

# ENDANGERED *Species* BULLETIN

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*From the spectacular comeback of the peregrine falcon to the restoration of rare plant communities, a growing number of endangered species recovery efforts are meeting with success. The key is creating effective partnerships. Recovery progress is due to the efforts of not only State and Federal scientists but also landowners, local agencies, private organizations, and concerned citizens. In the case of the peregrine, for example, organizations like the Peregrine Fund, with support from the Fish and Wildlife Service, propagated and released about 6,000 falcons over several decades, some on private lands and others at protected sites on public property. This edition of the Endangered Species Bulletin takes a look at how such partnerships make a difference in species recovery.*

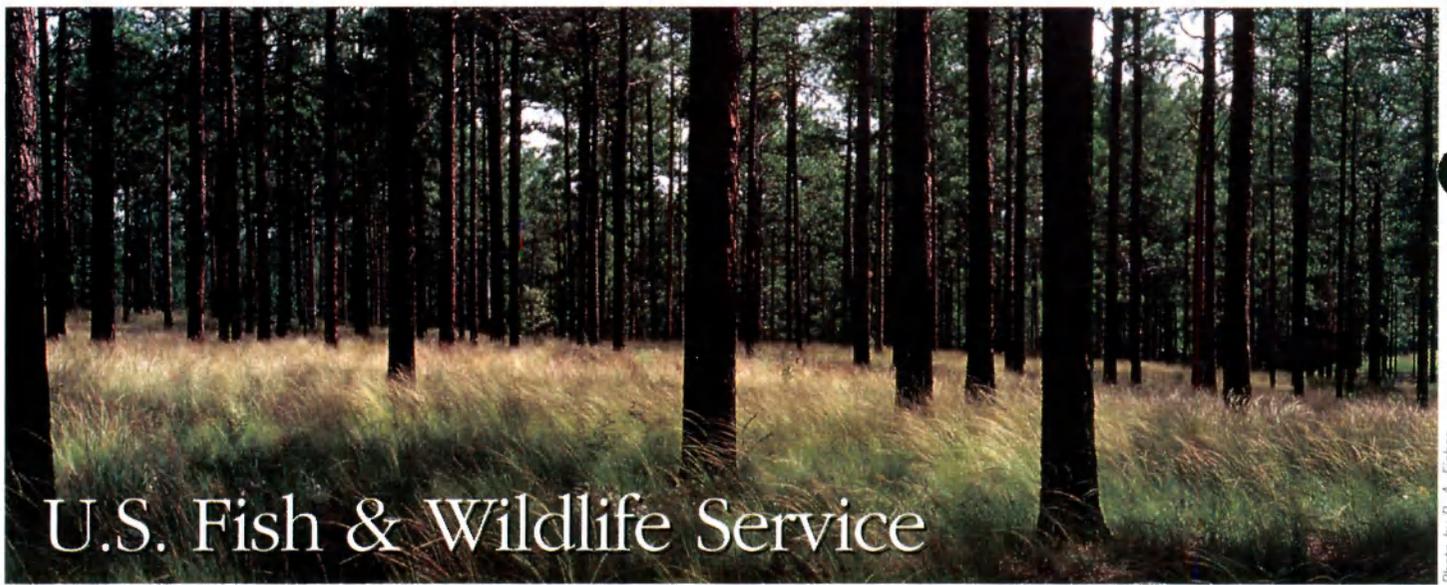


Photo by R. A. Fisher

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**On the Cover**

The dramatic comeback of the American peregrine falcon was made possible by captive-propagation and release of young birds, the protection of nesting sites, and the ban on DDT.

Photo by B. Moose Peterson/WRAP©

**Oppositepage**

Longleaf pine forest, habitat of the endangered red-cockaded woodpecker



*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.*

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by Jack Arnold

# Partners for *Fish and Wildlife*: A New Name for a Growing Program



**Clubshell mussel**

Photo by Craig Stihler/West Virginia  
Division of Natural Resources

**One recent example of the Partners For Fish and Wildlife Program began in 1994, when the FWS New York Field Office launched a project with the Central and Western New York Chapter of The Nature Conservancy to preserve and enhance French Creek. This stream, which originates in the foothills of the Allegheny Plateau in the southwestern corner of New York State, is one of the most biologically**

*French Creek before restoration*



Approximately 70 percent of the land in the United States is in private ownership. Consequently, a large proportion of the Nation's fish and wildlife are directly affected by the manner in which those lands are used. The U.S. Fish and Wildlife Service (FWS) has been working with private landowners to voluntarily restore and protect fish and wildlife habitats on their properties since 1987 through a program now called Partners for Fish and Wildlife.

The Partners for Fish and Wildlife Program began with an emphasis on restoring wetlands. From the humble start of restoring approximately 2,000 acres (810 hectares) of wetlands in 1987, the program has grown to include native prairie, riparian corridor, and in-stream habitat restoration. For example, in 1997, a total of 33,000 acres (13,350 ha) of wetlands, 53,000 acres (21,450 ha) of

native prairie/grasslands, and 450 miles (725 kilometers) of riparian corridors and in-stream habitats were restored through the program. Since the program's inception, an even more remarkable list of accomplishments has emerged. Over a decade, the Partners program has engaged in over 17,500 cooperative habitat restoration agreements with private landowners, and has restored over 363,000 acres (146,900 ha) of wetlands, 282,000 acres (114,125 ha) of prairie grassland, and 1,600 miles (2,575 km) of riparian and instream habitats for wildlife.

To better reflect the program's breadth and diversity, and to emphasize the watershed and ecosystem approach to conservation the FWS is taking to restore important habitats, the program's name was changed in February 1998 from Partners for Wildlife to Partners for Fish and Wildlife.

The Partners for Fish and Wildlife Program provides both technical and financial assistance to private landowners for restoring the native habitats of Federal trust species—endangered and threatened species, migratory birds, and certain fish and other aquatic species. The purpose of the program is twofold: 1) to make a significant contribution to improving fish and wildlife habitats on private lands by implementing “on-the-ground” habitat restoration projects, and 2) to directly assist private landowners in good stewardship of their lands.

The program operates on a strictly voluntary basis. No funds are provided for purchase, rent, lease, or incentive

payments for use of the land for habitat projects. Rather, in exchange for an agreement from the landowner to maintain the habitat project for a specific period of time (at least 10 years, and often longer), the FWS will provide assistance to the landowner in completing the project. The landowner agrees to maintain the project according to the terms of the cooperative agreement but otherwise retains full control of the land. Habitat projects emphasize, to the extent practical, restoration of lost and degraded native habitats to their original ecological communities.

The FWS has been extremely successful in leveraging Partners for Fish and Wildlife Program funds with those from other government agencies, industries, conservation groups, Tribes, and private landowners to make the program more cost-effective. While no minimum cost share is required, the FWS established a goal of obtaining 40 percent of the cumulative project costs from non-Federal sources. To date, the FWS has exceeded this goal by leveraging almost 60 percent of project costs from these other sources. Such partnerships have allowed the various participants to accomplish far more together than would have been possible working on the projects separately.

The Partners for Fish and Wildlife Program is being implemented in every State. For more information about obtaining technical or financial assistance, or if you wish to become a Partner, contact the coordinator for your region (or State) from the following list.

