

ENDANGERED *Species* BULLETIN

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*To stand an old saying on its head, “A thousand pictures can be worth one word.” For this edition of the Bulletin, that word is **recovery**. The photographs to the left represent some of the more than one thousand plants and animal species in the United States now listed as threatened and endangered. The Endangered Species Act directs federal agencies, working in partnership with state and local governments and the private sector, not only to protect such imperiled species but to return them to a secure status. Recovery is seldom an easy or straightforward task, and the pace at which it can be accomplished depends on our society’s willingness to invest the necessary time, funds, and other resources.*



Photo by John and Karen Hollingsworth

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The Endangered Species Bulletin welcomes manuscripts on a wide range of topics related to endangered species. We are particularly interested in news about recovery, habitat conservation plans, and cooperative ventures. Please contact the Editor before preparing a manuscript. We cannot guarantee publication.

We also welcome your comments and ideas. Please e-mail them to us at esb@fus.gov.

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Three Decades of Recovery

by Martin Miller



Missouri bladderpod

Photo by Jim Rathert/Missouri Department of Conservation



Biologists conducting research on the Ozark cavefish at Logan Cave National Wildlife Refuge, Arkansas.

USFWS photo by John and Karen Hollingsworth

The theme of this issue of the *Bulletin* is the foundation of the Endangered Species Act: recovery. In the ESA, Congress declared that threatened and endangered “fish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people.” Based on this finding, Congress enacted “a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” and “a program for the conservation of such endangered species and threatened species.” With over 1,200 threatened and endangered species in the United States, fulfilling the purposes of the ESA is no easy matter. Although recovery of so many species may seem daunting, when examined more closely there is good cause for optimism and inspiration. This year, the 30th anniversary of the ESA, is a natural point at which to reflect on the progress of endangered species recovery efforts.

Much has been written about whether the ESA is “working.” These debates have often focused on the regulatory impacts of the ESA or the fact that few species have been removed from the List of Threatened and Endangered Species while several others have become extinct. However, in gauging the law’s success, it’s important to consider the significant improvements in status for many species; the capacity of the Fish and Wildlife Service and NOAA-Fisheries (the two agencies charged with administering the ESA), along with our many partners, to carry out recovery programs for the growing number of listed species; and the increasing challenges we all face in addressing ecological threats.

When considering simple figures, such as the number of species that have been fully recovered and the number that have become extinct, it’s instructive to look behind the statistics. Although only a handful of species have been removed from the List of Endangered and Threatened Species, the Service has identified over a dozen more species that have reached or are nearing their recovery goals and may be delisted in the near future, such as the prairie bush clover (*Lespedeza leptostachya*), populations of the gray wolf (*Canis lupus*), and the Magazine Mountain shagreen snail (*Mesodon magazinensis*). Yet even for these species, the story of recovery is dramatic not because the final milestone of full recovery was achieved but because of the challenges that were met along the way. One article in this edition, “Species on the Brink of Recovery,” describes the path to recovery for several species that have reached or are nearing their recovery goals.

Seven species on the U.S. list have probably become extinct since passage of the ESA. In addition, 28 other listed species may be extinct (U.S. Fish and Wildlife Service 2003). Although some of these species either were already suspected of being extinct or were on the brink of extinction at the time they were added to the list, the loss of these species is still cause for alarm. However, when it comes to the potential to prevent extinction, there is a strong case that the glass is more than half full. In an independent study, it was estimated that, without the ESA, 192 species might have been expected to become extinct from 1973 to 1998 (Schwartz 1999). For some species, halting their decline and holding off extinction in order to preserve the



The gray wolf represents one of the most successful recovery stories in the three decades since passage of the Endangered Species Act.

Corel Corp. photo

opportunity for further recovery in the future is an extremely difficult task. It is challenging but possible, and a clear example of recovery progress. The article "Preventing Extinction" examines a few of the species we are working to save from the brink of extinction.

Most examples of recovery success fall between the ultimate goal of achieving full recovery and the intermediate goal of stabilizing a species' status to prevent imminent extinction. The Service has reported over 500 U.S. species in stable or improving status (U.S. Fish and Wildlife Service 2003). While this number is only about one-third of the listed species, it demonstrates that many species are significantly better off than they were at the time of their listing under the ESA. It represents the progress of recovery efforts by many agencies, organizations, and individuals.

Whatever measure of recovery success one might use, it's important to consider the difficulty and magnitude of the job. The difficulty varies from species to species, depending on the status when recovery efforts begin, the knowledge of the species' life history

and the threats it faces, the complexity of necessary recovery actions, the financial and other resources available, and the level of public support for recovery of the species. It's also important to consider the generally long period of time necessary to achieve full recovery. The biology of some species, particularly long-lived species that are late-maturing and have low reproductive rates, establishes an inherently long time frame for recovery. Habitat restoration, the propagation and establishment of new populations, and other complex recovery actions may require decades. Acquiring adequate knowledge, resources, and support, and conducting the planning needed even before recovery actions can begin, also may require considerable time. The article "A Journey of a Thousand Steps" addresses these difficulties.

As much as recovery is about species, it is also about people—those who make recovery happen. The center article in this edition, "Recovery Champions," features Service employees who have been recognized for their significant contributions toward the recovery of

endangered and threatened species. We are looking forward to expanding this program to recognize state, federal, and tribal agency employees, conservation organization members, and other partners for their work.

There have been many successes in recovering our nation's listed species, but there are also many species that require more attention. At last count, the Service reported 417 species that are still declining (U.S. Fish and Wildlife Service 2003). It is by duplicating the efforts illustrated in this issue of the *Bulletin* that we will achieve full success in recovering more of the growing number of listed species.

Recovery success will continue to be measured in different ways by different people for different purposes. If measuring recovery success is intended as an assessment of the possibilities for improving the status of our living resources, then the answer is clear. The articles in this issue of the *Bulletin* show that the Service, NOAA-Fisheries, other federal agencies, states, tribes, local governments, conservation organizations, businesses, and individuals are successfully recovering many species across the country.

References:

- M.W. Schwartz, 1999, Choosing the Appropriate Scale of Reserves for Conservation, *Annual Review of Ecology and Systematics*, 30: 83-108.
- U.S. Fish and Wildlife Service, 2003, *Recovery Report to Congress, Fiscal Years 1997-98 and 1999-2000*, Washington, D.C. [This report is available via the Internet at http://endangered.fws.gov/recovery/reports_to_congress/97-2000/index.html.]

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A Journey of a Thousand Steps

by Paul Nickerson and
Mary Parkin



Photo by C. Perez/USFWS



USFWS photo

The piping plover (top), seabeach amaranth (above), and Kemp's ridley sea turtle (opposite page) all benefit from the conservation of beach habitats. Progress toward recovery of the Kemp's ridley also has been aided by multi-national teams that collect and protect eggs.

Photo by David Bowman/USFWS

The Endangered Species Act of 1973 (ESA) requires the Fish and Wildlife Service and National Oceanic and Atmospheric Administration-Fisheries to develop recovery plans for listed endangered and threatened species and to implement these plans to the extent that resources allow. Species are considered to be recovered when their status has improved to the point that ESA protection is no longer necessary. Some critics of the endangered species program contend that very few species have been “delisted” since the ESA was passed, in spite of the money and effort that has been expended. If one looks only at the number of recovered and delisted species in contrast to the entire list, it would be easy to agree with that conclusion, yet such a cursory review hardly gives an accurate picture.

Many people see recovery as a straightforward goal that we should be able to achieve in a reasonable time. Unfortunately, however, there is seldom anything simple or straightforward about the recovery of an imperiled species. Instead, it is a complex, often circuitous process, a journey of a thousand steps. Sometimes great strides can be made in short order, but for most species, recovery is a hard-won victory following a fight against great odds.

Limits to the pace and success of recovery may be biological, fiscal, or anthropogenic (human-caused) in nature. Development pressures, economic and recreational uses, natural resource extraction, unintended technological consequences (e.g., effects of new sophisticated sonar on whales and dolphins, outmigrating salmon being ground up in power generating turbines) and biological

manipulations (exterminations of predators, intentional introductions of invasive species, etc.) are arrayed against the conservation of ecosystems. Ultimately, our society's ability and willingness to eliminate or ameliorate threats to biological diversity will determine what comes off the list and what may have to stay on it. Based on decades of experience and investigation, we are now able to identify a variety of specific obstacles to recovery and suggest the steps that might be taken to overcome them.

Sometimes, the factors that may prolong recovery relate directly to the life cycles of the species in question. For instance, sea turtles are slow to reach breeding age, so it may take years, even decades, of work before we see results from such programs as “head-starting” young turtles that are hatched and raised for a time in captivity. Coupled with





Stock Island tree snail

Photo by Beth Forys

continuing threats such as egg collection, predation, the trade in turtle shell, human consumption, and incidental take during shrimping operations, there's little wonder that sea turtle recovery is slow in coming. But with an attitude of "Never Say Die," our nation hasn't given up. As a result, we are witnessing a remarkable success story for one sea turtle species as Kemp's ridley turtles (*Lepidochelys kempii*) once again crawl ashore to nest in Texas after years of head-starting and releases.

Invasive plants and animals can also pose a serious problem for listed species. When there are few natural enemies in the areas they are colonizing, they can be extremely difficult to control. Zebra mussels, phragmites, and exotic snails are but a few of the more pervasive impediments to the recovery of some listed species. In many cases, invasive species imperil the existence of listed species through over-competition or predation.

Sometimes the culprit is an otherwise benign natural event. For example, Karner blue butterflies (*Lycaeides melissa samuelis*) rely on early successional pine savanna dominated by pitch pine and lupine. This dynamic habitat is literally growing out of existence in much of the butterfly's range, and efforts to replicate

this type of open habitat in the absence of wildfires are being undertaken at great expense.

In most cases, habitat is lost or altered as a consequence of human activity. In the Southeast, many habitats of mussel species that need clear, flowing water have been inundated by dams or degraded by pollution, nearly obliterating the world's epicenter of molluscan diversity. To prevent the extinction of some of these rare mollusks, we have learned how to propagate certain species in captivity, with the goal that their offspring can then be used to repopulate depleted stretches of suitable habitat. This work, which has entailed years of research and experimentation, is well underway. But even with the improvements in water quality that have been achieved with other environmental laws, it will be decades before we begin to approach recovery in the remaining wildlife habitats.

Single catastrophic events can also be major setbacks to recovery. Recently, oil spilled from a barge despoiled Ram Island in Buzzards Bay, Massachusetts. Ram Island had been cleared of competing gulls some years ago to open up beach nesting habitat for the endangered roseate tern (*Sterna dougallii dougallii*),

Grizzly bears

Photo by Chris Servheen/USFWS





Recovery of Robbins' cinquefoil (left) was made possible by a partnership to protect the fragile alpine habitat and establish new populations. Pictured at left are Ken Kimball of the Appalachian Mountain Club, Bill Brumback of the New England Wild Flower Society, and Kathy Starke of the White Mountain National Forest.
 Photos by Susi von Oettingen/USFWS.



which then flocked to nest there. We are now faced with the need to frighten these terns away from the island so they won't become fouled by oil, even though a failure to nest this year could significantly set back the tern's progress towards recovery.

Lack of suitable undisturbed habitat is the principal biological factor that limits our prospects of achieving full recovery for many listed species. Two threatened species, nesting piping plovers (*Charadrius melodus*) and a plant, the seabeach amaranth (*Amaranthus pumilis*), compete with beach-goers, off-road vehicles, predators, development, and storm tides for a narrow strip of beach just above the high tide line. Intense management has improved the numbers of these birds and plants, but as long as the competing uses remain,

we won't be able to walk away from our beach protection responsibilities. A multitude of other species are also limited by lack of suitable habitat. For example, Stock Island tree snails (*Orthalicus reses*) are limited to a few Brazilian pepper trees in Florida because development has eliminated most of their habitat. Some of our listed fish exist primarily in refugia at hatcheries.

Research into the biology of species and the threats they face frequently is needed before progress towards recovery can be achieved, but this information often can be gained only over considerable time and through sustained effort. Planning an effective course for species recovery depends on having this knowledge. And although there are times when the road to recovery can readily be mapped, the funds needed to complete this journey are always limited. This situation places listed species in the unfortunate position of "competing" with each other for recovery resources. Finally, the recovery program itself must compete for funding with nondiscretionary aspects of the endangered species program that require immediate attention, such as listing, interagency consultations, and law enforcement.

