



blunt-nosed leopard lizard
photo by Steve Busack

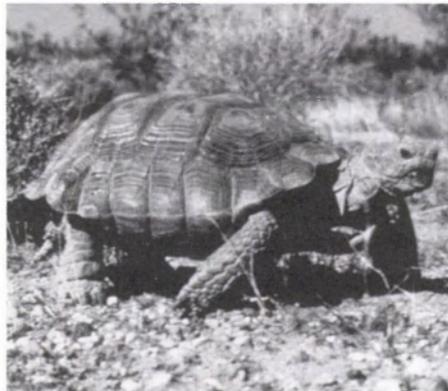
Due to the availability of trucking services and modern highways, Southern Pacific, Tulare Valley, and San Joaquin Valley railroad companies are abandoning short routes in California's Central Valley that historically were used to ship agricultural commodities. Some of the abandoned routes are within the historical range of the San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia silus*), Fresno kangaroo rat (*Dipodomys nitratooides exilis*), and giant kangaroo rat (*Dipodomys ingens*). The Fish and Wildlife Service (FWS) is coordinating with the Interstate Commerce Commission on the abandonments, approximately 15 of which have been reviewed for potential impacts to listed species living in or near the railroad right-of-way.

The FWS is working with the California Department of Parks and Recreation and the U.S. Coast Guard to facilitate a transfer of scenic coastal properties for dune restoration and sensitive habitat management by Asilomar State Beach. The dune habitat on these properties harbors several listed plant species, including Menzies' wallflower (*Erysimum menziesii*), Tidestrom's lupine (*Lupinus tidestromii*), beach layia

(*Layia carnosa*), and Monterey spineflower (*Chorizanthe pungens* var. *pungens*). Another listed plant, the Monterey gilia (*Gilia tenuiflora* var. *arenaria*), and a listing candidate, the California black legless lizard (*Anniella pulchra nigra*), also may occur there. The dunes are degraded and subject to additional disturbance by unregulated human use. Dune restoration efforts at Asilomar State Beach have demonstrated high levels of success for the enhancement of sensitive habitat while allowing compatible human uses.

Region 1 staff visited a kangaroo rat breeding facility at the University of California-Berkeley. The facility, which is in its second year of operation under Dr. Sonja Yoerg, was established to develop captive breeding techniques for the Morro Bay kangaroo rat (*Dipodomys beermanni morroensis*), and is funded primarily under section 6 of the Endangered Species Act. To avoid risk to this Endangered mammal, the propagation research is being conducted with a non-endangered surrogate species, the Lompoc kangaroo rat (*Dipodomys beermanni arenae*).

In addition to achieving breeding success with *D. b. morroensis*, Dr. Yoerg has been testing various



desert tortoise
photo by Ross Haley

techniques to teach survival skills to captive-bred animals. Section 6 funds will be used in 1995 to capture any Morro Bay kangaroo rats that may remain in the wild and place them in the facility for captive breeding. Potential exists to use the facility to develop propagation techniques for other listed kangaroo rats. The facility is maintaining, but not currently breeding, individuals of another Endangered subspecies, the Tipton kangaroo rat (*Dipodomys nitratooides nitratooides*).

The Desert Tortoise Management Oversight Group met in Las Vegas, Nevada, on November 1 to coordinate designation of Desert Wildlife Management Areas (DWMAs) for desert tortoise (*Gopherus agassizii*) conservation. The Technical Advisory Group recommended research priorities and announced its intent to hold workshops on tortoise nutrition and health profiles. Other workshops are planned for population monitoring protocols and fire management. FWS staff from the Las Vegas and Phoenix, Arizona, field offices submitted comments to the Desert Tortoise Council concerning draft guidelines on proper techniques to handle and relocate desert tortoises. When finalized, these guidelines are expected to replace the 1990 desert tortoise handling protocol.

Region 3

Over 7,500 children and their families visited an FWS endangered species booth during an environmental education event at the Mall of America, located in Bloomington, Minnesota. The FWS was one of 25 environmental organizations participating in the 2-day public information event.