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*Jack Arnold is a Wildlife Biologist with the Partners for Fish and Wildlife Program in the FWS Arlington, Virginia, Headquarters Office.*

**Approximately 1.5 miles (2.4 km) of high tensile wire fencing was constructed along French Creek by the New York Field Office's Partners For Fish and Wildlife Program. The fencing allowed riparian vegetation along the creek to recover.**

*Photos by Susan McAlpine*

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diverse aquatic systems in the northeast. The 1,200 square mile watershed, designated as one of the "Last Great Places" by The Nature Conservancy, is home to 66 species of fish and 25 species of mussels. It supports 98 rare or endangered species of plants and animals, including the clubshell mussel (*Pleurobema clava*) and the northern riffleshell mussel (*Epioblasma torulosa rangiana*).

Thus far, the partnership has fenced over 3 miles (4.8 km) of French Creek for four willing landowners in order to limit cattle access along the stream banks. Studies have shown that intensive livestock use of riparian areas can have detrimental effects on the physical, chemical, and biological characteristics of streams. In addition, herd health has been shown to improve when livestock use of wet, marshy areas is limited or completely restricted. The fencing along French Creek allows vegetation to grow, which stabilizes the stream banks. As a result, landowners, livestock, fish, and wildlife all benefit.

*French Creek after restoration*



# Partnerships Take Flight

by Kurt Waterstradt



**The male and female of this small butterfly are different in appearance. The topside of the male is silvery or dark blue with narrow black margins. The female (above) is grayish brown, especially on the outer portions of the wings, to blue on the topside, with irregular bands of orange crescents inside the narrow black border. The underside of both sexes is gray with a continuous band of orange crescents along the edges of both wings and with scattered black spots circled with white.**

*Photo by Thomas Meyer/Wisconsin Department of Natural Resources*

In 1995, the Fish and Wildlife Service's Partners for Fish and Wildlife Program in Wisconsin began working with property-owners to reconstruct habitat on private lands for an endangered butterfly called the Karner blue (*Lycaeides melissa samuelis*). Today, our restoration efforts for this little blue creature are being realized in leaps and bounds.

Jon Petersen, a rural landowner in Wisconsin, was one of the first people who worked with the Partners program in restoring the habitat characteristics needed by the Karner blue. His property in central Wisconsin is part of a large continuum of privately owned oak "barrens" interspersed among agricultural fields and pine plantations. Wild lupine (*Lupinus perennis*), the butterfly's larval host plant, grew naturally in openings throughout this region but was eliminated by certain agricultural and forestry activities, including suppression of the natural wildfires that maintained open habitats. The Karner blue's long-term survival depends on protection of barrens ecosystems and the restoration of open habitats in an interconnected system that allows subpopulations of butterflies to shift their location from one area to another.

Mr. Petersen contacted the FWS to inquire about the Partners program during the 1995 field season. After an initial site review, he and FWS biologists discussed management strategies and goals, and worked together to adopt a Wildlife Management Agreement. This habitat restoration plan was based on the latest available restoration ecology and adaptive management strategies. Fifteen acres (six hectares) of retired agricultural land would be the core area for replicating Karner habitat. Mr. Petersen took it upon himself to prepare

the area for planting. A local cooperative sprayed the existing vegetation in early September with Round-up, a nonpersistent glyphosate herbicide, which was followed by two shallow diskings prior to planting. The reseeding mix took into account not only host and nectar plant needs of both flight periods for the Karner blue, but also focused on establishing quality grassland habitat for associated bird and other animal species. Trees and fence rows that act as structural barriers for butterfly dispersal were identified. Removal of such barriers eliminates fragmentation, which opens up the landscape to a more contiguous prairie/barrens complex. Adjacent areas were identified for jack pine and red oak removal in order to reduce the canopy cover, allowing sunlight penetration for the herbaceous layer needed by the butterfly. Management included burning the newly planted prairie within the first three years to suppress exotic cool season grass species and to stimulate vegetative growth among the native species. A noteworthy point of this project was that Mr. Petersen assisted in all aspects of the restoration process, including the planting. His involvement and continued interest are making this partnership a success.

No one really knew how long it would take for Karner blues to colonize the site, or if they would at all. The closest known population was a mile

away, and that was across two roads with plenty of potential barriers. However, it happened sooner than expected. Today, the project is still in the establishment phase, but there is already a small population of Karner blues occupying the site (24 counted on a recent survey).

Some people ask how the FWS and the landowner will work together for continued success of the project. The answer lies with the Karner Blue Butterfly Habitat Conservation Plan (HCP) put forth by the Wisconsin Department of Natural Resources and 27 other partners who represent the largest landowners within the butterfly's range. The HCP is part of an application to the FWS for a permit to allow incidental take of the Karner blue. The overall goal of the HCP is to allow continued reasonable uses of the land by the citizens of the State, but with the welfare of the species in mind. Now under final FWS review, the HCP proposes to place Mr. Petersen into a volunteer category. As such, he would be able to manage his property to ensure the future success of this restoration project and have permit coverage for incidental take of the butterfly associated with manage-

ment activities. The HCP takes the pressure off private landowners and puts it on the conservation agencies to inform, promote, and assist people who want to help conserve our Nation's natural resources.

The story doesn't end here. New partnerships are being developed with other private landowners across the Karner blue's range in Wisconsin. These landowners are interested in joining the Partners program to restore Karner blue habitat and connect the small, isolated populations of butterflies. Creating new patches of habitat across a mosaic of landscapes will continue to encourage dispersal of the butterfly and, in the long run, keep the Karner blue's gene pool rich and diverse.

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*Kurt Waterstradt is a Wildlife Biologist at the FWS Wisconsin Private Lands Office in Madison.*

**Wild lupine**  
*Photo by Joel Trick/USFWS*



**Male Karner blue butterfly**  
*Photo by John and Karen Hollingsworth*

by Greg Neudecker

# Native Trout Rebound in the Blackfoot River



**Male bull trout**

Photo by Wade Fredenberg/USFWS

When the once-renowned Blackfoot River trout fishery of Montana hit rock-bottom in the late 1980's, biologists believed, or at least hoped, that native bull and westslope cutthroat trout (*Salvelinus confluentus* and *Salmo clarki*, respectively) could be the river's salvation. The theory was that native trout, which have the advantage of being

perfectly adapted to the Blackfoot's natural environment, would be better candidates for rebuilding the fishery than the introduced rainbow and brown trout (*Salmo gairdneri* and *Salmo trutta*, respectively) that had become the river's dominant species.

In 1989, private landowners, recreationists and others concerned about the future of the Blackfoot River teamed up to form the Big Blackfoot Chapter of Trout Unlimited. The U.S. Fish and Wildlife Service (FWS)—

through the Partners for Fish and Wildlife Program—and the Montana Fish, Wildlife, and Parks joined the chapter under a cooperative agreement to work toward restoration of the Blackfoot's fishery.

The Big Blackfoot Chapter developed a two-pronged strategy for dealing with the fishery decline: 1) protecting the

vulnerable native trout from anglers with catch-and-release fishing regulations throughout the drainage, and 2) working with private landowners to restore the Blackfoot's degraded tributary streams.