Yes, recovery takes time and patience, and incremental progress is important. Much effort has been expended to recover flagship species like wolves

(*Canis lupus*), bald eagles (*Haliaeetus leucocephalus*), California condors (*Gymnogyps californianus*), salmon (*Oncorhynchus* spp.), whooping cranes (*Grus americana*), black-footed ferrets (*Mustela nigripes*), and grizzly bears (*Ursus arctos*). As a result, their populations are stable or increasing. In fact, wolves and eagles are now the subject of reclassification or delisting rules. We have also made great progress in improving the status of hundreds of other listed species, and even while they remain listed, their numbers are up and more habitat is protected. Over time, these and additional species will recover fully. The peregrine falcon (*Falco peregrinus*), Aleutian Canada goose (*Branta canadensis leucopareia*), and Robbins' cinquefoil (*Potentilla robbinsiana*) are three that were delisted recently after years of ESA protection and recovery efforts. Each is now self-sustaining and a living testimony to humankind's ultimate commitment to conserving biological diversity.

Paul Nickerson served for 28 years as the Endangered Species Chief in the Service's Northeast Regional Office until he retired recently, capping a 34-year career with the Service. Mary Parkin is the Recovery Coordinator for the Northeast Region (mary_parkin@fus.gov; tel. 617/876-6173).

by Karene Motivans and
Martha Balis-Larsen

Species on the Brink of Recovery



Flat-spined three-toothed land snail
Photo by Craig Stihler/West Virginia Division
of Natural Resources

The purpose of the Endangered Species Act is to conserve endangered and threatened species and the ecosystems upon which they depend. The ultimate symbolic action in a species' recovery effort is taking the species off the endangered and threatened species list because it is no longer threatened with extinction now or likely to become so within the foreseeable future. Final delisting and downlisting (i.e., changing a species' status from endangered to threatened) is achieved through time, steadfast dedication, and the use of existing and innovative techniques.

In the Midwest, for example, the prairie bush clover (*Lespedeza leptostachya*) has been helped by years of dedication toward recovery. Restoring the prairie bush clover focused on identifying and protecting populations in both the core and peripheral portions of its range. All that remains before delisting is to conduct a viability analysis of the protected populations to ensure that they will remain healthy.

The endangered Magazine Mountain shagreen (*Mesodon magazinensis*) is restricted to a single population found on the talus slopes of Magazine Mountain in the Ozark National Forest of Arkansas. Evidence has revealed that the range of this snail had not contracted; instead, it has always been endemic to this one site. As part of the construction of a state park on Magazine Mountain in 1995, the U.S. Forest Service began monitoring the snail for 10 years. At the end of this period, if the shagreen is still stable, the species could be considered for delisting. The final survey will be conducted in the spring of 2005, but at this time the results of the survey indicate that the population has remained stable.

One of the most recognized species on the list of endangered and threatened species is the gray wolf (*Canis lupus*). After decades of widespread persecution of the wolves due to perceived and real conflicts between wolves and human activities, it is estimated that only several hundred wolves survived in northeastern Minnesota and on Isle Royale, Michigan,

Biologists with northern flying squirrel at Canaan Valley NWR
Photo by Leah Ceperley/USFWS





Left: Borax Lake chub

Photo by Jack Williams

with possibly a few scattered wolves in the Upper Peninsula of Michigan, Montana, and the American Southwest at the time the Endangered Species Act of 1973 was enacted.

Today, with improved and coordinated management, the introduction of wolves back into areas where they once existed, and the cooperation of the states, conservation organizations, many private landowners, and numerous other partners, gray wolf populations have rebounded in the East to over 3,000 wolves. In the Northern Rocky Mountains, there are an estimated 664 wolves in 44 packs in northwestern Montana, Idaho, and in and around Yellowstone National Park. Populations in both regions are exceeding their numerical recovery goals. As a result, in April 2003, the Service downlisted the gray wolf from endangered to threatened in the Eastern and Western Distinct Population Segments (the Southwest DPS is still listed as endangered) and established two new special rules under section 4(d) of the ESA that increases our ability to respond to wolf-human conflicts in these areas. At the same time, the Service announced its intention to propose delisting the gray wolf in the Eastern and Western DPSs within the near future. Another strong sign of its recovery progress.

Many of the other articles in this issue of the Bulletin describe the dedication and resolve required to achieve recovery of a species, including an article on the riparian brush rabbit (*Sylvilagus*

bachmani riparius), which would have gone extinct if the Service hadn't taken action, and Robert "Sea Otter" Jones' efforts to recover the Aleutian Canada goose (*Branta canadensis leucopareia*).

Recovery is on the horizon for many species on the list. Ninety-seven percent of U.S. species listed as of September 30, 2002, still survive and many of them are headed toward recovery. In fact, the Service considers over 500 listed species to be stable or improving in status. By any measure, this is a tremendous success. The many partners involved in contributing to recovery deserve the credit. Endangered or threatened species recovery is often a long, slow process, but the goal of preventing extinction and giving hope to other listed species is attainable. If you are interested in learning more about what you can do to help recover a species, please contact your nearest Fish and Wildlife Service office or see our web site at <http://endangered.fws.gov/recovery>.

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Cheat Mountain salamander

Photo by Mark Watson



Following delisting, the Service is obligated to monitor delisted species for at least five years to ensure a seamless transition off the endangered species list. Monitoring may involve population counts and making sure the species is reproducing in the wild, or evaluating the effectiveness of management actions. The cost of keeping tabs on delisted species is often shared with state and other partners. Species that are currently being monitored because they were recently delisted include the Robbins' cinquefoil, Aleutian Canada goose, and American peregrine falcon.

by Martha Balis-Larsen and
Karene Motivans

Saving Species on the Brink of Extinction



Tan riffleshell

Photo by Richard Biggins/USFWS

What's in a name?

The common names for many critically imperiled species identify the areas that sustain them: **Tumbling Creek cave snail, Alabama sturgeon, Laguna Mountains skipper, Shasta crayfish, Rio Grande silvery minnow, Sonoran pronghorn, Chittenango ovate amber snail, and Wyoming toad.** Other names describe the beauty of the species, such as **slender chub, autumn buttercup, and winged mapleleaf mussel.**



Rio Grande silvery minnow

USFWS photo

According to paleontologist Niles Eldredge, Earth is experiencing its sixth major wave of extinction.¹ Our nation has not escaped the forces threatening plant and animal species. Of the more than 1,200 species in the United States currently protected by the Endangered Species Act, 417 are declining in number and 28 others are now believed to be extinct. Many critically endangered species are geographically concentrated in “hot spots.”

Aquatic species in the Southern Appalachian and Lower Tennessee Cumberland ecosystems. The southeastern U.S. has the greatest diversity of freshwater mussels and crayfishes in the world, and the highest diversity of freshwater fishes and snails in the country. Conservatively, we estimate that nearly 40 of these species have reached such low population numbers that a single isolated event could cause their extinction. Because many of these species survive in only a fragment of their former range, a single catastrophic event could cause their extinction. Among the southeastern aquatic species that are critically endangered are the tan riffleshell (*Epioblasma florentina walkeri*), with only one reproducing population in Indian Creek, Virginia; the plicate rocksnail (*Leptoxis plicata*), currently found only in the Locust Fork, Alabama; and the boulder darter (*Etheostoma wapiti*), found only in the Elk River in Tennessee and Alabama. Recovery actions needed to save these species include developing propagation technology, restoring habitat, reintroducing the species into restored habitat,

and supporting sustainable development and resource use that also conserves the species.

Endemic Hawaiian plants and animals. Hawaii has more critically endangered species than any other state. As of October 24, 2003, there are 312 listed species, 106 candidate species, and over 1,000 species of concern. Of these, there are 102 endangered species, including 11 birds, four tree snails, and 87 plants, in such low numbers that could be rendered extinct by a single isolated incident, such as a fire or hurricane. The most serious threats to these species include the continued influx of competitive and predatory nonnative species, and the fragmentation and degradation of habitats. Efforts needed to save these species include removing or controlling destructive invasive species (for more information, see the article on the Hawaii's Plant Conservation Strategy in this issue). Emergency management needed to protect Hawaii's critically endangered species will also benefit other listed species and at least 30 candidate species.

¹ (see <http://www.actionbioscience.org/newfrontiers/eldredge2.html>)

While the Southern Appalachians and Hawaii host groupings of critically endangered species, there are many other such species across the Nation. Some examples follow:

The **Carson wandering skipper** (*Pseudocopaeodes eunus obscurus*) is a butterfly currently known from only two populations, one in Washoe County, Nevada, and one in Lassen County, California. It needs grassland habitats on alkaline substrates to survive, and this habitat type has been reduced by activities associated with development, certain agricultural practices, collection, and nonnative plant invasions. This rare butterfly is also threatened by unscrupulous collectors.

The **pallid sturgeon** (*Scaphirhynchus albus*) is a fish that has survived for over 200 million years but it is now on the verge of extinction. After the construction of dams on the Missouri River, the ecosystem inhabited by pallid sturgeon was almost completely altered. There is limited evidence that reproduction is still occurring in the wild. Most of the pallid sturgeon in the wild are 40 to 50 years old. The window of opportunity for obtaining reproduction from these individuals is close to the end. Retrofitting Missouri River fish hatcheries to accommodate the needs of this unusual species is critical to aug-

menting the wild populations. The efforts the Service and our partners make during the next five years will be crucial for preventing this species' extinction.

The **Mississippi gopher frog** (*Rana capito sevosa*) was once found in suitable habitat within the Lower Coastal Plain from Florida to eastern Louisiana. Today, however, the frog is known from only one small pond in extreme south-central Mississippi. It spends most of the year underground, often using the burrows of the threatened gopher tortoise (*Gopherus polyphemus*). In spring, the frogs travel overland to reach small ephemeral ponds, where they mate and lay eggs. Most of these ephemeral ponds have been lost to forestry practices, agriculture, and, in some cases, conversion to permanent ponds stocked with game fish. Surrounding habitats with gopher tortoise burrows have likewise been lost to development and land use changes. Preventing the extinction of this unique frog will require the restoration of ponds and surrounding habitats and the reintroduction of frogs from the surviving population.

The emergency-listed **Columbia Basin pygmy rabbit** (*Brachylagus idahoensis*) has fewer than 50 individuals in the wild, all in Douglas County,

Washington. Its faces imminent extinction resulting from disturbances to its sagebrush habitat, disease, predation, and loss of genetic diversity. We need to develop a program to breed the rabbits in captivity for release into the wild. Its survival will depend on working with our partners and stakeholders to implement conservation actions and to integrate these actions with agricultural practices.

Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*) may be North America's most endangered bird. Since 1996, captive-bred birds have been released on the Attwater's Prairie-Chicken National Wildlife Refuge and the Texas City Prairie Preserve. However, these sites can support only a small number of prairie-chickens. Saving this species will require strong partnerships with private landowners. Prescribed burns, brush control, conversion of land back to native grasses and forbs, and grazing regimes that will foster native species are needed.

Halting the loss of these and other species will require continued collaboration between the Service and our many partners. By working together, we can conserve the remaining habitats and restore others, while at the same time supporting sustainable development and land use.



Above: pallid sturgeon
USFWS photo

Left: Carson wandering skipper
Photo © B. Moose Peterson/WRP

Recovering a Prairie Orchid

by Kris Lah



This picture was taken at one of the volunteer training sessions on non-federal land. In the middle of the picture is Marlin Bowles of the Morton Arboretum, a species expert and author of the recovery plan. In the front and to the left is June Keibler, the Volunteer Coordinator for the stewardship network for over 10 years.

USFWS Photo

A partnership of stakeholders and the Fish and Wildlife Service's Chicago Ecological Services Field Office took root over 10 years ago and has blossomed into an active recovery program for the eastern prairie fringed orchid (*Platanthera leucophaea*). Scientists, volunteers, landowners, and conservation organizations in northeastern Illinois have a strong interest in the recovery of the rare wildflower. This interest grew into action that includes habitat management, annual demographic and census data collection, research, hand-pollination, population augmentation, reintroduction, and outreach.

Sowing Seeds of Stakeholder Involvement

The eastern prairie fringed orchid was once widespread across the upper Midwest, with additional populations in Oklahoma, Virginia, New Jersey, and Maine. After it had declined in range by more than 70 percent, it was listed as threatened in 1989. Most populations now contain fewer than 50 plants and are not considered highly viable. Illinois had the largest and most extensive presettlement orchid populations and has suffered the most drastic decline of any state in the species' historical range. The orchid once occurred in 33 counties of northern Illinois but is now only found in 9 counties.