In October, Federal and State endangered species coordinators from all Region 3 States convened in Indiana to identify and discuss endangered species issues, priorities, and opportunities for 1995. This annual event is considered vital to the success of Region 3's endangered species program.

Region 5

In keeping with the spirit of the new Interagency Memorandum of Understanding among the Departments of Agriculture, Interior, and Commerce to conserve candidate species, the FWS West Virginia Field Office and the George Washington National Forest have funded a study to identify the range of the Cow Knob salamander (*Plethodon punctatus*) in West Virginia. The recent conservation agreement between the FWS and the George Washington National Forest mainly protected areas in the Virginia portion of the species' native range.

Leroy Koch of the FWS Southeastern Virginia Field Office assisted the Virginia Chapter of The Nature Conservancy in hosting a November 3 workshop for science teachers of Russell County, Virginia. The workshop was held at the Pinnacle State Natural Area Preserve, at the confluence of Big Cedar Creek and the Clinch River, in Russel County, Virginia. Teachers and resource professionals discussed strategies for building awareness among school children for the aquatic fauna of the Clinch River watershed, home to a large number of Threatened and Endangered mussels and fish.

Region 6

Region 6 field staff assisted a contract video crew in documenting FWS efforts on behalf of listed and candidate species. Professional footage, intended for use in news and features programming, was compiled on the bull trout (*Salvelinus confluentus*), fluvial populations of arctic grayling (*Thymallus arcticus*), Wyoming toad (*Bufo hemiophrys baxteri*), greenback cutthroat trout (*Oncorhynchus clarki stomias*), and black footed ferret (*Mustela nigripes*), as well as other species native to short-grass prairie habitats.

Items for Regional News and Recovery Updates are provided by regional endangered species contacts.

Region 1

Hawaiian crow (*alala*) With the recent release of seven chicks from the hacking aviary, the wild population of 'alala has grown by about 50 percent. Despite this significant increase, the wild population still stands at around 20 individuals. On October 25, the first bird ventured outside the aviary and eventually was followed by the others. Upon their release, the chicks almost instantly began behaving like wild birds, foraging on native plants and searching for arthropods in tree bark. Four of the birds were produced at the State-run Olinda Endangered Species Propagation Facility on Maui. This marked the first time that birds from the captive breeding flock were released into the wild.

Region 5

Virginia big-eared bat (*Plecotus townsendii virginianus*) A census of the 11 known summer colonies by the West Virginia Department of Natural Resources (WVDNR) in June 1994 found a population increase of 7.3 percent over 1993 levels. These sites comprise well over half of the species' known summer colonies. Night vision equipment enabled biologists to tally the bats with minimal disturbance.

In another WVDNR study, 14 lactating Virginia big-eared bats were fitted with radio transmitters and tracked for a 2-week period in late June and early July. The bats traveled up to 6.2 miles (10 kilometers) from the maternity cave to forage for insects. Foraging habitats included old fields, forests, and lightly grazed fields. This study was conducted at Cave Mountain Cave on the Monongahela National Forest. Funding was provided by the FWS, The Nature Conservancy, the Monongahela National Forest, and the West Virginia Nongame Wildlife Fund.

Cheat Mountain salamander (*Plethodon nettingi*) Surveys for this Threatened amphibian conducted by Dr. Thomas Pauley of Marshall University (under a Section 6 contract to the WVDNR) located two new populations. Both sites are within Blackwater Falls State Park in Tucker County, West Virginia. This species is now known from 64 sites in 4 West Virginia counties.

Northern flying squirrel (*Glaucomys sabrinus fuscus*) The State of West Virginia has requested that the FWS review the status of this subspecies to consider reclassifying it from Endangered to the less critical category of Threatened. Although there were

only 10 squirrel captures in West Virginia prior to the listing of this subspecies in 1985, survey efforts resulted in 525 captures at 69 sites from 1985-1993. In 1994, surveys conducted by WVDNR, Monongahela National Forest, and West Virginia University biologists located six additional sites in West Virginia. All locations where the squirrel has been found since 1985 are on Monongahela National Forest lands and are protected by the U.S. Forest Service.