The second phase of restoring the tributaries proved to be much more complex than implementing the regulation change.

Although bull and westslope cutthroat trout spend much of their adult life in the mainstem of the Blackfoot River, they spawn and rear in the tributary streams. Sadly, the tributaries and their watersheds have changed a great deal in the past 100 years. Logging, mining, culverts, dams, irrigation, and improper grazing have left the tributaries and the fishery in poor condition.

In setting their stream restoration priorities, FWS and State fishery biologists emphasized improving stream connectivity and habitat conditions that support native fish species. Among the approaches that have been used are the removal of fish barriers, instream habitat restoration, riparian restoration, "fish friendly" irrigation systems, water conservation practices, grazing systems,



**U.S. Senator Max Baucus (left) and the author install an off-site watering system to remove a livestock corral from the stream system.**

USFWS photo



**(left) Rancher Gary Jacobsen opens his new infiltration irrigation structure. This structure keeps the rancher's heavy equipment out of the stream and keeps fish out of the irrigation ditch.**

*USFWS photo*

**(right) An irrigation diversion on Salmon Creek was an impassable barrier to fish prior to the installation of a fish ladder.**

*USFWS photo*



off-site water development, and conservation easements. To date, \$2.8 million has been spent on restoring habitat or connectivity to over 300 miles (480 kilometers) of Blackfoot River tributary streams. In addition, over 55,000 acres (22,260 hectares) of fish and wildlife habitat on private property is now protected with conservation easements.

Nine years later, the long-shot bet on the Blackfoot's native fishery is turning out to be a winner, maybe even a little sooner than we might have dared hope. Redd (spawning beds) counts for bull trout in two key tributaries have improved from just 18 redds in 1989 to 130 in 1997. Westslope cutthroat trout numbers in the mainstem of the Blackfoot River are up 720 percent from 9 years ago. Other species, such as bald eagles (*Haliaeetus leucocephalus*), also benefit from the improved fishery. Prior to the restoration work, there were six active bald eagle nests in the valley. By 1998, that number had grown to 17 active nests, with 4 of them located above stream restoration projects.

Recreationists are pleased with the restoration work, too. "The cutthroats are coming back like gangbusters," says Montana Fish, Wildlife, and Parks Biologist Ron Pierce. "We're seeing larger numbers of cutthroats and more of the larger cutthroats. The proportion

of cutthroats to other trout species, which was very low in the '80s, is increasing."

But the most important component of this project may be the trust that has developed between agencies and private landowners because of this non-regulatory approach to fish and wildlife management. As rancher David Mannix puts it: "We need each other. Agriculture needs open space to stay in business. Wildlife needs open space to stay alive."

*Greg Neudecker is the Assistant State Coordinator of the FWS Partners for Fish and Wildlife Program in Montana.*

**Gold Creek's lower three miles were logged and all woody debris was removed from the system. Restoration consisted of placing more than 100 large logs throughout the system, adding much needed fish habitat**  
*USFWS photo*



# Habitat Restoration in the North Carolina Sandhills

by Peter Campbell



## Longleaf Restoration Initiative

by Anita Goetz

**The FWS is working with other agencies and organizations in North Carolina on the Longleaf Restoration Initiative. Public support to restore longleaf pine habitat in North Carolina has been growing. Through the Partners for Fish and Wildlife Program, six longleaf habitat restoration projects have been identified.**

**As an example, the FWS, through the Partners for Fish and Wildlife Program, recently awarded \$10,000 to the North Carolina Coastal Land Trust to restore 30 acres (12 hectares) of longleaf pine/wiregrass habitat on land recently donated to them by the Dupont company. The Coastal Land Trust is working to leverage those funds to expand the project**

The North Carolina Sandhills population of the endangered red-cockaded woodpecker (*Picoides borealis*) is the second largest of 15 populations identified in the Fish and Wildlife Service's (FWS) 1985 Red-cockaded Woodpecker Recovery Plan. Unlike the other 14 populations, which are located on Federal land, the North Carolina Sandhills population is spread across a mosaic of Federal, State, and private lands. Currently, the population is fragmented into two distinct core groups found primarily on public lands. The groups are separated by a 6-mile (9.6-kilometer) "gap" of private lands devoid of active red-cockaded woodpecker clusters. Reaching the recovery plan objectives will require the creation of habitat links to allow interaction between the two groups. This can only be achieved by working with private landowners. In 1992, Federal and State wildlife agencies joined landowners and conservation organizations in a partnership to restore and protect red-cockaded woodpecker habitat on private lands.

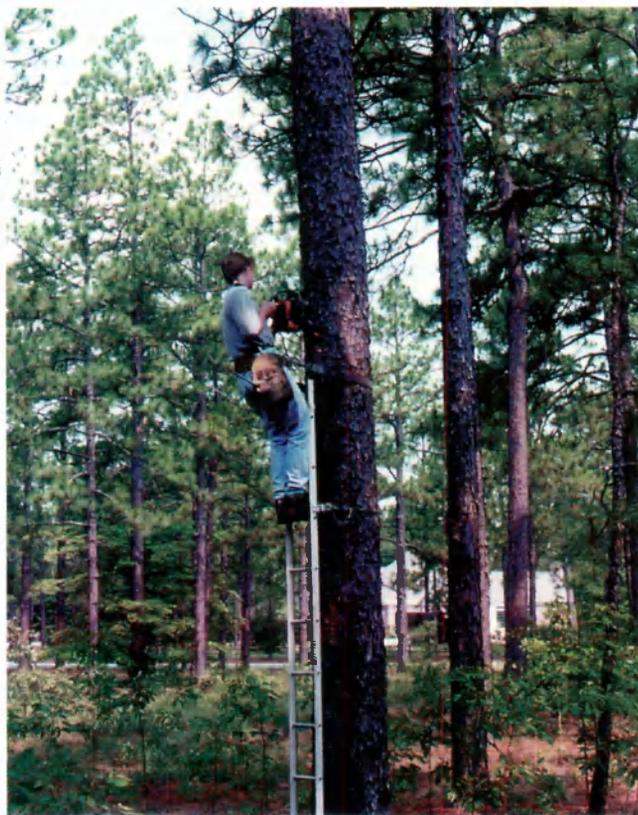
The result was the "Safe Harbor" concept.

Safe Harbor agreements encourage landowners to practice the kind of good stewardship that attracts endangered species while allowing the landowners to convert their property to other uses, without penalty, if they change their minds at a later date. (For information on the evolution of the Safe Harbor Program, see story in the May/June 1995 *Endangered Species Bulletin*.)

On March 1, 1995, Secretary of the Interior Bruce Babbitt announced the North Carolina Sandhills Safe Harbor Habitat Conservation Plan (HCP), the first of its kind issued under section 10 of the Endangered Species Act. This regional HCP, which covers a six-county area, offers incentives for landowners to take voluntary conservation actions for endangered species, particularly the red-cockaded woodpecker.