All of the Illinois populations are on nonfederal land and are concentrated in the Chicago metropolitan area. In fact, the largest populations in Illinois occur on private property and land owned by small municipalities. Therefore, cooperative efforts are essential for recovering the orchid. Landowners have cooperated

in the recovery effort by providing access to their property and allowing research, management, and seed collection to be conducted. In addition, they have become partners with the state and the Service by sharing the costs of many of these projects.

Stakeholders were identified and consulted early, and consultation has continued throughout the recovery planning and implementation stages. Once individuals, groups, or agencies have an interest in the issue and are made aware of how the subject is being addressed, they become participants in the recovery process. Input from stakeholders during developing the recovery plan for the orchid, and recognition of recovery achievements, has given stakeholders a sense of ownership of the plan and a commitment to the orchid's recovery.

By working with stakeholders such as state and county agencies, The Nature Conservancy, Chicago Wilderness, the Orchid Society, private landowners,

corporations, botanic gardens, and arboretums, the Chicago Field Office has been able to pool resources, skills, and knowledge for accomplishing recovery tasks. One of the first tasks was to locate additional orchid populations and contact the landowners. As a result, new population remnants have been found and the quest to find appropriate habitats for orchid reintroduction continues.

The Project Blossoms

In 1993, the Service's Chicago Field Office cultivated a partnership with The Nature Conservancy. It first approached the Conservancy with the idea of tapping into its volunteer stewardship network to engage "citizen scientists" in recovery efforts for the orchid. The Conservancy helped to recruit volunteers, but most of the interest was spread by word of mouth and with help from the media. There were 30 participants at the first volunteer training session, with 30 more volunteers joining soon after. Members of the volunteer network have remained very dedicated over the last 10 years, with 70 percent of the original group still active.

Since the volunteer program's inception, its leaders have maintained their roles. Most notable is June Keibler, the Volunteer Coordinator. Through more than 10 years, June's dedication has shown a personal commitment to the species. Her enthusiasm and diligence motivates others to take a stake in eastern prairie fringed orchid recovery.

So what do the volunteers do? *A Lot!* They collect census and demographic data, evaluate the management condition of their site, and collect and disperse seeds. Some of the variables that the volunteers collect data on include height, number of leaves, number of flowers, number of flowers hand-pollinated, herbivory impacts, and habitat conditions. Volunteers have been asked to do additional work on occasion, such as collect tissue samples and manage habitat, and they have always come through. All of the data the volunteers

collect are provided to researchers at the Chicago Botanic Garden and the Morton Arboretum. Researchers then compile this data and look for correlations with other variables.

In addition to annual census and demographic data collection, volunteers also hand-pollinate the orchid. The natural pollinators for the eastern prairie fringed orchid are night flying hawk-moths. Hand-pollinating the orchid has increased seed production, which allows for augmentation of existing populations and introduction of seed to start new populations.

The Fruits of Their Labor

A month and a half after the plants are pollinated, volunteers return to the site to monitor and collect seed capsules. The seeds are then used to augment existing populations and establish new ones in protected sites, with the hope of contributing towards recovery. State partners have helped by finding publicly owned sites with appropriate habitat. Last year alone, their efforts provided for introduction of seed into 15 new sites.

The progress that has been made toward the recovery of the orchid could not have been accomplished without the participation of stakeholders. The volunteer program alone is responsible for starting six new populations, successfully reintroducing the orchid to five historic sites, finding unknown populations, and augmenting existing populations. The Service has provided seed for protected land, established relationships with landowners, and assisted in the management of orchid habitat. Such stakeholder involvement is a vital part of recovery efforts for the eastern prairie fringed orchid and many other threatened and endangered species.

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The eastern prairie fringed orchid may grow as tall as 40 inches, and has an inflorescence with as many as 40 creamy white flowers

Photo © M. Redmer

From Cage to Rainforest

by Thomas H. White, Jr., and
Fernando Nuñez-García



The Puerto Rican parrot and its tropical rainforest habitat.

Top photo © Roland Seitre

The Puerto Rican parrot (*Amazona vittata*), endemic to the island of Puerto Rico, is one of the 10 most endangered birds in the world. This emerald-green parrot is one of nine native species of Amazon parrots found in the West Indies, and the only extant native parrot in the United States. Historically abundant throughout Puerto Rico and its offshore islands, the parrot is now only found deep within the montane rainforest of the Caribbean National Forest (also known as El Yunque), the only tropical rainforest in the U.S. National Forest System.

When Columbus arrived in Puerto Rico in 1493, the parrot was well known to the native Taino Indians, who called it “Iguaca,” after the sound of its distinctive flight call. However, the subsequent European colonization of Puerto Rico eventually resulted in a major increase in the island’s human population. This increase led to widespread agricultural deforestation, shooting of parrots for food or crop depredation, and the taking of wild nestlings for household pets. By 1959, only an isolated population of around 200 Puerto Rican parrots remained in the Caribbean National Forest, the last tract of essentially virgin forest left in Puerto Rico (Rodríguez-Vidal 1959). By the time the parrot was officially listed as endangered in 1967, the population had declined to 70 individuals (Snyder et al. 1987).

Intensive recovery efforts began in 1968. Captive breeding was initiated in 1973, with the establishment of the Luquillo Aviary in the Caribbean National Forest. The captive breeding effort was expanded in 1993, with establishment of a second captive flock at the

Jose L. Vivaldi Aviary in the Rio Abajo Commonwealth Forest. These two captive flocks now ensure against loss of the entire population to a single catastrophic event, such as a hurricane or disease. The aviaries also are invaluable as a safe haven for parrot chicks suffering from mishaps in the wild, a genetic reservoir for the species, and a source of parrots for eventual release into the wild.

Over the years, the combined production of these two successful aviaries has resulted in a steady accumulation of Puerto Rican parrots in captivity. In fact, there currently are more Puerto Rican parrots in captivity (156) than in the wild (30-35). This, combined with the dangerously small size of the sole wild population, led to plans for releasing free-flying captive-reared parrots to bolster the wild population.

A pilot project, supported in part by the U.S. Fish and Wildlife Service, was first conducted in the Dominican Republic using native non-endangered Hispaniolan parrots to test methods and develop a safe protocol for releasing the Puerto Rican parrots (Collazo et al.

2003). Following the success of the pilot project, 10 captive-reared Puerto Rican parrots were carefully selected from the aviary flocks for the crucial initial release in the Caribbean National Forest. These parrots were subjected to an intensive pre-release training and acclimation period to develop and improve their flying ability, wild food manipulation, and predator recognition and avoidance skills. To maximize the probability that released parrots would integrate into the wild population, a release site was chosen in the heart of the wild parrots' rainforest territory.

Finally, at dawn on June 27, 2000, we released the first group of 10 Puerto Rican parrots. Because each parrot was equipped with a radio transmitter, we could determine post-release movements and survival of this group. After months of tracking the parrots across the rugged, inhospitable terrain of El Yunque, we were rewarded by finding that half of the parrots had not only survived their critical first year in the wild, but also had

settled into the same valleys used by the wild parrots. Of those Puerto Rican parrots that did not survive, most fell prey to red-tailed hawks (*Buteo jamaicensis*) (White et al. 2002).

Building on this positive experience, we released a larger group of 16 captive-reared parrots in May 2001. We subjected it to similar pre-release training as the first group. However, predator aversion training was intensified because of the previous incidents of raptor predation. Once again, each parrot was equipped with a radio transmitter and tracked following release. First-year survival of the second group (44 percent) was similar to that of the first group. However, in 2000, 30 percent of released parrots fell prey to hawks within three months of release, whereas only one parrot (6.3 percent) did so within the same period in 2001 (White et al. 2002).

A third release of nine captive-reared Puerto Rican parrots was conducted in May 2002, with a first-year survival

trajectory nearly identical to that of the year 2001 release. In an unprecedented event, a pair of the year 2002 released parrots appeared back at the Luquillo Aviary more than 11 months after their release. Although it was too late in the year to begin breeding, the pair quickly began investigating an artificial nest cavity that we placed near the aviary soon after their arrival. Given this encouraging sign, we hope to observe successful nesting by released parrots—the true indicator of success—during the upcoming 2004 nesting season.

We have frequently observed survivors from releases not only flying and foraging together with the wild parrots, but also apparently paired with them. These survivors can now be considered wild parrots. We believe that with our continued support, the call of "Iguaca" will continue to resound throughout the rainforest of El Yunque.

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Photo © Roland Seitre

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Partners for Running Buffalo Clover Recovery

by Sarena M. Selbo



Running buffalo clover "on the move" to a safer home.

Photos by Sarena M. Selbo

In the space between forest and prairie, shade and sunshine, calm and disturbed, grows an unassuming endangered plant with historical ties to the buffalo (*Bison bison*). Running buffalo clover (*Trifolium stoloniferum*) once occurred over a broad area of the Midwest. Today, however, it survives only in small populations in Ohio, West Virginia, Kentucky, Indiana, and Missouri. The Fish and Wildlife Service listed this plant in 1987 as endangered.

The reasons for the decline of this species may be due to historic changes in land management. Running buffalo clover's relationship with buffalo is thought to have depended on the animal's habit of periodically disturbing areas and creating open habitat, as well as dispersing seeds. As buffalo were eliminated from much of the Midwest, their role in maintaining vital habitat disappeared. Fortunately, land management practices that maintain a somewhat open and disturbed habitat may prove beneficial for the recovery of this species.

Because running buffalo clover occurs in two fairly distinct habitat types

(shaded lawn and open woodland), management recommendations are required for both habitats. Lawn habitats include cemeteries, parks, and old home sites. Although these sites are frequently mowed, the clover appears to thrive under these conditions if seasonal restrictions are followed. Woodland

sites occur in mesic forests, often associated with streams and trails, where the clover is exposed to indirect sunlight. Management for invasive species such as Japanese honeysuckle (*Lonicera japonica*), wintercreeper (*Euonymus fortunei*), garlic mustard (*Alliaria petiolata*), and Amur honeysuckle (*Lonicera maackii*) is critical in both lawn and woodland sites.

In Ohio, recent recovery efforts for running buffalo clover have focused on transplantation and habitat management, and have involved federal, state, county, non-governmental organizations, and private partners. The Ohio Historical Society, Ohio Department of Natural Resources, Miami University, Hamilton County Park District, private botanists, and the Service recently teamed up to develop management recommendations for running buffalo clover in Ohio. Participants expressed concern over current inconsistencies in management practices and the need for improved guidelines. The Service then compiled recommendations to guide property owners and land managers in the management and recovery of this endangered species. Land managers in Ohio are hopeful that they now have the

Recovery partners moving running buffalo clover from a site slated for development to a new home at a state Nature Preserve.





tools to protect and recover this unique plant species.

Beyond directly protecting habitat for running buffalo clover, the Service is working closely with private landowners to conserve populations threatened by development. On Earth Day of 2003, a “transplant team” consisting of state biologists and land managers, as well as volunteers and Service biologists, moved 195 running buffalo clover plants, under an agreement with the

landowner and developer, to a nearby state natural preserve.

Along with our partners, we hope to continue efforts that lead to the recovery of running buffalo clover in Ohio and throughout its range. Maybe some day we can even bring back this endangered clover’s namesake.

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Recovery Planning for the White Abalone

by Melissa Neuman



Photo by Kevin D. Lafferty



NOAA photo

The white abalone (*Haliotis sorenseni*), a marine mollusk highly prized for its tender white meat, is native to the Pacific coast of North America from Point Conception, California, to Punta Abreojos in Baja California, Mexico. It was listed as an endangered species in 2001, primarily due to excessive take by commercial and recreational fisheries. The status review for this species estimated that only 1,600-2,300 white abalones remained and that, without intervention, the species would disappear by the year 2010.

The following threats, which were key factors identified in the final listing determination, continue to imperil white abalones:

- critically low levels of abundance (less than 0.1 percent of the estimated pre-exploitation population size), causing repeated recruitment failure and further population decreases;
- illegal take;
- habitat loss and increased susceptibility to disease through climate change;
- potential inadequacy of regulation for populations in Mexico; and
- hybridization with other species.

Recommendations for the best means of reducing or stopping these threats will be an important outcome of the recovery planning process.