Fanshell mussel (*Cyprogenia stegaria*) Pat Morrison, a biologist at the Ohio River Islands National Wildlife Refuge, recently reported collecting a specimen of this Endangered mollusk on the refuge at the head of Neal Island in the Ohio River. The discovery marks the first time this species has been found on the refuge. Fanshell mussels are known from only two other locations in West Virginia.

Region 6

Black footed ferret (*Mustela nigripes*) In October, two introductions of captive-reared black footed ferrets were carried out on the Charles M. Russell National Wildlife Refuge in Montana. Early radio-tracking reports indicated that most ferrets were not dispersing from the black-tailed prairie dog colony on which they were released. Out of the first group of 12 ferrets released October 6, six were killed by predators, the location of one is unknown, and five were doing well and remained within the vicinity of the release site.

Also during October, the Wyoming Game and Fish Department reported that its recent black-footed ferret surveys at the Shirley Basin release site near Medicine Bow revealed an additional four wild born juveniles this year. Ferrets also were reintroduced this year into South Dakota on Badlands National Park.

Grizzly bear (*Ursus arctos*) Region 6 intends to initiate an Environmental Impact Statement (EIS) addressing the potential reintroduction of grizzly bears into the Bitterroot Mountains region of eastern Idaho, one of the largest roadless tracts in the lower 48 States. The Interagency Grizzly Bear Committee considers it good grizzly bear habitat. Grizzlies have been absent from the Bitterroot for nearly 40 years. The EIS process will consider the reintroduction as a "non-essential, experimental" population. A grassroots committee with representation from logging interests and the conservation community has expressed initial support.

Final Listing Rules October/November 1994

Four final rules listing a total of 16 species—15 plants and 1 animal—as Endangered were published by the Fish and Wildlife Service during October and November 1994. Endangered Species Act protection now applies to the following:

Thirteen Hawaiian Plants Twelve plant species endemic to the Hawaiian Islands were listed as Endangered November 10:

Adenophorus periens—an epiphytic fern in the grammitis family (Grammitidaceae);

Bonamia menziesii—a vine in the morning glory family (Convolvulaceae);

Diellia erecta—a fern in the spleenwort family (Aspleniaceae);

Flueggea neowawraea, or mehamehame—a large tree in the spurge family (Euphorbiaceae);

Hibiscus brackenridgei, or ma'o hau hele—a shrub or small tree in the mallow family (Malvaceae);

Mariscus pennatiformis—a perennial in the sedge family (Cyperaceae);

Neraudia sericea, or ma'aloa—a tall shrub in the nettle family (Urticaceae);

Plantago princeps, or ale—a shrub or robust perennial herb in the plantain family (Plantaginaceae);

Sesbania tomentosa, or 'ohai—a shrub or small tree in the pea family (Fabaceae);

Vigna o-wahuensis—a sprawling annual or perennial herb in the pea family;

Solanum incompletum—a shrub in the nightshade family (Solanaceae); and

Spermolepsis hawaiiensis—an annual herb in the parsley family (Apiaceae).

In a separate November 10 rule, another Hawaiian plant, Mann's bluegrass (*Poa mannii*), also was listed as Endangered.

Two Puerto Rican Trees A November 25 final rule listed two tree species endemic to the island of Puerto Rico as Endangered:

Eugenia baematocarpa, or uvillo—a small tree in the myrtle family (Myrtaceae); and

Pleodendron macranthum, or chupacallos—an evergreen tree in the family Canellaceae.

Appalachian Mussel The Appalachian elktoe (*Alasmidonta raveneliana*), a freshwater mussel

endemic to the upper Tennessee River system in western North Carolina and eastern Tennessee, was listed November 23 as Endangered.