Two key components of red-cockaded woodpecker habitat are roosting/nesting habitat and open pine foraging habitat. Historically, the open savannah longleaf pine (*Pinus palustris*) forest in the North Carolina Sandhills provided the optimal habitat for the red-cockaded woodpecker. The park-like pine habitat was maintained historically by a natural fire regime. But as people colonized the Sandhills, the old growth longleaf pines were cut and fires were suppressed. The result was a heavy invasion of the forest midstory by oaks (*Quercus* spp.). Hardwood midstory encroachment results in increased





Without a cavity to roost in at night, a red-cockaded woodpecker (right) is vulnerable to the elements and to predation. Suitable cavities for roosting and nesting are limited due to the shortage of old growth longleaf pines and to competition from other species, such as the flying squirrel and red-bellied woodpecker (*Melanerpes carolinus*). Normally, it may take a red-cockaded woodpecker group up to 6 years to excavate a new cavity, but biologists have developed a drilling technique that can complete an artificial cavity in just one hour. Cavity provisioning is used to establish new cluster sites and to augment existing sites.

USFWS photos



predation on woodpeckers and competition for nesting cavities from species such as the flying squirrel (*Glaucomys volans*) that are attracted to hardwoods. A lack of suitable cavities and/or increased hardwood intrusion will eventually cause red-cockaded woodpeckers to abandon their roosting/ nesting sites.

One approach to assisting landowners in voluntary habitat improvements has been to provide funding through the FWS Partners for Fish and Wildlife

*(left) Landowner support is critical to restoring degraded longleaf pine habitat. The North Carolina Chapter of The Nature Conservancy gained the cooperation of landowner Brenda Maness, whose property contains one of the oldest living Piedmont specimens of longleaf pine. Brenda (left) is shown being interviewed by local news reporters.*

*Photo by Anita Goetz/USFWS*

*(Opposite page) Prescribed burning on private lands keeps the midstory clear, and promotes growth of wiregrass and forbs associated with the longleaf pine ecosystem.*

*Photo by Mark Cantrell*

Program. So far, \$16,000 has been awarded for red-cockaded woodpecker habitat enhancement on four separate Safe Harbor agreements. The money has been used to slow the loss of roosting habitat by creating artificial cavities in two active but cavity-limited woodpecker sites, and to create new cavities in two abandoned sites. Funding has also paid for improving the overall habitat of red-cockaded woodpecker cluster sites by removing the hardwood midstory. While we are still far from our recovery objective for the North Carolina Sandhills red-cockaded woodpecker population, the Safe Harbor program fosters growing cooperation between the FWS and private landowners for endangered species conservation.

*Peter Campbell, FWS North Carolina Sandhills Red-cockaded Woodpecker Recovery Coordinator, is located in Southern Pines, North Carolina.*

for restoration on additional Coastal Land Trust Dupont Preserve lands, research and monitoring (in cooperation with the U.S. Forest Service), and outreach and education.

Longleaf pine forests and savannahs in the southeastern coastal plain are critically endangered ecosystems, with a greater than 98 percent decline. In addition to the red-cockaded woodpecker, rare species that depend on longleaf pine habitats include a butterfly, the St. Francis' satyr (*Neonympha mitchellii francisci*), and three plants, the American chafseed (*Schwalbea americana*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), and Michaux's sumac (*Rhus michauxii*).

*Anita Goetz is FWS Partners for Fish and Wildlife Program Coordinator in Raleigh, North Carolina.*

by Steven D. Arey, Edith  
Erfling, Ronald K. Jones,  
and Terry A. Rosignol

# A Team Approach to Coastal Prairie Conservation

A vast expanse of more than 6 million acres (2.4 million hectares) of coastal prairie habitat once extended from southwest Louisiana to the lower Texas coast. One early explorer described the coastal prairie as “an unbroken, level grassy plain extend[ing] for miles...on which a few islands of trees and shrubs were scattered.” Today, coastal prairie is recognized as one of the rarest habitats in the nation, with less than a total of one percent remaining in relatively pristine condition.

*Photo by Carolyn Fannon*



The degradation, displacement, and fragmentation of coastal prairie habitat has contributed to the decline of such birds as the lark sparrow (*Chondestes grammacus*), Henslow's sparrow (*Ammodramus benslowii*), LeConte's sparrow (*Ammodramus leconteii*), Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*), and other grassland-dependent bird species.

The U.S. Fish and Wildlife Service's (FWS) Texas Gulf Coast Ecosystem Team identified prairie enhancement and restoration, including the recovery of Attwater's prairie-chicken, perhaps North America's most endangered bird, as a top priority within the ecoregion. However, with 98% of coastal prairie habitat in private ownership, finding suitable sites for the release of captive-bred birds and restoring the coastal prairie ecosystem will depend on the cooperation of private landowners.

For this reason, the FWS, along with the Sam Houston Resource Conservation and Development Area (sponsored by the U.S. Department of Agriculture), instituted the Native Gulf Coast Prairie Restoration Project within the framework of the Partners for Fish and Wildlife Program. The project is designed to restore and maintain coastal prairie habitat on private lands by providing technical and financial assistance to landowners for conservation practices benefitting species of concern.

To ease the concern of private landowners about habitat enhancement leading to an increase in endangered species and accompanying regulatory impacts, the Fish and Wildlife Service helped to establish a Habitat Conservation Plan—including a "Safe Harbor" provision—for the species in 1995. Safe Harbor agreements encourage the restoration, conservation, or enhancement of prairie habitats on private lands by providing protection from additional future liabilities under the Endangered Species Act in the event that habitat enhancement results in higher prairie-chicken numbers. Landowners would be responsible only for maintaining a



baseline number for the species, even if that baseline is zero. For example, if no birds are present when the agreement is reached, the landowner would not be liable for any birds present at the end of the agreement period.

Reaction to the Safe Harbor program from private landowners has been very positive. To date, 7 landowners have signed up for the program, allowing the restoration of about 15,000 acres (6,070 hectares) of coastal prairie at an average restoration cost to the FWS of less than \$15 per acre. The program has the potential to mushroom into a very positive outreach tool for this imperiled ecosystem, although the availability of restoration funds has thus far limited its success. We plan to continue the use of Safe Harbor agreements to promote releases of Attwater's greater prairie-chickens within the bird's historic range.

By creating alliances and providing conservation tools to private landowners, the FWS will ensure the conservation of the coastal prairie ecosystem and its wildlife for future generations.

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*Steven D. Arey, Edith Erfling, and Ronald K. Jones are with the FWS Clear Lake, Texas, Ecological Services Field Office. Terry A. Rostgnol is Manager of the Attwater Prairie Chicken National Wildlife Refuge.*

***A member of the grouse family, the Attwater's greater prairie-chicken is a ground-dwelling bird about the size of a domestic chicken. In the late 1800's, an estimated 1 million birds roamed across about 6 million acres (2.4 million hectares) of coastal prairies in Texas and southwestern Louisiana. Today, an estimated 57 birds remain in the wilds of three Texas counties. Fewer than 200,000 fragmented acres (81,000 ha) of coastal prairie habitat remain in Texas. The bird's decline can be attributed largely to habitat loss and degradation, predation, disease, genetic problems, and abnormal weather patterns in the last 10 years.***  
USFWS photo

by Laura Mitchell

# Partners Restore Rare Serpentine Ecosystem

Serpentine “barrens” are rare natural communities composed of grasslands and oak savanna growing around outcrops of serpentine, a magnesium-rich mineral that contributes to dry, acidic, erodible, nutrient-poor soils. Despite their name, such habitats are not really barren. They contain a high percentage of rare species adapted to these harsh conditions.