The Southwest Regional Office of the National Oceanic and Atmospheric Administration (NOAA) Fisheries, located in Long Beach, California, began preparing a recovery plan for the white abalone in July 2002. It appointed a recovery team consisting of state (California Department of Fish and Game), federal (NOAA Fisheries, National Park Service), academic (University of

California at Davis and San Diego, University of Arizona, University of Washington), and not-for-profit organization (Channel Islands Marine Resource Institute, Carlsbad Aquaculture and Research Institute) scientists.

Since then, NOAA Fisheries and the recovery team have been working together to determine the scope of the plan and the appropriate level of public and private involvement in the planning process (for example, when and how to form implementation teams; how to involve commercial and recreational anglers; how many public meetings to hold; how to establish international partnerships). A recovery outline and terms of reference were drafted within six months after the formation of the recovery team, and these documents have helped form the framework for the recovery plan.

The major goals of the recovery plan are still under discussion. Preliminary drafts focus on the need to: 1) assess and monitor populations in the wild in cooperation with the state of California and with other federal agencies; 2) protect white abalone habitat; 3) rebuild



Photo © Ron McPeak

the white abalone population throughout its range by establishing a captive breeding and enhancement program; 4) investigate threats posed by disease; 5) create international partnerships; and 6) develop a public outreach plan.

The most challenging aspect of recovering white abalones will be to overcome the lack of basic biological information for this species. The habitat is remote (depths greater than 35 meters or 115 feet) and juvenile white abalones are cryptic. Therefore, estimates of fecundity, larval survival, larval dispersal distances, recruitment rates, growth

rates, and overall population size in the wild are either unknown or imprecisely known. The recovery plan will emphasize the need to identify critical research questions that must be answered to gain a better understanding of the basic ecological needs of white abalones and, ultimately, to ensure their survival.

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Recovery Champions

by Martha Balis-Larsen

*I*t often takes many individuals and organizations to accomplish the steps that move a threatened or endangered species away from the brink of extinction. Yet, it also takes the passion and dedication of individuals to promote and direct the action. To recognize some of the devoted biologists and leaders within the U.S. Fish and Wildlife Service, the Service established an Endangered Species Recovery Champions recognition

campaign in 2002. Recovery Champions are individuals who were nominated by their peers because their hard work and dedication is resulting in significant progress towards the recovery of threatened or endangered species.

“Recognition counts most when it comes from the people who most understand what you do, from those who know what it takes to accomplish great things in your field—the people you work with

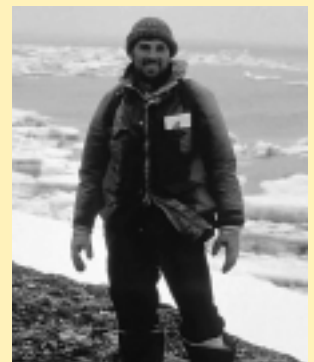
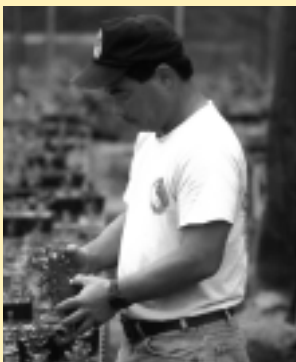
Ed Bangs
Paul Nickerson
Ron Refsnider
Robert (Bob) Currie



Paul Hartfield
Sarah Dawsey
Michael Amaral
Pam Thiel



Baron Horiuchi
Ralph Costa
Linda Laack
G. Vernon Byrd



every day," says Gary Frazer, the Service's Assistant Director for Endangered Species. "We are giving recognition that comes from a sincere understanding that accomplishing great things in endangered species recovery is the result of accomplishing a million small things through persistence, hard work, and the kind of energy that comes only from devotion to a cause."

A list of all the individuals recognized as 2002 Recovery Champions with

information describing their accomplishments is available on the Internet at <http://endangered.fws.gov/recovery/champions/index.html>. Some of them are pictured below. It is important to remember, though, that the designated Recovery CHampions are a small portion of the many hard-working Service employees dedicated to endangered and threatened species recovery throughout the Nation.



**Marie Bruegmann
Greg Balogh
Ted Swem
Dawn Zattau**



**Tom Augspurger
Alan Clark
Alison Whitlock
Craig Koppie**



**Billy Brooks
Joy Albertson
John Robinette
Linda Walker**

by Gary E. Peeples

Dick Biggins, Recovery Hero



Above and opposite page on top:
Dick Biggins was always ready to
plunge in when it came to restoring
aquatic species of the southeast.

Photo © Lynda Richardson

You wouldn't expect one of the Service's most accomplished biologists to readily share embarrassing stories about himself. Retired Fish and Mollusk Recovery Coordinator Dick Biggins is responsible for getting 29 rare species on the threatened and endangered list, and he enjoys talking about what's been accomplished for those species, but he'll just as easily and enthusiastically tell you about the time he had poison ivy on his posterior.

It's that kind of self-effacing humor that helped Dick form the partnerships and personal relationships that elevated him to "godfather" status with a hard-working cadre of aquatic biologists who work in the Tennessee and Cumberland River basins, the most aquatically diverse region in the United States.

In addition to getting 29 species listed, Dick has authored, coauthored, or served as project officer for 42 recovery plans. These plans are guiding the path to recovery for a total of 46 species, an impressive accomplishment. For his work, he was awarded the Department of the Interior's Meritorious Service Award, named a Fish and Wildlife Service Recovery Champion, and presented with the Lifetime Achievement Award from the Freshwater Mollusk Conservation Society. Not bad for a man who chose his graduate school partly because its curriculum didn't require a foreign language.

A "biocrat" is how Dick describes himself, having bridged the gap between biology and bureaucracy. He downplays his biological knowledge, deferring technical questions to others, saying that his talent lies in providing the vision—the big picture—and then bringing together teams of partners to pull it off.

"I saw that the real needs for aquatic species were habitat restoration, research into life history and threats, reintroductions, and outreach," he says, explaining his vision.

Throughout his 22-year career with the Service, Dick surrounded himself with qualified people working together to accomplish those goals. Thanks in part to his work, scientists at Virginia Tech University are propagating rare mussels in captivity; researchers with Conservation Fisheries, Inc., are rearing various species of rare fish for reintroduction; and the Tennessee Aquarium has a display on freshwater mussels.

About his success, Biggins says, "Once you get some funding and have some success, you can get more funding and have more success, and then you get seats at more tables and spread your message."

A quiet corner in the Great Smoky Mountains National Park is the site of his biggest accomplishment: the reintroduction of not one, but four, listed fishes into Abrams Creek.¹ After 17 years, three of the four species are

¹The four listed fish are the spotfin chub (*Cyprinella monacha*), yellowfin madtom (*Noturus flavipinnis*), smoky madtom (*Noturus baileyi*), and duskytail darter (*Etheostoma percnurum*).



Photo by Richard J. Neves

reproducing on their own in the wild, and the project has been expanded to the nearby Tellico River. That project involved the Fish and Wildlife Service, the National Park Service, the Forest Service, the Tennessee Wildlife Resources Agency, the North Carolina Wildlife Resources Commission, and the nonprofit Conservation Fisheries, Inc. As if the reintroduction of four fish species weren't enough, Biggins helped lay the groundwork for the reintroduction of 16 mussels and one snail into

the Muscle Shoals section of the Tennessee River.

"We can't do it all through regulation; we have to use education," says Biggins, and he has been heavily involved in education efforts. Over the years, he helped find financing a video and poster series about aquatic species, produced by Virginia Tech; photographed numerous aquatic species of the Southeast; put together slide shows about the Endangered Species Program; and developed a children's book entitled *Russell The Mussel*, just to name a few of his outreach projects. *(Editor's note: We're also very grateful for the many fine articles and photographs he has contributed over the years to the Endangered Species Bulletin.)*

Dick began his career as a sport fishery biologist with the Vermont Department of Fish and Wildlife, but game fish weren't that interesting to him. He tried working for the State of Utah on Lake Powell, but being 150 miles from a grocery store was more than his family could bear. Then, a contact he met at a party led to his first Fish and Wildlife Service job, a biologist in the Northeast Regional Office working on interagency consultations for activities affecting listed species.

In the 1970s while the snail darter (*Percina tanasi*) was focusing national

attention on the Tellico Dam on the Little Tennessee River, another dam project was threatening two listed mussels slightly to the west on the Duck River. One of the alternatives to jeopardy was to reintroduce one of the mussels into a tributary and restore habitat over a broad geographic range, including part of southwestern Virginia, which meant that the Service's Northeast Region would be involved. Dick Biggins was assigned to the project. It was then that he became acquainted with the Service's Asheville, North Carolina, Field Office and some of the regional players involved with imperiled aquatic species.

Dick eventually joined the Asheville Office as a listing biologist and later became the Fish and Mollusk Recovery Coordinator for the Tennessee and Cumberland River basins, a position he held until retirement. He was tempted once to leave Asheville to become the Endangered Species Coordinator for the Service's Southwest Region, but his kids didn't want to move to Albuquerque. He doesn't regret staying in the Southeast.

"We need good people to stay in the field, but we don't need people to stagnate," he says, warning about losing initiative and creativity. "But if you have a good thing going, stay where you are."

After a career in the country's most aquatically diverse area, what is Dick's favorite river? The Clinch River at Kyle's Ford. With characteristic enthusiasm, he says, "It's like a freshwater coral reef with all the fishes and mussels and snails." Sounds like a recovery hero in his element.

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Dick Biggins (left) and Steve Ahlstedt sort mussel samples.

Photo by Paul Johnson

“Sea Otter” and the Geese

by Bruce Woods



Once thought to be extinct, the Aleutian Canada goose responded well to the work of “Sea Otter” Jones and others. It is now recovered and off the threatened and endangered species list.

USFWS photo

Robert “Sea Otter” Jones first came to the Alaska’s Aleutian Islands while serving as a radar officer in the U.S. Army during World War II. He moved to Kodiak after the war, but turned his attention to the Aleutian archipelago again in 1948 when he joined the U.S. Fish and Wildlife Service as manager of the Aleutian Islands National Wildlife Refuge (see sidebar).

A skilled dory operator, Jones visited the remote reaches of the islands in his care, often landing on dangerous, surf-battered shorelines in the sturdy little work boats. His nickname dates back to the early 1950s, when Jones was involved in attempts to return northern sea otters (*Enhydra lutris kenyoni*), which had been driven nearly to extinction by the fur trade, to their former Aleutian range. Although these early efforts were unsuccessful, Jones’s work, and that of other Fish and Wildlife Service biologists (notably Karl W. Kenyon), set a course that would eventually lead to a strong recovery for the species, although it has since declined again significantly from undetermined causes.

Ironically, although the “Sea Otter” nickname stayed with him, one of the highlights of Jones’s career involved a different species: the Aleutian Canada goose (*Branta canadensis leucopareia*). These birds were also victims of the fur industry, although indirectly. In the mid-1700s, Russian fur traders first introduced nonindigenous foxes onto islands in the Aleutian chain. The predators thrived, feeding on local birds and their eggs, and eventually supported a rich fur industry. By 1936, foxes had been introduced to at least 190 islands in the Aleutians, and to more than 400 others

along Alaska’s coast. All of these islands fell within the sole breeding range of the Aleutian Canada goose. Unfortunately, the birds were particularly vulnerable to predation. For one thing, they are ground nesters, and their eggs and chicks were easy targets for the foxes. Furthermore, the adult birds are flightless during the molting season and, while on shore, are extremely vulnerable to predators during this period.

So hard did these introduced predators hit the Aleutian Canada goose population that not a single bird was observed in the Aleutians between 1938 and 1962. The little goose was thought to be extinct.

But “Sea Otter” Jones never gave up hope. As Vernon Byrd, now Supervisory Wildlife Biologist at the Alaska Maritime National Wildlife Refuge, tells it: “Bob thought there might be geese left somewhere. He understood that the reason the geese had declined was the introduction of foxes on their nesting islands. As a result, Bob started trying to take foxes off one island so, if he ever found geese, he could either restore them or they would come back on their own. That was really sort of the beginning of the recovery program.”

In 1962, Jones forced his dory through the surf and rocks to land on



Robert "Sea Otter" Jones

USFWS photo

Buldir Island. So hazardous was the approach to this remote piece of rock that it's believed foxes were never introduced to Buldir. It was here that Bob Jones found his Aleutian Canada geese. At the time, he estimated that this remnant population, which may have represented the world's entire population of Aleutian Canada geese, numbered no more than 300 birds. In 1967, the rediscovered goose was listed as endangered under the Endangered Species Protection Act of 1966, a precursor of today's Endangered Species Act.