Listing Proposals October/November 1994

Twelve plant species, all native to California, were proposed by the Fish and Wildlife Service (FWS) October 4, 1994, for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:



Kelso Creek monkeyflower/FWS photo

Ten Sierra Nevada Plants One proposal addressed 10 plant taxa found in the foothills of the Sierra Nevada in central California. The four most vulnerable plants were proposed for classification as Endangered: Chinese Camp brodiaea (*Brodiaea pallida*)—an erect herbaceous perennial in the lily family (Liliaceae) with rose-pink flowers;

Mariposa pussypaws (*Calyptridium pulchellum*)—a compact, rosette-forming annual herb in the purslane family (Portulacaceae);

Mariposa lupine (*Lupinus citrinus* var. *deflexus*)—an erect annual herb belonging to the pea family (Fabaceae) bearing white flowers with pink or lavender tips; and

Kelso Creek monkeyflower (*Mimulus shevockii*)—a desert annual in the snapdragon family (Scrophulariaceae).

Because the other six plants are vulnerable but in somewhat less immediate danger, they were proposed for listing as Threatened:

Rawhide Hill onion (*Allium tuolumnense*)—an erect, herbaceous perennial in the lily family that grows from underground bulbs;

Springville clarkia (*Clarkia springvillensis*)—an annual herb in the evening-primrose family (Onagraceae) that bears lavender-pink flowers;

Carpenteria (*Carpenteria californica*)—an evergreen shrub in the mock orange family (Philadelphaceae) with large white showy flowers;

Greenhorn adobe lily (*Fritillaria striata*)—a slender, herbaceous perennial in the lily family that grows from a bulb and produces one to four fragrant, bell-shaped flowers;

Piute Mountains navarretia (*Navarretia setiloba*)—an erect annual herb in the phlox family (Polemoniaceae) with purple flowers; and

Red Hills vervain (*Verbena californica*)—a perennial herb in the vervain family (Verbenaceae) producing white-blue to purple blossoms.

The 10 proposed Sierra Nevada plants are threatened by habitat damage from one or more of the following: agricultural land conversion, urbanization, logging, overgrazing, off-road vehicle use, mining, insect predation, incompatible fire management techniques, and highway construction and roadside maintenance.

Two San Francisco Plants Two plant species from the San Francisco peninsula also were proposed for listing:

San Francisco lessingia (*Lessingia germanorum*)—a slender annual in the aster family (Asteraceae) that bears heads of lemon-yellow disc flowers. It is known only from five sites on the Presidio (an Army base at the tip of the peninsula) and one site on San Bruno Mountain to the south. Ninety percent of the plant's historical habitat has been lost, and this species was proposed for listing as Endangered.

San Bruno Mountain manzanita (*Arctostaphylos imbricata*)—a low, spreading evergreen shrub in the heath family (Ericaceae) with small, white, urn-shaped flowers. It is used sometimes as an ornamental plant. This species is restricted to five colonies on San Bruno Mountain, and was proposed for listing as Threatened.

The San Bruno Mountain Habitat Conservation Plan gives some protection to the manzanita. But some colonies face various threats, including urbanization, sand quarrying, bulldozing, collection, changes in natural fire cycles, invasions by weedy non-native plants, and the impacts of certain recreational activities.

Contributing to the Endangered Species Bulletin

Because of its increasingly diverse audience, the *Bulletin* is seeking to diversify and expand its coverage of endangered species issues. To be successful, we need your help.

Material on a wide range of topics relating to endangered species is welcome, and it may be technical or popular in nature. We are particularly interested in success stories and news about recovery (both the development of recovery plans and their implementation). Material is needed on interagency consultations; Habitat Conservation Plans; other cooperative ventures with Federal and State agencies, conservation organizations, business, and private landowners; changes in a species' status; and significant new threats.

Before preparing a manuscript, please contact the *Bulletin* Editor (703/358-2390) to determine the proper length, focus, and timing of proposed articles. We welcome submissions but cannot guarantee their publication in the *Bulletin*. (Authors will be notified if their material is not used.) Manuscripts may be circulated to reviewers for technical content and consistency with Fish and Wildlife Service policies. They may also be edited for length, style, and clarity. The *Bulletin* editorial staff will consult with authors on changes that may affect the content of a manuscript, and authors will have an opportunity to review edited material before publication. Credit will be given for all articles and illustrations used.

Style

When preparing a manuscript, follow the *GPO Style Manual*. Keep in mind the diversity of the *Bulletin* audience. People from many different backgrounds are added to the mailing list each month, and discussing the context of an issue is an important aid to new readers.