Since colonial times, over 100,000 acres (40,470 hectares) of native serpentine habitat have been destroyed in the Mid-Atlantic region of the United States, leaving only small fragments of this unique ecosystem. But recently, the U.S. Fish and Wildlife Service's (FWS) Chesapeake Bay Field Office joined a partnership with the Maryland Department of Natural Resources' Heritage and Biodiversity Conservation Program and the Maryland/District of Columbia chapter of The Nature Conservancy to restore one of the largest and most biologically diverse serpentine habitats

remaining: Soldier's Delight Natural Environment Area.

Prior to European settlement, Maryland contained over 50,000 acres (20,235 ha) of serpentine habitats, consisting of two primary plant communities: little-bluestem (*Andropogon scoparius*) dominated grasslands, and oak savanna characterized by stunted hardwoods, primarily blackjack oak (*Quercus marilandica*) and post oak (*Q. stellata*). Serpentine oak savanna is considered the State's rarest natural community.

For thousands of years, serpentine plant communities were maintained by periodic exposure to fires caused by lightning or set by Native Americans. Following the decimation of native peoples, pine and cedar trees invaded the serpentine savanna and grasslands. Many of the serpentine barren habitats have become dominated by conifers, while the native grassland and oak species have all but disappeared. Mining activities and recent residential development have destroyed most of the remaining serpentine habitats.

In Maryland, only four sites remain, totaling about 2,500 acres (1,010 ha). The largest, Soldier's Delight, is also the largest serpentine grassland in all of North America, with about 1,800 acres (730 ha) of serpentine soils. This site contains at least 28 state-listed threat-

## **Fully open *Agalinis acuta***

Photo by Laura Mitchell



ened or endangered species, including 90 percent of all populations of the federally-listed sandplain gerardia (*Agalinis acuta*). The site also contains serpentine aster (*Aster depauperatus*), a candidate for Federal listing.

In 1996, the Maryland Department of Natural Resources began restoring hundreds of acres of serpentine barren habitat at Soldier's Delight. The FWS Partners for Fish and Wildlife program recognized the importance of this work to restoring viable populations of sandplain gerardia and maintaining biodiversity in Maryland. In 1997, Partners staff at the FWS Chesapeake Bay Field Office, in cooperation with the Maryland/D.C. chapter of The Nature Conservancy, joined the restoration team, contributing funds for contracting the manual site clearing and staff for surveying sandplain gerardia colonies.

Restoration actions include removal of large, invasive conifers and periodic, controlled burning to maintain grassland and savanna communities. First, pine trees were cut and manually removed from the site, uncovering small stands of scrub-type oaks, some of which are more than 100 years old. Due to the easily-compacted nature of serpentine soils, cutting and chipping activities were done manually, minimizing heavy equipment impacts. Project volunteers included local Soldier's Delight supporters, the Boy Scouts of America, and members of The Nature Conservancy. Last summer, the Partners program and Maryland Department of Natural Resources had trees removed from 50 acres (20 ha) of serpentine habitat at Soldier's Delight.

As with Midwestern prairie systems, species richness and productivity on serpentine barrens are maintained by frequent, low-intensity fires. Burns control colonization by conifers and greenbriar (*Smilax* sp.), which have overwhelmed the grasses and oaks over the past 50 years. Burning also encourages the growth of native warm-season grasses and rare serpentine community plants, including sandplain gerardia.



**U.S. Fish and Wildlife Service biologists evaluate the serpentine restoration area.**

*USFWS photo*

Forty acres (16 ha) on which pines had been cut down were burned last fall. The burned area will be transformed into an oak savanna, complete with native prairie grasses. Another 50 acres of serpentine habitat have been restored through cutting and will be burned sometime this fall.

These efforts are part of a long-term plan by the Maryland Department of Natural Resources, The Nature Conservancy, and the FWS to eliminate invasive plants and restore 1,000 acres (404 ha) of the serpentine ecosystem. Soldier's Delight provides exceptional opportunities for recovery of sandplain gerardia and research on eastern grassland communities. But perhaps more important is this area's value as a tool for teaching about rare habitats and associated biodiversity issues.

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*Laura Mitchell, formerly with the FWS Chesapeake Bay Field Office in Annapolis, Maryland, is now at Cornell University with the New York Cooperative Fish and Wildlife Research Unit.*

# Atlantic Salmon Watershed Collaborative

by Jed Wright



Photo by Lois Winter

The U.S. Fish and Wildlife Service's (FWS) Gulf of Maine Program, working in conjunction with the Maine Fisheries Stewardship Project, is implementing an innovative partnership to protect and restore Atlantic salmon (*Salmo salar*) watersheds. This effort began in 1996 when the National Fish and Wildlife Foundation (NFWF) and the Gulf of Maine Program called a meeting with State agencies, non-profit conservation organizations, and industry stakeholders to design a grant proposal for Atlantic salmon conservation in Maine. The NFWF grant provided \$100,000, to be matched at least 3 to 1 with non-Federal funds, to create the Atlantic Salmon Watershed Collaborative.

The Collaborative supports Atlantic salmon conservation initiatives by focusing on the seven "wild" salmon rivers in downeast and midcoast Maine. Specifically, it is:

- supporting community-based watershed coalitions to identify conservation priorities and implement solutions;
- educating the public of the importance of the Atlantic salmon watersheds;
- assessing Atlantic salmon habitat to determine the most effective stocking rates and to set priorities for protection and restoration efforts;
- permanently protecting key parcels in the Atlantic salmon watersheds; and
- restoring important areas of former Atlantic salmon habitat.

The Collaborative has grown out of a variety of recent efforts in Maine to develop local involvement in the protection of Atlantic salmon watersheds. Farlier, the Gulf of Maine Program assisted the Mid-Coast Atlantic Salmon

Watershed Coalition in successfully applying for a Fisheries Across America grant from the NFWF. This grant provided matching funds to develop GIS (geographic information system) coverage and other natural resource databases, conduct water quality monitoring, and provide public outreach programs for the Sheepscot and Ducktrap Rivers. NFWF funds have also supported the work of Project SHARE, a public/private partnership that has funded the design of floating weirs, conducted temperature monitoring studies, removed river obstructions, and provided outreach and education programs to benefit Atlantic salmon.

The Collaborative is guided by a board made up of 15 representatives from Federal and State agencies, conservation organizations, and industry. The board provides guidance, determines funding priorities, identifies sources of potential matching funds, and approves grant proposals submitted to the Collaborative. The Gulf of Maine Program, with assistance from the Fisheries Stewardship Project and NFWF's Falmouth, Maine, office, provides staff support for the board and projects endorsed by the board.