The recovery process began quickly. In the 1970s, Service biologists began moving birds from Buldir to other islands from which, following Jones' plan, foxes had been eliminated. Thus began one of the most spectacular recoveries of a species ever accomplished. Protection of the birds on their California and Oregon wintering grounds, including hunting closures, the establishment of California's San Joaquin

National Wildlife Refuge in 1987, and partnerships with private landowners in the Pacific Northwest, who managed habitat on their own lands for the benefit of the geese, greatly aided the species' dramatic comeback.

By 2001, the estimated population of Aleutian Canada geese reached 37,000, with birds nesting throughout most of the species' former range. With that milestone reached, the goose was declared recovered and removed from the national list of endangered and threatened species.

"Sea Otter" Jones retired from the Service in 1980. He passed away in 1998, leaving, in both furred and feathered forms, a conservation legacy on refuge lands that few have ever equaled.

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The Aleutian Islands NWR eventually became part of the Alaska Maritime National Wildlife Refuge. Today, the Alaska Maritime NWR, which includes territory first placed under protection in 1892, consists of more than 2,400 islands, headlands, rocks, islets, spires, and reefs of the Alaskan coast. It reaches from Cape Lisburne on the Chukchi Sea to the tip of the Aleutians and eastward to Forrester Island on the border of British Columbia. The 4.5 million-acre (1.8 ha) refuge is a spectacular blend of tundra, rain forest, cliffs, volcanoes, beaches, lakes, and streams. Most of the refuge (2.64 million acres; 1.07 million ha) is wilderness.

A Plan for Hawaiian Plants and Their Ecosystems

by Marie M. Brueggemann



One of only about 1,000 remaining individuals of *Dubautia waialealae*

Photo by Marie Brueggemann

Members of the Hawaii and Pacific Plants Recovery Coordinating Committee:

Marie Brueggemann, U.S. Fish & Wildlife Service

Vickie Caraway, Hawaii Division of Forestry and Wildlife

Sam Gon III, The Nature Conservancy of Hawaii

Robert Hobdy, Division of Forestry & Wildlife, retired

James D. Jacobi, U.S.G.S. Biological Resources Division

Kapua Kawelo, U.S. Army, Oahu Natural Resources Program

Joel Lau, Hawaii Natural Heritage Program

Lloyd Loope, U.S.G.S. Biological Resources Division

Michael Maunder, Fairchild Botanical Garden

Clifford Morden, University of Hawaii at Manoa

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Robert Robichaux, University of Arizona

Nellie Sugii, Lyon Arboretum, University of Hawaii at Manoa

The native plants and animals of the Hawaiian Islands comprise one of the world's most remarkable examples of insular evolution. However, since colonization of these islands by humans, starting with the Polynesian voyagers over 1,500 years ago, and more recently following Western contact in 1778, most native ecosystems have been significantly altered. As a result, many native species have declined or become extinct. About 100 of the approximately 1,500 known native plant species are considered extinct, and 312 species or subspecies are listed as endangered or threatened by the Fish and Wildlife Service and the Hawai'i Department of Land and Natural Resources. Additionally, approximately 106 species are candidates for listing, and roughly 257 species are believed to be declining.

Time remains to save many of the native plant resources, but only by a concerted effort through a comprehensive

strategy that embraces conservation at both the species and ecosystem levels. The Service asked the Hawai'i and Pacific Plants Recovery Coordinating Committee (HPPRCC), the plant recovery team for the Pacific Islands Office, to develop such a strategy. This Hawaiian Plant Conservation Strategy is intended to provide guidance to the state's citizens, conservation agencies, and other interested parties about plant conservation issues and needs and assist them in coordinating within the broad strategy.

The Hawaiian Plant Conservation Strategy will consist of nine major components: 1) emergency *ex situ* (off site) and *in situ* (on site) actions; 2) species and ecosystem recovery actions; 3) quarantine and invasive species; 4) species and habitat monitoring; 5) field surveys; 6) research; 7) data management; 8) public outreach and education; and 9) capacity building, or increasing infrastructure and funding. *Bulletin 27(3): 8-11*



The dry forests of Hawai'i have been reduced to 90 percent of their original range. Major weed control efforts, restoration of common native species, and reintroduction of endangered species will be required to restore these ecosystems and species to some semblance of their former grandeur.

Photo by Marie Brueggemann

provides more detail on the types of emergency *ex situ* and *in situ* actions planned for Hawaiian plant species.

Part 1 of this plan, the Conservation Strategy, will identify those threats and issues that are common to all of the islands and affect the most species (such as habitat loss, control of harmful non-native species, fire management, and research needs) and address how to determine appropriate management using the nine components listed above. Part 2, the Implementation Plan, will provide a regional framework for identifying and prioritizing management/recovery actions. It will include action statements representing specific tasks needed to achieve the Plan's overall goals.

While emergency actions may prevent the extinction of species and provide short-term protection for critically endangered plants, large-scale habitat management is necessary for full recovery. The HPPRCC has taken the first step by identifying those habitats that are essential for the recovery of endangered, threatened, and candidate Hawaiian plant species. The next step will be to refine and prioritize the essential habitats and implement the necessary management actions. For example, montane bogs are extremely rare and fragile, and already have been the focus of many conservation efforts. In addition to habitat management, many species will require propagation and reintroduction efforts to achieve full recovery, as is discussed in *Bulletin* 23(6):4-5, 23(2/3):21-25, and 11(6):8-10 regarding the Mauna Kea and Mauna Loa silverswords (*Argyroxiphium* s. ssp. *sandwicense* and *A. kauense*).

Exclusion of new animal and plant invaders is another essential component for long-term protection and recovery of endangered species and Hawaiian ecosystems. The introduced two-spotted leafhopper (*Sophonia rufofascia*) and glory bush (*Miconia calvescens*) are particularly destructive examples of species that have recently entered Hawai'i with devastating consequences for the future of native plant resources.



***Miconia calvescens* is one of the major invasive plant species in Hawai'i, with the potential to replace essential habitat for endangered species recovery up in all tropical rain forest areas of Maui and Hawai'i to approximately 5,000 feet elevation within the next three to five decades.**

Photo by Mindy Wilkinson/State of Hawaii

Other components of the strategy, which include species and habitat monitoring, field surveys, research, data management, public outreach and education, and capacity building, are integral to achieving recovery. Species and habitat monitoring will help us determine whether our management actions are successful or else allow us to adapt new methods. Additional surveys are needed, particularly in the more rugged and inaccessible areas of Hawai'i, which we hope hold more populations.

Many aspects of plant conservation in Hawai'i are still poorly understood, and research will play a key role for conservation. While the major factors responsible for ecosystem decline are often known, effective and economical methods of controlling these factors are frequently elusive. Finding more efficient alien control methods would greatly reduce the funding needed to protect habitats. In addition, little is known about the pollinators and seed dispersers for most species, and even less is known about the role of each species in the overall function of the ecosystem.

The success of the conservation strategy ultimately depends on support from partners, both the public and the implementing agencies. The public

outreach and education components include increasing public exposure to the native plant species (both rare and common species), increasing public awareness of Hawaiian plant conservation problems and the consequences of further loss of these unique resources, and enlisting public support in refining and implementing this strategy.

The development of a conservation plan for such a widespread and diverse area as the Hawaiian Islands involves many steps. This plan, which should be completed soon, will identify the necessary components at all levels that are needed to develop and implement plant conservation in the Hawaiian Islands. Additional resources must be found beyond those currently available to the Service, and there must be a close coordination between the many different entities involved with the conservation effort. The HPPRCC's goal is to assist the Service in the development and implementation of this ambitious plan.

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by Kathryn Reshetiloff

An Unconventional Approach to Habitat Conservation



The bog turtle is one of North America's smallest turtles, measuring only 3-4.5 inches in length. It is recognized by its light brown to ebony shell and bright orange, yellow or red blotch found on each side of its head.

Photos by Scott A. Smith/Maryland Department of Natural Resources

Last year, biologists in the U.S. Fish and Wildlife Service's Chesapeake Bay Field Office tried something new to protect a rare reptile, the bog turtle (*Clemmys muhlenbergii*). They began their work one tree at a time. They were not saving the trees, however; they were getting rid of them. As Service biologists, they usually create habitat by *planting* trees and other vegetation. But trees and other invading vegetation are swallowing up the last remnants of bog turtle habitat in the northern portions of Carroll, Cecil, Baltimore, and Harford counties, Maryland.

Bog turtles are sparsely distributed from New England south to northern Georgia. A 250-mile (400-kilometer) gap within the range separates the species into distinct northern and southern populations. The northern population extends from southern New York and western Massachusetts southward through western Connecticut, New Jersey, and eastern Pennsylvania to northern Delaware and Maryland. The southern population occurs in the Appalachian Mountains from southwestern Virginia southward through western North Carolina, eastern Tennessee, northwestern South Carolina, and northern Georgia.

Bog turtles face a variety of threats, including habitat degradation and fragmentation from agriculture and urban development, illegal trade and collecting, and habitat succession due to invasive exotic and native plants. These problems led the Service to list the northern population, which is the more vulnerable, as threatened.

Open habitats dominated by grasses and sedges are ideal for the bog turtle. Unfortunately, red maple (*Acer rubrum*) and multiflora rose (*Rosa multiflora*) are invading bog turtle wetlands. The invading trees and shrubs kill the grasses and sedges through excessive shading and dry out the wetland through transpiration. The result is an even better seed bed for more red maple and multiflora rose. This rate of succession quickens because the red maple and multiflora rose absorb and transpire more water than the existing emergent vegetation. As a result, the wetlands become drier, which favors the natural regeneration of more red maple and multiflora rose.

Once red maple and multiflora rose dominate a wetland, the bog turtles have to relocate. Unfortunately, most bog turtle wetlands in Maryland are isolated, which means there are no safe corridors for these tiny turtles to seek out another habitat. A turtle may be crushed by a vehicle while crossing a road, killed by a





John Frederick and Lori Erb of the Maryland Department of Natural Resources survey a bog turtle site.

raccoon or dog, or starve to death while searching for suitable habitat.

The Maryland Department of Natural Resources has conducted two bog turtle surveys (1976 and 1992-93). In 1976, bog turtles inhabited 177 wetlands. By 1993, only 84 wetlands potentially contained viable populations of bog turtles.¹ This constitutes a 53 percent reduction in wetlands inhabited by bog turtles in 17 years. As more time passes, the rate of vegetational succession in these wetlands increases and the problem becomes more difficult to combat. With no aggressive vegetation control program, fewer than 42 wetlands will contain viable bog turtle populations by 2010, potentially pushing the bog turtle into

¹Smith, Scott. 1994. Report on the status of the bog turtle (*Clemmys mublenbergi*) in Maryland. Report to the U.S. Fish and Wildlife Service, Chesapeake Bay Field Office.

the endangered status. In response, the Service's Chesapeake Bay Field Office teamed up with the Maryland Department of Natural Resources and the National Fish and Wildlife Foundation to control invasive plants and conserve Maryland's bog turtle population.

To control invasive red maple and multiflora rose in bog turtle wetlands, Service biologists applied herbicides in six bog turtle wetlands. For red maples, capsules containing the product Garlon 3A were injected into the trunks of trees located on the perimeter of the wetlands. Red maples growing in the wetland proper were controlled with Rodeo (an herbicide approved for the use in water) by employing the "hack-and-squirt" method. Last year, nearly 40 acres (16 hectares) at six bog turtle sites were sprayed, eliminating almost all of the multiflora rose. Survival surveys of red

maples will be conducted late this summer. Maryland Department of Natural Resources biologists will continue management efforts this summer and fall.

To determine the effects of these treatments on bog turtles, biologists from the Service's Endangered Species and Partners For Fish and Wildlife programs are assisting the Maryland Department of Natural Resources with bog turtle surveys. Through status surveys, vegetation control, and land conservation easements, the Service will target its protection and management efforts to those areas with the best potential for providing future habitat for bog turtles.

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by Harry McQuillen

Progress in Riparian Brush Rabbit Recovery

Although it was once pervasive in the dense riverside forests of California's San Joaquin Valley, the riparian brush rabbit (*Sylvilagus bachmani riparius*) nearly disappeared in the 20th century as forests were cleared for farms and cities. With numbers estimated at fewer than 250 individuals in a single known population, biologists worried the subspecies might go extinct. It was listed as endangered in 2000. Now, however, a new captive-propagation program launched by the U.S. Fish and Wildlife Service and numerous partners is rearing rabbits for release into the wild, and the riparian brush rabbit is back, hopefully to stay.