As a general rule, feature articles should be between three and six double-spaced pages in length. Shorter items can be sent to the appropriate Regional endangered species specialist for inclusion in the Regional News column. Notices and announcements may be mailed directly to the Editor.

Because the *Bulletin* recipients include many scientists and foreign subscribers, please include:

- scientific and common names of all species mentioned (listed and non-listed species).

- Metric equivalents for all measurements (including area and volume).

- Celsius and Fahrenheit equivalents for temperatures.

- Complete names or terms to accompany the first use of all abbreviations and acronyms.

Submissions should always include the author's name, position, duty station, address, and telephone and fax numbers.

Illustrations

Photographs and/or line drawings are very important, and should be submitted with all articles as available. Photographs are particularly welcome, and can be provided as transparencies, prints (black-and-white preferred), or negatives. Include the photographer's name and material for a caption. Material will be returned upon request. Please obtain in advance the necessary permission for the *Bulletin* to publish the submitted illustrations.

Submission Format

Manuscripts for the *Bulletin* can be submitted several ways. We prefer to receive computer files in Wordperfect 5.1 format. Please transmit them via CC:MAIL (send to R9FWE_DES), or via Internet at R9FWE_DES.BIM@mail.fws.gov. You may also mail DOS-formatted diskettes to Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 452 ARLSQ, Washington, D.C. 20240. Submissions by FAX can be sent to 703/358-1735 (703/358-2390 to confirm). In all cases, please also mail a double-spaced hard copy.

Printing Schedule

The *Bulletin* is on a bimonthly printing schedule, with six issues per year and an index.

We welcome contributions at any time, but material not received by the "Article Due" date will be held for the next issue.

ISSUE DATE	ARTICLE DUE DATE
May/June 1995	March 1, 1995
July/August 1995	May 3, 1995
September/October 1995	July 3, 1995
November/December 1995	September 1, 1995

On the Web

To assist the ecosystem approach and to reach as broad an audience as possible, FWS has placed several electronic information items on the Internet World Wide Web, and on Internet E-mail. These items include:

🌐 **List of Threatened and Endangered Species, updated monthly;**

🌐 **Lists of Animal and Plant Candidates, as published;**

🌐 **Current Distributions for Listed Species under Fish and Wildlife Service Jurisdiction by State or Territory;**

🌐 **The Endangered Species Act of 1973, as amended through the 100th Congress; and**

🌐 **Species Maps that indicate the number of listed, proposed, candidate, and Category 1 species by state or territory.**

The Fish and Wildlife Service World Wide Web Home Page address is:
<http://www.fws.gov/>
The Internet E-mail address is:

R9IRMLIB@fws.gov
When using Internet E-mail, type [Send ES Instructions] on the Subject line to receive a list of the retrieval commands for the available information.

BOX SCORE

Listings and Recovery Plans as of January 1, 1995

GROUP	ENDANGERED		THREATENED		TOTAL LISTED	SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	55	252	9	22	338	39
 BIRDS	75	153	16	0	244	73
 REPTILES	14	65	19	14	112	31
 AMPHIBIANS	7	8	5	0	20	10
 FISHES	68	11	37	0	116	66
 SNAILS	15	1	7	0	23	11
 CLAMS	51	2	6	0	59	42
 CRUSTACEANS	14	0	3	0	17	4
 INSECTS	19	4	9	0	32	17
 ARACHNIDS	4	0	0	0	4	4
ANIMAL SUBTOTAL	322	496	111	36	965	297
 PLANTS	422	1	89	2	514	208
GRAND TOTAL	744	497	200	38	1,479*	505**

*Separate populations of a species 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, green sea turtle, and olive ridley 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.

TOTAL U.S. ENDANGERED: 744 (322 animals, 422 plants)

TOTAL U.S. THREATENED: 200 (111 animals, 89 plants)

TOTAL U.S. LISTED: 944 (433 animals, 511 plants)

**There are 416 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.

E N D A N G E R E D

Species

B U L L E T I N

*Department of Interior
Fish and Wildlife Service
Washington, D.C. 20240*

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