## Project Selection

In April 1997, the Gulf of Maine Program, with concurrence from the Collaborative board, solicited proposals from approximately 200 individuals and groups interested in Atlantic salmon conservation in Maine. Later, the board selected 10 projects designed to assess, protect, and restore Atlantic salmon habitat and/or conduct related outreach. In total, the board distributed \$100,000 in NFWF funds, plus an additional

\$583,185 raised from the State, the public, and private industry for Atlantic salmon conservation in Maine. Projects funded include the following:

Two habitat assessment projects needed to optimize fry stocking rates and identify priority sites for restoration and protection were carried out by local volunteers using GPS (geographic positioning system) receivers and GIS mapping techniques. Both projects also provided volunteers to assist biologists conducting electrofishing surveys.

Four land acquisition projects, totaling about 1,600 acres (650 hectares), will protect habitat along the Dennys, Sheepscot, and Ducktrap Rivers.

Two watershed coordinator positions were created to facilitate restoration and protection projects on the Pleasant and Sheepscot Rivers. The coordinators are focusing on streambank restoration and obstruction removal projects, water quality monitoring, watershed assessment and planning activities, development of landowner contacts to encourage easements and acquisitions, and outreach aimed at cultivating a stewardship ethic in the watershed. The coordinators are also developing volunteer networks within their watersheds to assist on habitat restoration and outreach projects.

Obstruction removal projects on Togus Stream and Bond Brook have reestablished Atlantic salmon passage by removing beaver dams and debris jams. These tributaries of the Kennebec River, located just south of Edwards Dam, provide spawning and rearing habitat for Atlantic salmon. The Atlantic Salmon Collaborative is playing a key role in drawing together important players in Federal and State government, the non-profit conservation community, and industry to support the State's salmon conservation plan. (See *Bulletin* Vol. XXIII, No. 1.) In the process, Collaborative members are learning from each other and becoming increasingly aware of the wide range of issues involved in Atlantic salmon restoration.



**Salmon research on Ducktrap River**  
USFWS photo

*Jed Wright is a Biologist with the FWS Gulf of Maine Program in Falmouth.*

**Atlantic salmon**  
USFWS photo



by Mike Wicker and  
Eric Hinesley

# Restoring an Atlantic White Cedar Bog



(above and opposite page)  
Volunteers from The Nature  
Conservancy help plant Atlantic  
white cedar seedlings.

Photos by John Ellis/USFWS

The Fish and Wildlife Service's Albemarle/Pamlico Coastal Program in North Carolina is working with the Pocosin Lakes National Wildlife Refuge and North Carolina State University to restore an 18,000-acre (7,280-hectare) Atlantic white cedar (*Chamaecyparis thuyoides*)/bald cypress (*Taxodium distichum*) bog. So far, approximately 2,000 acres (810 ha) have been replanted to primarily bald cypress and Atlantic white cedar. Plans are underway to restore wetland hydrology on the remaining acreage by installing a total of 14 water control structures on canals that drain the area. Planting of Atlantic white cedar and bald cypress will continue until the area is revegetated. The project is intended not only to benefit wildlife but also to promote water quality.

This site is of particular interest because the Atlantic white cedar ecosystem is categorized as globally endangered by The Nature Conservancy and because the area is vitally important as a water filter for the Albemarle/Pamlico Estuary. Mature Atlantic white cedar bogs provide a unique habitat that has naturally acidic waters and is cooler than surrounding hardwood swamps or pinelands. Cedar bogs support high breeding bird densities (425 to 554 pairs per 100 acres or 40 ha) of species such as ovenbirds (*Seiurus aurocapillus*), yellowthroats (*Geothlypis trichas*), and prairie, prothonotary, and hooded warblers (*Dendroica discolor*, *Protonotaria citrea*, and *Wilsonia citrina*, respectively). Hessel's hairstreak (*Mitouri besseli*), a butterfly, uses Atlantic white cedar exclusively. Black bear (*Ursus americanus*), river otter

(*Lutra canadensis*), and bobcat (*Felis rufus*) are numerous in cedar bogs, as are the State-listed eastern diamond-back rattlesnake (*Crotalus adamanteus*). The federally-listed red-cockaded woodpecker (*Picoides borealis*) inhabits mature pond pines that are scattered around cedar bogs.

The Albemarle/Pamlico system, the second largest estuary in the country, is experiencing anoxia (an absence of aquatic oxygen) and blooms of the toxic dinoflagellate *Pfiesteria piscicida*, both of which are the result of poor water quality. Historically, the fringe marshes, creeks, and beds of submerged aquatic vegetation in the Albemarle/Pamlico Estuary have provided essential nursery habitat for most commercial and recreational fish and shellfish in the North Carolina coastal area. The estuary also provides important habitat for anadromous fish, including the endangered shortnose sturgeon (*Acipenser brevirostrum*). All of these habitats depend on maintaining adequate water quality.

In the 1980's, the Atlantic white cedar bog was owned by a commercial operation that proposed to mine the area's peat and construct a large peat-to-methanol synthetic fuel plant. The proposal was later abandoned, but the area had already been cleared, ditched, and drained. The site became part of the Pocosin Lakes National Wildlife Refuge in 1990. Although the transfer of property to Federal ownership ended the threat of peat mining in the area, the site remained devoid of a natural community of plants and animals, and the water that drained from the site exceeded North Carolina water quality standards for mercury. Also, the

nitrogen in the runoff was likely contributing to eutrophication (excess algal growth) downstream.

Peat in the project site and surrounding area (the old East Dismal Swamp) formed over the last 9,000 years since the Wisconsin period of glaciation. Vegetation deposited organic material faster than it could decompose and a thick layer of peat developed slowly over thousands of years. The peat retained the nitrogen that had been stored by growing plants and eventually created a very large bank of nitrogen. The peat also absorbed mercury from the rain water, similar to the way an activated charcoal filter cleans water by accumulating contaminants. Historically, mercury was present in the atmosphere at low levels from volcanic activity, and mercury has increased recently as a consequence of human activities (e.g., combustion of fossil fuels, smelting).

When peat bogs are ditched, the water table is lowered and the peat is aerated, which increases microbial activity and accelerates decomposition and nutrient release. To illustrate the magnitude of non-point source pollution that results from decomposition of peat, consider the following comparison. Raleigh, the capital of North Carolina, discharges 60 million gallons/day ( $2.26(10^6)$ liters) of wastewater with a concentration limit for total nitrogen of 6.0 mg/liter, resulting in a nitrogen discharge of 1,100,000 pounds/year ( $4.97(10^5)$  kilograms). The peat on the 640-acre (260 ha) demonstration plot alone contains an amount of stored nitrogen equal to 75 years of Raleigh's waste water discharge.

Net accumulation of organic material is essential for a peat bog to perform its beneficial water quality role. If ditched bogs are allowed to decompose, they can release excess nutrient loads into coastal rivers and estuaries on par with the largest point source (e.g., industrial site) discharges. Wetlands with deep organic soils can be either very good or very bad for surface water quality, depending on their condition.

Restoration of the Atlantic white cedar ecosystem is a long-term effort.

Improvements to the site's hydrology and vegetative community have already reduced mercury runoff to levels that are better than the State water quality standard. The ultimate goal is to have water leaving the site with mercury and



nitrogen concentrations equal to, or less than, rainfall concentrations. Restoring the hydrology has also encouraged the growth of moss (*Sphagnum* spp.) and improved habitat for small mammals and amphibians. In 3 to 4 more years, the trees should be large enough to provide nesting sites for many neotropical songbirds.