One year into a five-year program, 49 pen-reared rabbits have been released at the San Joaquin River National Wildlife Refuge, and 28 remain alive and are reproducing. Of the 21 animals "missing in action," nearly half are confirmed to have answered their call of duty as prey for other wildlife. Over the

next four years, nearly between 80 and 100 rabbits a year will be raised and released into the wild to establish three self-sustaining populations in existing or restored habitat in the San Joaquin Valley. Thus far, we are extremely gratified by the results, but the road has not been easy.



Photo © B. Moose Peterson/WFP



Photo by Dan Williams

At first glance, it might seem pointless to recover an animal responsible for the cliché “breeding like rabbits.” However, the same challenges facing high-profile recovery efforts like the gray wolf (*Canis lupis*) or the California condor (*Gymnogyps californianus*) can also wreak havoc on a program with small, seemingly easy-to-work-with species such as the riparian brush rabbit.

Money has been tight. Funding is a continual struggle, not only to build and operate a captive-breeding facility but also to acquire and restore habitat. We have had other challenges as well. The program has spent time building productive relations with adjacent landowners, acquiring habitat from willing sellers, overcoming genetic and disease issues in a population that was dangerously small, and completing the necessary environmental and public review processes. The individuals and agencies involved worked together to find common ground, and they translated that into conservation action.

Our success would not have been possible without the cooperative effort of our partners, including the Bureau of Reclamation; California Department of Water Resources; California Department

of Fish and Game; Endangered Species Recovery Program at California State University, Stanislaus; private landowners; and even a Girl Scout troop from the nearby town of Ripon, California, which spent an afternoon planting tree saplings for our habitat-restoration effort. Strong partnerships resulting in action on the ground are what makes endangered species recovery exciting and successful.

The Bureau of Reclamation and the CALFED Bay-Delta Program, a consortium of two-dozen state and federal agencies working to improve water supplies and the environment, have provided much of the funding. The Bureau of Reclamation is providing about \$500,000 a year for the captive-breeding facility. CALFED has provided about \$4 million for habitat restoration, and we hope to receive additional funding later this year. We hope eventually to restore several thousand acres of riverside forest along the San Joaquin River and its tributaries. However, habitat restoration is expensive, so continued support for the program is fundamental to its long-term success.

Whether you are a biologist on the ground collecting field data, or a biologist working from an office trying

to hold a successful recovery program together, the message is the same: species vary, but recipes for successful projects often do not. Some species are easier to capture and handle, some are easier to breed in captivity, and some are just cuter. The problems associated with making their recovery successful, however, are generally the same, and they can be overcome. Strong partnerships, sufficient funding, some willingness to adapt, and a bit of luck have all served the riparian brush rabbit well, and these things can serve other recovery actions well, too. In the case of the riparian brush rabbit, the program has been a success. The bunny is back, and if things go as planned, select riverside forests in the San Joaquin Valley will be thick with riparian brush rabbits in a few short years.

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Stakeholders Unite for Flycatcher

by Christopher J. Botnick



A Southwestern willow flycatcher feeds its young.

USFWS photo by S. & D. Maslowski

Q: *What do you get when you cross 14 scientists from various disciplines, numerous Native American tribes, 15 federal agencies, and over 200 community representatives, including ranchers, farmers, water and power interests, environmental representatives, federal and state land managers, and local governments?*

A: *Possibly the most successful example of early stakeholder involvement translating into effective recovery action.*

At first blush, the obstacles to a meaningful recovery plan for the southwestern willow flycatcher (*Empidonax traillii extimus*) seemed insurmountable. Although numbering only 900-1,100 individuals, the flycatcher's range sweeps from the plains of west Texas to the California coast and from Mexico into the Rocky Mountains of Colorado and Utah. The listing of this bird as endangered ignited emotions across the southwest. Farmers and ranchers were opposed to regulations that they perceived might impede the productive use of their land. Environmental organizations and individuals weighed in on the benefits of biological diversity and conserving adequate habitat. Native Americans—the first inhabitants of the Western Hemisphere—feared seeing their tribal rights compromised by federal environmental law. Decisions on flycatcher recovery involved political jurisdictions across six states and necessitated coordination across Regions 1, 2, and 6 of the Fish and Wildlife Service.

Further complicating the process is the unique habitat of the flycatcher. The southwestern willow flycatcher depends upon one of the most critically endangered habitats in North America—south-

western riparian ecosystems—of which approximately four percent remain. While this habitat has always comprised a very small portion of the southwestern landscape, it is disproportionately important to wildlife and plants. Southwestern riparian ecosystems typically support far greater species diversity than the surrounding upland ecosystems, supporting many species of birds, mammals, fish, plants, reptiles, amphibians, and invertebrates. These valuable habitats and the species that depend on them are imperiled by the impacts of the region's rapid human population growth and dispersion. Destruction and modification of riparian habitats have been caused mainly by water diversions and groundwater pumping, dam and stream channelization, clearing of vegetation, livestock overgrazing, disruption of the natural hydrologic cycle, and the introduction of non-native plants. In the rapidly growing west, these trends could only be expected to continue.

Stuart Leon, the Service's Recovery Coordinator for Region 2, knew that the success of the recovery effort would require stakeholder involvement early in the planning process and throughout the flycatcher's range. Stuart and the scientists on the recovery team spent the better half of a year criss-crossing the southwest and meeting with various constituencies, many of whom initially mistrusted the Service and assumed that its representatives would not listen to their needs. The challenge was to overcome geographic, jurisdictional, and emotional obstacles to produce a plan that would lead to species recovery with buy-in from the stakeholders involved.

In 1997, the Service initiated a recovery planning process for the flycatcher

that ultimately would span five years. To organize and coordinate the effort, the recovery team established six recovery units (further subdivided into management units) based on watershed and hydrologic units within the bird's breeding range. Basing the organizational structure of the team on the biology of the flycatcher provided a means to characterize populations, structure recovery goals, and facilitate recovery actions that would closely parallel the physical, biological, and logistical realities on the ground. Further, the use of recovery and management units ensures that populations will be well distributed when recovery criteria are met.

To manage the myriad stakeholder interests, the Service established recovery team "subgroups," consisting of a technical subgroup, six implementation subgroups, and a tribal working group. The technical subgroup consisted of 14 academic science advisors, whose

function was to compile and review scientific information, develop recovery goals and strategies, and recommend recovery actions. The implementation subgroups consisted of more than 200 community representatives across the Southwest, including ranchers, environmental representatives, water and power interests, state and federal land managers, and local governments. The role of the implementation subgroups was to advise the Service's Regional Director and the technical subgroup on the feasibility of recommended recovery strategies, as well as to implement recovery actions on the ground.

The recovery team employed several creative ideas to help keep the various interests informed and involved. For example, the technical subgroup developed "issue papers" to address major issues involved in flycatcher recovery, such as cowbird parasitism, livestock grazing, tribal perspectives, fire manage-

ment, and invasive species. Once these issue papers were developed, they were posted to a mutually accessible website where stakeholders could comment on the research. This process allowed the recovery team members to incorporate feedback from stakeholders across the spectrum of interests.

The subgroup and issue paper approaches ensured the use of the best available science and addressed the major technical and logistical challenges to recovery before release of the draft recovery plan for public review. The public then was given 210 days to comment on the recovery plan. In response to public comments, the recovery team addressed 87 distinct issues in the final plan. For a conservation and recovery effort of such scope and complexity, this approach proved to be of great value.

Because of the effort to reach out broadly to the public, stakeholders on all sides gained a better understanding of the biology and needs of the flycatcher as well as the perspectives of others around the table. Stakeholders felt not only that they were better informed on the issues, but that their voices had been heard before the final recovery plan was released on March 5, 2003. As a result, stakeholders across the spectrum will be involved in the implementation phase of recovery. As Stuart Leon commented when reflecting on the effort, "Everyone who chose to participate in this process can find their influence in that plan."

"Fitz-bew! Fitz-bew!" Thanks to the cooperative efforts of hundreds of stakeholders, the commitment of participants on the recovery team, and flexibilities built into the Endangered Species Act, the sneezy song of the southwestern willow flycatcher may be heard for generations to come.

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Riparian habitat along the San Pedro River in southern Arizona

Photo by Jim Dick



CPR for Species

by Ann Carlson



USFWS photo

A Butterfly's Magical Reappearance

The Fender's blue butterfly pulled its own magic act. After being described in 1931, it disappeared for 50 years, only to reappear in the late 1980s. Endemic to native prairie habitats in the Willamette Valley, we now know the species exists in 16 small populations totaling fewer than 2,000 individuals. This endangered species is linked to several other prairie species. Its host plant, Kincaid's lupine, harbors eggs and is a larval food source. Adult butterflies feed on a suite of nectar-producing flowers, especially those from the lily family. The larvae have an interesting relationship with a variety of ant species. Fender's blue larvae have specialized glands that produce secretions rich in carbohydrates and amino acids that ants use as food. The ants, in return, provide the larvae protection from insect predators.

Kincaid's lupine is listed as threatened federally and by the state of Oregon. A native of the highly endangered western Oregon upland

*H*ave you ever wondered how to give CPR to a plant? Would it be easier with a butterfly? Yes, we are talking about resuscitating species in trouble. However, the abbreviation in this case stands for Cross Program Recovery. This program began when a Fish and Wildlife Service employee with broad ecological services experience became the manager of the Willamette Valley National Wildlife Refuge Complex in western Oregon.

Carol Schuler manages a complex of seven refuges throughout the Willamette Valley, which extends roughly from Portland to Eugene. With 17 listed species, 1 candidate, and 51 species of concern to support, Schuler wondered: "How can I stretch my refuge budget to manage all this?" Further complicating things, 70 percent of Oregon's population lives in the Willamette Valley, 96 percent is private land, and 16,000 stream miles (25,760 kilometers) wind through it. It was time, as they say, to "think outside the box."

Along with colleague Vicki Finn, Fisheries Resources Recovery Team

Leader for the Service's Pacific Northwest Region, Schuler began drawing together individuals from all walks of Service life. They established a Cross Program



Bradshaw's desert parsley

Photo by Aaron Drew



Willamette daisy

USFWS photo

Recovery (CPR) approach, a collaborative effort by the Service's Refuges, Fisheries, Ecological Services, Migratory Birds, and Federal Aid programs to benefit species. The goals include recovering listed species and conserving others to prevent the need for future listings. Focusing on wildlife refuge lands is a first step toward meeting these goals in the Willamette Valley.

The CPR team focused on seven listed species: Nelson's checker-mallow



Oregon chub
Photo by Jeff Ziller

(*Sidalcea nelsoniana*), Bradshaw's desert parsley (*Lomatium brashawii*), Willamette daisy (*Erigeron decumbens* var. *decumbens*), golden paintbrush (*Castilleja levisecta*), Fender's blue butterfly (*Icaricia icarioides fenderii*) and its host plant Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), and Oregon chub (*Oregonichthys crameri*). Success with these species seemed likely. They shared some positive attributes: they were isolated to smaller landscapes, and their biology, propagation methods, and habitat restoration techniques were known. The promise of success, however distant, galvanized the team.

Next, the team assessed threats and habitat. They prioritized ecological principles, such as focusing on habitat types rather than individual species and restoring native plant communities. Three habitat types common to the focal species needed CPR: oak savanna/upland prairie, wet prairie, and aquatic.

Along with all the usual recovery steps of reviewing plans, determining current species status, and identifying needs, the CPR team dug into the Service programs, partnerships, and funding available to see how each could be applied to recovering seven species on Refuge land. Each program had roles to play.

Recovering species does not happen after one valiant application of CPR. Time and persistence are key. Other hot tips from Schuler and Finn include:

- Ask partners, both internal and external, to take specific actions.
- Narrow research questions to what *must* be answered, and let the rest go.
- Use available programs.
- Secure recovery sites through acquisitions, easements, and "safe harbor" agreements.
- Use Service lands for recovery efforts.
- Use Refuge equipment instead of contracting.
- Use Refuges as test sites or seed sources.