Restoring hydrology and native plant communities in peat bogs can turn an environmental liability (drained decomposing peat bog polluting downstream coastal estuary) into a environmental asset (functional wetland with surface water discharges cleaner than rainwater), while improving wildlife habitat.

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*Mike Wicker is the FWS Albemarle/Pamlico Coastal Ecosystems Coordinator in Raleigh, North Carolina, and Eric Hinesley is a Professor with the Department of Horticultural Science at North Carolina State University in Raleigh.*

by Cindy Hoffman

# Peregrine to Soar Off Endangered List



Photos by Craig Stihler/West Virginia  
Division of Natural Resources

**The FWS initiated recovery of the peregrine falcon by developing partnerships with the Peregrine Fund, the Santa Cruz Predatory Bird Research Group, and the Midwestern Peregrine Recovery Group to breed peregrines for release in unoccupied historical habitat and to augment depressed populations. These institutions released an estimated 6,000 captive-bred young in 34 States between 1974 and 1997. A small army of release site attendants cared for the birds. Hundreds of Federal and State biologists, independent researchers, bird watchers, and falconers supported this release effort.**

The American peregrine falcon (*Falco peregrinus anatum*) is expected to be removed from the endangered species list, Interior Secretary Bruce Babbitt announced recently, marking one of the most dramatic success stories of the Endangered Species Act.

"Every American should be proud," Babbitt said. "In 25 years, the people of the United States have rescued this awesome raptor from the brink of extinction. We have proved that a strong Endangered Species Act can make a difference. We don't have to stand idly by and watch our wildlife go extinct. We can bring species back. We have proved it with the peregrine falcon."

The American peregrine falcon historically ranged throughout much of North America, from the subarctic boreal forests of Alaska and Canada south to Mexico. A medium-sized raptor, the falcon nests on tall cliffs or urban skyscrapers and hunts other birds for food, reaching speeds of 200 miles per hour (320 km per hour) as it dives after its prey. While those nesting in the lower latitudes travel shorter distances, if at all, peregrines nesting in Alaska and Canada are well known for their long spring and fall migratory flights to and from wintering areas in Latin and South America. In fact, this bird's name comes from the Latin word *peregrinus*, meaning "foreigner" or "traveler."

The peregrine's remarkable speed and agility, however, could do nothing to prevent its sharp decline after World War II, when widespread use of DDT and other organochlorine pesticides decimated populations. The pesticide DDT caused peregrines, as well as birds such as the bald eagle (*Haliaeetus*

*leucocephalus*), to lay thin-shelled eggs that break during incubation.

U.S. Fish and Wildlife Service (FWS) researchers, learning of studies being conducted in Great Britain on the link between DDT and egg shell thinning, confirmed these findings on peregrines in the United States. Rachel Carson, a former FWS employee, helped alert the public to the hazards of pesticides on wildlife in 1962 with her book *Silent Spring*. A decade later, the Environmental Protection Agency took the historic and, at the time, very controversial step of banning the use of DDT in the United States, which was the first step on the road to recovery for the peregrine.

In 1970, the FWS listed the American peregrine falcon as endangered under the Endangered Species Conservation Act of 1969, the predecessor of the current law, when the population in the eastern United States had completely disappeared and the populations in the west had declined by as much as 80 to 90 percent below historical levels. By 1975, the American peregrine falcon population reached an all time low of 324 nesting pairs in North America.

The banning of DDT made the recovery of the peregrine falcon possible. But the protection provided by the Endangered Species Act and the efforts of the FWS, in partnership with State wildlife agencies, universities, private ornithological groups, and individuals,

accelerated the pace of recovery through captive breeding programs, reintroduction efforts, and the protection of nest sites during the breeding season. Similar efforts took place in Canada, where the Canadian Wildlife Service and Provincial agencies took the lead in a major captive breeding and reintroduction program. Currently, there are at least 1,593 peregrine breeding pairs in the United States and Canada, well above the overall recovery goal of 631 pairs. The species has recolonized most of its former range and, due to the construction of buildings and other structures that can be used for nesting platforms, it has even expanded into some new areas. "It would have been hard to imagine this day back in the 1970's when there were so few peregrines left, but it shows how effective a law the Endangered Species Act is when allowed to work as it was intended," Babbitt said.

Three subspecies of peregrine falcons are found in North America: the American, Arctic (*P. f. tundrius*), and Peale's (*P. f. pealei*). The FWS declared the Arctic peregrine, once listed as endangered, as recovered in 1994. The Peale's peregrine, which inhabits remote areas of the Pacific Northwest, was not significantly affected by DDT and was never listed as endangered.

Although a final determination to delist the American peregrine falcon would remove it from ESA protection, it would still be protected by the Migratory Bird Treaty Act. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except when authorized by the Interior Department.

Secretary Babbitt announced the proposal to delist the peregrine at Stone Mountain Park near Atlanta, Georgia. FWS Director Jamie Rappaport Clark made a simultaneous announcement at The Peregrine Fund's World Center for Birds of Prey in Boise, Idaho. Founded in 1970 at Cornell University, the Fund helped lead the way toward recovery with a highly successful captive breeding program. Provincial and State wildlife



agencies also played a fundamental role in the recovery process by protecting nesting habitat, carrying out releases, and monitoring peregrine populations within their borders.

"The recovery of the peregrine has been a model of partnership in the conservation and recovery of an endangered species," Clark said. "Our agency could never have reached this day by ourselves. We needed the help of many organizations and individuals to bring about the recovery."

The proposal to delist the American peregrine falcon was published in the August 26, 1998, *Federal Register*. A final decision on delisting will be published within one year, after a review of all public comments.

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*Cindy Hoffman is a Public Affairs Specialist in the FWS Washington, D.C., Office.*

by Kenneth Sturm

# From Summer Range to Home Range?



USFWS photo

On June 25, 1996, during an air boat training session near the Alamo River, which flows into southern California's Salton Sea, Assistant Refuge Manager Chad Karges and I first noticed the young, downy pelicans. They were sitting on nests made from dead reeds (*Phragmites* sp.) and salt cedars (*Tamarix chinensis*) among a small colony of double-crested cormorants (*Phalacrocorax auritus*) and great blue herons (*Ardea herodias*). Not believing our eyes, we approached and counted three nests containing nine pre-fledging brown pelicans (*Pelecanus occidentalis*), a species that is listed in California as endangered.

Although brown pelicans have visited the Salton Sea for decades, this was the first documented nesting and, after a consultation with brown pelican expert Dan Anderson from the University of California-Davis, we confirmed that these were also the first to nest on an inland lake as well. Anderson shared in our enthusiasm and visited on July 16 to see for himself the nests and young birds of a species he has studied intensively for more than 26 years.

The brown pelican was listed as an endangered species in 1970, largely due to widespread reproductive failure directly linked to environmental contamination by DDE, a persistent metabolite of DDT. Since then, most uses of DDT in the United States have been banned and brown pelican populations have rebounded off the California coast. In Mexico's Sea of Cortez, brown pelican populations have remained healthy.