Golden paintbrush
Photo by Ted Thomas

- Focus on recovery efforts that match the primary purposes of Refuges.
- Use all types of funding: base, partners, grants, agency programs.
- Start at the grassroots level with local employees and partners.
- Streamline programmatic section 7 coverage for Refuges.
- Be pragmatic! Simplify the strategy, focus on practical steps.

Once you have accomplished all of the above, please report back to the Willamette Valley CPR team. They are still figuring it out as they go along.

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prairie, most of the perennial's 57 sites are on private land. By examining lateral growth rings of this woody species, researchers estimate that some of the plants could be hundreds of years old. This trait historically provided stability for populations of Fender's blue butterflies, allowing them to persist at single locations for long periods. The threats facing both the Fender's blue butterfly and Kincaid's lupine include habitat loss, invasions of nonnative plants, and disruption of historic disturbance regimes. The Willamette Valley was burned prior to the 1900s by native Kalapuya Indians, preventing invasions of tall grasses, shrubs, and trees. Conservation and recovery efforts are focused on prescribed fire and weed control measures, and on linking known populations. Most of the existing sites function independently. Sites must be no more than a few kilometers apart to accommodate the flight distance of the Fender's blue butterfly and ensure genetic stability.

Partners in Butterfly Conservation

by Hillary Walker



Butterfly conservation often depends on plant conservation. The endangered Fender's blue butterfly depends for its survival on a rare plant, the Kincaid's lupine.
USFWS photo

When the American Zoo and Aquarium Association (AZA) and the Fish and Wildlife Service conceived of organizing the Butterfly Conservation Initiative (BFCI), it was, in many ways, a good idea because of the expertise that already existed within the conservation community as a whole. Several AZA zoos and aquariums have been committed to butterfly research, propagation, habitat protection, and public education for many years, and Service biologists have been responsible for butterfly recovery for nearly three decades. Much of this work has been done in concert with other conservation organizations dedicated to butterfly conservation and habitat protection. However, previous butterfly recovery efforts, while often significant, had yet to be organized under a common set of goals. "Disparate programs existed," says Dr. Michael Hutchins, Director/William Conway Chair for Conservation and Science at the AZA, "but we saw a great opportunity for coalition building."

Since 2001, BFCI has grown into an integrated network with an impressive toolbox of diverse skills. In addition to its 47 zoological facility members, the BFCI has attracted an impressive diversity of partners, including The Xerces Society, Environmental Defense, the National Wildlife Federation, the Service, and the AZA. Each bringing their own unique strengths to the table, these partners help shape and direct the future of the initiative.

The Xerces Society has long recognized the importance of butterflies and other invertebrates to ecosystems. Formed in 1971, the Society has worked for more than three decades on butterfly research and public education programs about

invertebrate conservation. "Butterflies and other invertebrates are the forgotten animals of the science and conservation world," says Xerces Society Executive Director Scott Hoffman Black. "[BFCI is an] extremely important partnership and very mission-oriented for us." The Xerces Society contributes both a long history of butterfly conservation action and strong leadership skills to the coalition. Xerces is contributing to the development of the BFCI strategic plan, which will help all of the partners work together, each utilizing their own strengths. They are also working on developing a matrix of needs that will serve as a roadmap for which species need assistance and what BFCI members and partners can do to aid their recovery. This "needs matrix" will pull together information on butterflies in every state in the union, as well as Canada. It will not focus solely on federally listed butterflies, but will also identify at-risk species before they need to be listed. The matrix will be a tremendous benefit to the AZA's initiative members, as the data will cover every region in which AZA-accredited zoos and aquariums are located.

Environmental Defense is a nonprofit organization that works through science, business, and law to pursue environmental goals. While the Xerces Society has experience focusing solely on invertebrate causes, Environmental Defense has, for over 30 years, pursued a wide range of environmental issues—from pesticide use, to global warming to endangered species. "We have a long-standing interest in the conservation of endangered species," says Michael Bean, Chair of Environmental Defense's Wildlife program. "Because butterflies have seldom gotten the attention of



The ugly reality of extinction: Xerces blue butterflies now exist only as museum specimens. Through the Butterfly Conservation Initiative, other species may be spared this fate.

Photo © the Xerces Society

other larger or more charismatic species in conservation efforts, we wanted to be part of this effort.” With its extensive experience working with endangered species conservation, private landowners, and Endangered Species Act issues, Environmental Defense brings many assets to the BFCI. In fact, to encourage BFCI members to work with local private landowners on butterfly conservation, Environmental Defense has made available a competitive grant that will fund a BFCI member-initiated project that focuses on private land issues. “We hope to take advantage of the good will most zoos have with landowners in their communities to involve them in conservation” says Bean.

The National Wildlife Federation (NWF), a member-supported conservation

group, also hopes to join forces with AZA institutions to further the goals of BFCI. Prior to becoming a partner in the Initiative, NWF was involved in other programs that aided butterflies. “We are very concerned about pollinator declines,” says Dr. Gabriela Chavarria, Director of Policy for Wildlife Management for NWF. “We were interested in BFCI because it was species-specific.” Like Environmental Defense, NWF brings to the table policy experience, including work with the Endangered Species Act. It sits on BFCI’s policy board and hopes to be very active in the directions BFCI takes.

In addition, NWF is very active in education programs. Efforts like NWF’s Backyard Wildlife Habitat™ Program provide community outreach while creating new habitat for butterflies and

other animals. Accordingly, NWF staff members are great resources for education and outreach planning in BFCI. The NWF sees working in the coalition as a great opportunity to partner and share education resources with other members of the BFCI, including AZA member zoos and aquariums.

As a founding partner, the Service is an integral part of BFCI’s work. Without the recovery authority and expertise of Service biologists, BFCI’s efforts to support butterfly conservation would lack direction. By working with each Service region and the recovery teams charged with restoring threatened populations and habitat, BFCI members can contribute to priority projects. Opportunities abound for further collaborations between BFCI members and partners and Service.

In many ways, AZA sees its role in the BFCI as similar to its job with members: to facilitate and promote the work of its partners, in this case the many organizations that already do such vital work on behalf of endangered and threatened butterflies. Through its administrative role, the AZA has brought the strengths of its partners together and focused them toward the collective goal of butterfly conservation. AZA’s membership encompasses many institutions that have butterfly exhibits or ongoing research projects, have extensive knowledge about specific butterfly species, have access to butterfly habitat, or have experience getting volunteers from the community involved in conservation. One of the best things about butterfly conservation is that people can get directly involved in their own backyards.

From government agencies to butterfly experts to private landholders and gardeners to the smallest AZA-accredited member, everyone can help BFCI meet its goal of recovering not just currently endangered butterflies, but those that can be saved from ever landing on that list.

Hillary Walker is a Public Affairs Program Assistant for the AZA. This article is reprinted with permission from the AZA’s June 2003 Communiqué.

From January through June of 2003, the Fish and Wildlife Service published the following proposed and final rules in accordance with the Endangered Species Act (ESA). The full text of each action can be found through our website: <http://endangered.fws.gov>.

Proposed Listing Rules

California Tiger Salamander (*Ambystoma californiense*) We proposed on May 23 to list the central California distinct population segment (DPS) of the California tiger salamander—which is at risk from habitat loss, nonnative species and other threats—as threatened. At the same time, we proposed a special rule to exempt current routine ranching activities from the prohibitions of the ESA because they are consistent with conservation of the California tiger salamander.

In addition, we will be reviewing in this rulemaking the relationship between the central California tiger salamander and the listed Sonoma and Santa Barbara DPSs of the species to determine whether there may be more appropriate configurations for listing, such as listing it rangewide as one entity. Accordingly, we are also proposing to reclassify the Santa Barbara and Sonoma populations from endangered to threatened and to extend the special rule to these areas as well.



California tiger salamander
Photo © B. Moose Peterson/WRP

The Santa Barbara County DPS was listed as endangered in 2000. The Sonoma County DPS was designated temporarily as endangered under an emergency ESA action last year, and in March 2003 we issued a final rule listing the DPS as endangered.

The California tiger salamander is a large, stocky, terrestrial salamander with small eyes and a broad, rounded snout. Its habitat includes vernal pools and other seasonal ponds, as well as nearby grasslands and oak savannahs.

Final Listing Rules

Scotts Valley Polygonum (*Polygonum bickmanii*) On April 8, we listed this plant, a small annual in the buckwheat family (Polygonaceae), as endangered. It is at risk of extinction because of habitat damage caused by erosion, soil compaction, habitat fragmentation, disturbance by people and pets, yard waste dumping, and introduction of nonnative species.

The Scotts Valley polygonum, which is native to Santa Cruz County, California, produces white flowers and reaches a height of only two inches (five centimeters). About 11 colonies of the plant are found in two locations in the northern area of the city of Scotts Valley, along with other locally rare plant species. It grows on “wildflower fields,” or small patches of herbs growing on thin soil interspersed in more extensive grassland habitat. As part of the listing rule, we designated about 287 acres (116 hectares) as critical habitat.

Smalltooth Sawfish (*Pristis pectinata*) On April 1, the National Oceanic and Atmospheric Administration—Fisheries, an agency in the U.S. Department of Commerce that has lead ESA jurisdiction for most marine species, determined that the Distinct Population Segment (DPS) of the smalltooth sawfish in the U.S. should be listed as endangered. Threats to this fish include overfishing, pollution of coastal waters, and loss of wetland and estuarine habitats.

Proposed Reclassification

Missouri Bladderpod (*Lesquerella filiformis*)

The Missouri bladderpod is an annual plant in the mustard family (Brassicaceae) about eight inches (20 centimeters) tall with bright yellow flowers that bloom in late April or early May. The species is found in the shallow soils of limestone glades in Christian, Dade, Greene, and Lawrence counties in southwestern Missouri, and at one site in Washington County, Arkansas. It has also been discovered on one dolomite glade in Izard County, Arkansas. The Missouri bladderpod was listed in 1987 as endangered. Threats to this species include overgrazing, urban development, and lack of management of its glade habitat to control encroachment by woody plants and aggressive nonnative pasture grasses. A recovery plan was completed in 1988.



Missouri bladderpod
Photo by Jim Rathert/Missouri Department of Conservation

On June 10, 2003, we proposed to reclassify the Missouri bladderpod from endangered to threatened. Some of the factors leading to the plant's improved status have been successful management techniques to enhance and protect existing populations, landowner contact programs, expansion of existing populations, and discovery of new populations. We will continue to work towards our goal of complete recovery and delisting for the Missouri bladderpod.

Final Reclassification

Gray Wolf (*Canis lupus*) On April 1, a steadily growing gray wolf population in the western Great Lakes states and a highly successful reintroduction program in the northern Rocky Mountains prompted us to change the status of gray wolves in these areas from endangered to the less serious category of threatened under the ESA.

The reclassification rule establishes three DPSs for gray wolves. The three DPSs encompass the entire historic range of the gray wolf in the lower 48 states and Mexico, and correspond to the three areas of the country where there are wolf populations and ongoing recovery activities.

Wolf populations in the Eastern and Western DPSs have achieved population goals for recovery, and we will soon begin work to propose delisting these populations.

The threatened designation, which now applies to all gray wolves in the lower 48 states except for those in the Southwest, is accompanied by special rules to allow some take of wolves outside the experimental population areas in the northern Rocky Mountains. Under the ESA, these rules provide options for removing wolves that cause problems for livestock owners and other people affected by wolf populations. Such rules are possible for threatened species but not for those designated as endangered. Wolves in experimental population areas in the northern Rocky Mountains are already covered by similar rules that remain in effect.

We will begin the process of proposing to remove gray wolves in the western and eastern United States from the endangered and threatened species list once we have determined that all recovery criteria for wolf populations in those areas have been met and sufficient protections remain in place to ensure sustainable populations. Gray wolf numbers in the western Great Lakes—estimated at more than 2,445 in Minnesota, 323 in Wisconsin, and 278 in Michigan—have climbed beyond recovery plan goals for wolves in the eastern U.S. In the Rocky Mountains, there are an estimated 664 wolves in 44 packs in northwestern Montana, Idaho, and in and around Yellowstone National Park. This is the third year the population has been at or above 30 breeding pairs, meeting the recovery plan goals for number and distribution in the west.

To delist the wolf, various recovery criteria must be met in addition to reaching population goals. Among those criteria are requirements to ensure continued survival of the gray wolf after delisting. This will be accomplished through management plans developed by the states and tribes. Once delisted, the species will no longer be protected by the ESA. At that point, individual states and tribes will resume management of gray wolf populations, although the Service will conduct monitoring for five years after delisting to ensure that populations remain secure.

In addition to reclassifying gray wolves in most states from endangered to threatened, the final rule establishes three DPSs for wolves. The Eastern DPS includes all Midwestern and Northeastern states, and the wolf populations in Minnesota, Wisconsin, and Michigan. The new rule did not change the status of wolves in Minnesota, where they were already listed as threatened.

The Western DPS includes all of Montana, Wyoming, and Idaho, along with Washington, Oregon, California, Nevada, northern Colorado, and northern Utah.

The Southwestern DPS includes all of Arizona and New Mexico, southern Colorado and southern Utah, portions of western Oklahoma, and Mexico.

This DPS will retain the status of endangered; the nonessential experimental population designation in Arizona, New Mexico, and a small portion of Texas, remains unchanged. This new rule does not affect the status or management of gray wolves in the Southwest.

Proposed Delisting

Johnston's Frankenia (*Frankenia johnstonii*) We proposed on May 22 to remove this plant—a low-growing, grayish-green perennial shrub native to southern Texas and adjoining areas in Mexico—from the federal list of endangered and threatened species. Recovery efforts have led to a new understanding of how the plant grows and where it can be found. Thanks to partnerships forged with area landowners, many previously unknown populations have been found in Texas and several new populations were observed in Mexico.

Both federal and state funds have been used to fund recovery efforts for Johnston's frankenia. Under the Service's recovery plan, we formed partnerships with the Texas Parks and Wildlife Department, Southwest Texas State University, and various county governments. Progress in implementation of the recovery plan has made it possible to propose delisting the species. This progress includes: 1) establishing conservation agreements between at least 10 private landowners and the Texas Parks and Wildlife Department; 2) acquiring Johnston's frankenia habitat for inclusion in the Lower Rio Grande Valley National Wildlife Refuge; 3) monitoring the status of Johnston's frankenia populations since 1993; 4) studying the species' habitat requirements, life history and population biology; 5) conducting surveys to find additional populations; and 6) launching a public outreach campaign about the species to establish good working relationships with private landowners. Service-funded surveys located additional populations and extended the species' range to include Webb, Zapata, and Starr counties in Texas and the Mexican states of Coahuila and Tamaulipas

Listing Withdrawal

Flat-tailed Horned Lizard (*Phrynosoma mcallii*) On January 3, we withdrew our earlier proposal to list this reptile as threatened, based on a determination that listing is not warranted at this time under the terms of the ESA. The threats to the species and its habitat identified in the proposed rule are not as significant as earlier believed, and current data do not indicate that the threats are likely to endanger its existence within the foreseeable future. This species is restricted to the Sonoran Desert in parts of southern California, southwestern Arizona, and adjoining parts of the Mexican states of Sonora and Baja California.

Critical Habitat

Critical habitat, as defined in the ESA, is a regulatory term for a specific area that contains physical and biological factors that are essential for the conservation of a listed species. Critical habitat designations do not establish a wildlife refuge, wilderness area, or any other type of conservation reserve, nor do they affect actions of a purely private nature. They are intended to delineate areas in which federal agencies must consult with the Service to ensure that actions these agencies authorize, fund, or carry out do not destroy or adversely modify the designated critical habitat. Within designated critical habitat boundaries, federal agencies are required to consult except in areas that are specifically excluded, such as developed areas within the boundaries that no longer contain suitable habitat. Maps and more specific information on critical habitats actions listed below are contained in the specific *Federal Register* notice designating each area. For more information on critical habitat designations in general, go to the website for our Endangered Species Listing Program (<http://endangered.fws.gov/listing/index.html>) and click on "About Critical Habitat."

Final Critical Habitat Designations

Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*) We designated critical habitat on June 23 for this threatened subspecies, which has an extremely long tail, large hind feet, and long hind legs. The designation includes 8 habitat units totaling approximately 31,222 acres (12,632 hectares) found along 360 miles (578 kilometers) of rivers and streams in the states of Colorado and Wyoming. It includes river and stream reaches and adjacent areas in the North Platte and South Platte rivers.

Ninety-nine O'ahu Plants On June 17, we designated critical habitat for 99 threatened and endangered plant taxa known historically from the Hawaiian island of O'ahu. The approximately 55,040 acres (22,274 ha) are within the island's Ko'olau and Wai'anae mountains.

Blackburn's Sphinx Moth (*Manduca blackburni*) We designated critical habitat on June 10 for the endangered Blackburn's sphinx moth, Hawaii's largest native insect. The designation encompasses a total of approximately 55,450 acres (22,440 ha) within the boundaries of nine units on the islands of Hawai'i, Kaho'olawe, Maui, and Moloka'i.

Five NW Hawaiian Plants We designated critical habitat on May 22 for five Hawaiian plant species on three small northwestern Hawaiian islands. All three islands—Nihoa, Necker, and Laysan—are federal lands within the Hawaiian Islands National Wildlife Refuge. Managed by the Service, access to these remote islands is by permit only.

Three of the plant species—*Amaranthus brownii*, *Pritchardia remota* or loulou, and *Schiedea verticillata*—are found only on the northwestern Hawaiian islands. The other two—*Mariscus pennatififormis* and *Sesbania tomentosa*—are also found on one or more of the main Hawaiian islands.

Sixty Hawaiian Plants On May 14, we designated critical habitat for 60 listed plant species known historically from the Hawaiian islands of Maui and Kaho'olawe. Approximately 93,200 acres (37,717 ha) on the island of Maui and 2,915 acres (1,180 ha) on the uninhabited island of Kaho'olawe fall within the boundaries of the 139 critical habitat units designated for the 60 species.

Two Kaua'i Cave Animals On April 9, we designated critical habitat for the Kaua'i cave wolf spider (*Adelocosa anops*) and the Kaua'i cave amphipod (*Spelaeorchestia koloana*), two eyeless invertebrates adapted to life underground. The designation covers 14 units whose boundaries encompass an area of approximately 272 acres (110 ha) on the Hawaiian island of Kaua'i.

Seven Texas Cave Animals We designated critical habitat on April 8 for seven species of cave-dwelling invertebrate species found in Bexar County, Texas, that are endangered primarily due to groundwater pollution. The critical habitat designation totals approximately 1,063 acres (431 ha) in 22 units.

Keck's checkermallow (*Sidalcea keckii*) On March 18, we designated three sites totaling 1,085 acres (438 ha) in Fresno and Tulare counties, California, as critical habitat for an endangered wildflower, Keck's checkermallow.

Forty-one Moloka'i Plants Also on March 18, we designated critical habitat for 41 threatened and endangered species of plants on the Hawaiian island of Moloka'i. The 88 distinct units total 24,333 acres (9,848 ha).

Two Northern California Plants On March 19, we designated critical habitat for Baker's larkspur (*Delphinium bakeri*) and the yellow larkspur (*Delphinium luteum*) in Marin and Sonoma counties, California. The total critical habitat for both plants is approximately 4,353 acres (1,762 ha) within 6 distinct units.

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) On March 29, we designated portions of the following Gulf of Mexico rivers and tributaries as critical habitat for a threatened species of fish, the Gulf sturgeon: Pearl and Bogue Chitto rivers in Louisiana and Mississippi; Pascagoula, Leaf, Bouie (also referred to as Bowie), Big Black Creek and Chickasawhay rivers in Mississippi; Escambia, Conecuh, and Sepulga rivers in Alabama and Florida; Yellow, Blackwater, and Shoal rivers in Alabama and Florida; Choctawhatchee and Pea rivers in Florida and Alabama; Apalachicola and Brothers rivers in Florida; and Suwannee and Withlacoochee rivers in Florida.

The designation also includes portions of the following estuarine and marine areas: Lake Pontchartrain, Lake Catherine, Little Lake, The Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the adjacent state waters within the Gulf of Mexico; Pensacola Bay system in Florida; Santa Rosa Sound in Florida; nearshore Gulf of Mexico in Florida; Choctawhatchee Bay system in Florida; Apalachicola Bay system in Florida; and Suwannee Sound and adjacent state waters within the Gulf of Mexico in Florida. These geographic areas encompass approximately 1,730 river miles (2,784 km) and 2,333 square miles (6,042 square km) of estuarine and marine habitat.

Eighty-three Hawaiian Plants On February 27, we designated critical habitat for 83 endangered and threatened plant species from the Hawaiian islands of Kaua'i and Ni'ihau. The designation included 52,549 acres (21,265 ha) on Kaua'i, and 1 unit of 357 acres (144 ha) on Ni'ihau.

Rio Grande Silvery Minnow (*Hybognathus amarus*) On February 19, we designated 157 river miles (253 km) of the middle Rio Grande in New Mexico as critical habitat for an endangered fish, the Rio Grande silvery minnow.

Three Lana'i Plants On January 9, we designated critical habitat for three listed plant species known historically from the Hawaiian island of Lana'i: *Bidens micrantha* ssp. *kalealaba*, *Portulaca sclerocarpa*, and *Tetramolopium remyi*. A total of approximately 789 acres (320 ha) of land on Lana'i fall within the boundaries of the six critical habitat units designated for the three species.

Proposed Critical Habitat Designations

Five Southeastern Mussels We proposed on June 3 to designate critical habitat in for five endangered species of freshwater mussels. The designation would include portions of rivers and streams totaling some 544 miles (875 km) in Alabama, Mississippi, Tennessee, Virginia, and Kentucky.

Braun's Rock-cress (*Arabis perstellata*) Also on June 3, we proposed to designate critical habitat for Braun's rock-cress, an endangered herb in the mustard family. The proposal calls for the designation of 20 upland areas, totaling approximately 1,008 acres (408 ha), in Kentucky and Tennessee.

Coastal California Gnatcatcher (*Polioptila californica californica*) We published a revised proposal on April 24 to designate approximately 495,795 acres (200,650 ha) in 13 units of land in portions of Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties as critical habitat for a threatened bird, the coastal California gnatcatcher.














San Diego Fairy Shrimp (*Branchinecta sandiegonensis*) On April 22, we published a revised proposal to designate critical habitat for this endangered crustacean. The proposed designation would cover approximately 6,098 acres (2,467 ha) in Orange and San Diego counties.

Eight Southeastern Mussels We proposed on March 26 to designate critical habitat in 26 river and stream segments within the Mobile River Basin for 11 endangered and threatened mussel species. These segments encompass a total of approximately 1,093 miles (1,760 km) of river and stream channels. The proposed critical habitat includes portions of the Tombigbee River drainage in Mississippi and Alabama; portions of the Black Warrior River drainage in Alabama; portions of the Alabama River drainage in Alabama; portions of the Cahaba River drainage in Alabama; portions of the Tallapoosa River drainage in Alabama and Georgia; and portions of the Coosa River drainage in Alabama, Georgia, and Tennessee.

Desert Yellowhead (*Yermo xanthocephalus*) We proposed on March 14 to designate 360 acres (160 ha) of federally managed lands in the Beaver Rim area of Fremont County, Wyoming, as habitat critical for the desert yellowhead, a threatened plant in the sunflower family (Asteraceae).

BOX SCORE

Listings and Recovery Plans as of December 31, 2003

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	U.S. SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	65	251	9	17	342	55
 BIRDS	78	175	14	6	273	77
 REPTILES	14	64	22	15	115	33
 AMPHIBIANS	12	8	9	1	30	14
 FISHES	71	11	43	0	125	95
 SNAILS	21	1	11	0	33	23
 CLAMS	62	2	8	0	72	64
 CRUSTACEANS	18	0	3	0	21	13
 INSECTS	35	4	9	0	48	31
 ARACHNIDS	12	0	0	0	12	5
ANIMAL SUBTOTAL	388	516	128	39	1,071	410
 FLOWERING PLANTS	569	1	144	0	714	577
 CONIFERS	2	0	1	2	5	2
 FERNS AND OTHERS	26	0	2	0	28	28
PLANT SUBTOTAL	597	1	147	2	747	607
GRAND TOTAL	985	517	275	41	1,818*	1,017

TOTAL U.S. ENDANGERED: 985 (388 animals, 597 plants)

TOTAL U.S. THREATENED: 275 (128 animals, 147 plants)

TOTAL U.S. LISTED: 1,260 (516 animals**, 744 plants)

* Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, chimpanzee, leopard, Stellar sea-lion, gray wolf, piping plover, roseate

tern, green sea turtle, saltwater crocodile, 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.

** Nine animal species have dual status in the U.S.

ENDANGERED Species BULLETIN

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

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