Anderson and other biologists hypothesized in 1977 that the presence of brown pelicans at the Salton Sea could be explained by what was

described as "passive dispersal" of birds originating from the Sea of Cortez. At the time, it was quite uncommon to find brown pelicans using inland habitats such as the Salton Sea. The hypothesis assumed that brown pelican movements to the inland sea were based on south-originating winds passively moving young pelicans from the Sea of Cortez.

Numbers of brown pelicans at the Salton Sea during the 1960's and 1970's appeared to support this theory of passive dispersal. Although brown pelicans increased at the Salton Sea during the 1970's, observations of flocks greater than 70 birds were still rare. Often the pelicans were sighted only during the summer and fall, and most were juvenile birds. Seeing a mature brown pelican at the Salton Sea or any at all in winter or spring was quite rare. But then things began to change.

In recent years, brown pelicans have become regular visitors to the Salton Sea. They are now present year-round, with peak populations numbering up to 3,000 individuals in the summer months. With the advent of the nesting at the Alamo River in 1996, it was becoming apparent that the Salton Sea may be playing a much larger role for the brown pelican than just post-fledging summer habitat. In fact, the species has become an established resident, much like other colonial birds before it.

Unfortunately, this exciting discovery of pelican nests was overshadowed by a devastating botulism outbreak in the late summer and fall of 1996. More than 8,000 American white pelicans (*Pelecanus erythrorhynchos*) and 1,500 brown pelicans succumbed. Whether or not our Alamo River birds survived the incident is unknown.

In an attempt to mitigate this horrible loss, sick white and brown pelicans were collected on the Salton Sea and sent to the Pacific Wildlife Project for rehabilitation. This nonprofit volunteer organization accepted 254 white and 818 brown pelicans from the Salton Sea in an incredible effort to save as many birds as possible. All told, a total of over 200 white and 446 brown pelicans were saved and released in California during this operation. Each released pelican was given an FWS band and a separate yellow plastic band to identify it as a rehabilitated bird from the 1996 botulism outbreak. It was our hope that we could learn more about the movements of these birds in southern California as well as track the success of rehabilitation.

Not long after the outbreak subsided in mid-November 1996, another exciting discovery was made on Mullet Island, about one-half mile east of the Alamo River delta. While counting double-crested cormorant nests in December, we again stumbled upon a brown pelican nest containing three eggs. Returning to the island one month later, we sadly discovered this first nest had failed. To our surprise, a new nest complete with three new eggs was found a short distance away, but later this nest was also unsuccessful.

In March 1997, more breeding activity occurred, as brown pelicans were observed forming pairs and exchanging nesting material on a small rocky islet offshore of Obsidian Butte, just south of the refuge. Five nests were constructed in early March, but no eggs had been laid by the time a spring wind storm washed over the islet, destroying all nests. No further nesting attempts were made by the pelicans and the excitement for the year appeared to be over.

Still, the Salton Sea is always full of surprises. In August, while observing some brown pelicans feeding, I noticed one bird with our telltale yellow leg band, which marked the bird as one rehabilitated during the 1996 botulism event. At the same time, Refuge Biological Technician Kathy Molina spotted a

banded brown pelican roosting at Obsidian Butte. These were the first brown pelican band returns we had come across at the Salton Sea.

In the coming weeks, still battling a lingering botulism problem, we encountered four more brown pelicans from the previous summer. These unfortunate four were not as lucky as they were last year—they died at the Salton Sea before they could be rescued and sent back to the Pacific Wildlife Project for another rehabilitation effort. However, their band recoveries are an important chapter in the brown pelican story at the Salton Sea. We now have several birds that returned to the Salton Sea after being released on the California coast. We can now document, for the first time, that brown pelicans have developed site fidelity with the Salton Sea. Their presence here is now seen as much less of an accident and more of a deliberate attempt in colonization. It is just one more example of how this unique habitat has become a center of avian biodiversity in the Southwest.

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*Kenneth Sturm is a Wildlife Biologist at the Salton Sea National Wildlife Refuge Complex.*



*Juvenile brown pelicans*  
USFWS photo

by Shawnetta Grandberry  
and Chris Nagano

# Protecting a Flower-loving Fly



**Female Delhi Sands flower-loving fly**  
Photo by Gilbert Goodlett/Thomas Olsen  
Associates, Inc.

In 1993, the Fish and Wildlife Service (FWS) issued a final rule protecting the Delhi Sands flower-loving fly (*Rhabdomidas terminatus abdominalis*), an insect, under the Endangered Species Act (ESA). Immediately, some in the media picked up on the listing and informed the world that the "Feds have gone crazy." Calls from concerned citizens and reporters tied up phone lines for days after the listing was announced. Everyone wanted to know why the government would even consider protecting a mere "fly."

The Delhi Sands flower-loving fly should not be confused with the common house fly. Although they belong to the same order, the two animals are strikingly different in appearance and behavior. The 1-inch (2.5-centimeter), orange and brown Delhi Sands flower-loving fly has feeding behavior similar to such species as the hummingbird and butterfly. It has a long tubular proboscis that it uses to extract nectar from flowers. The Delhi Sands flower-loving fly is a strong flier and, like the hummingbird, is capable of rapid rocket-like flight as well as stationary, hovering flight.

*Rhabdomidas terminatus* consists of two subspecies, the El Segundo flower-loving fly (*Rhabdomidas terminatus terminatus*) and the Delhi Sands flower-loving fly. The El Segundo subspecies is almost certainly extinct, having been confined to the El Segundo sand dunes and portions of the sandy alluvial plain of the Los Angeles River. The El Segundo sand dunes ecosystem has been virtually eliminated by urban development. The last known viable habitat for the El Segundo flower-loving fly was eliminated by construction for

the Los Angeles International Airport in the 1960's. Thus, the Delhi Sands flower-loving fly is the only living representative of its species.

The Delhi Sands flower-loving fly is a rare endemic insect currently restricted to only 12 known populations in the semi-arid sand dunes of southern California's San Bernardino and Riverside counties. Once more than 40 square miles in extent, the Colton Sand Dune system was the largest inland sand dune formation in this part of southern California. One of the most characteristic features of this biologically unique habitat type is the fine, sandy soils classified as belonging to the "Delhi" series. The fly's historical distribution extended from the eastern margin of the City of Colton in San Bernardino County to the western boundary of the unincorporated district of Mira Loma in Riverside County and from the foothills of the San Gabriel Mountains south into Riverside County. New populations have been discovered as far west as the City of Ontario in San Bernardino County. This distribution suggests that it once occurred throughout much of the 40 square miles of the Delhi series soils. But today, an estimated 98 percent of this habitat has been converted to residential, agriculture, and commercial uses.

The Delhi series habitats were a hot spots of biodiversity and, like some other plants and animals found there, the Delhi Sands flower-loving fly populations are now on the brink of extinction. The Delhi Sands flower-loving fly undergoes a complete metamorphosis (egg, larva, pupa, adult), but its precise life span is not known. The adults are active during August and September, a time typically referred to as

the flight period. The females possess specialized egg-laying organs used to lay up to 40 eggs in suitable sandy soil. The egg, larval, and pupal stages, which constitute the bulk of the animal's life history, are spent beneath the surface of the sand.

Over the last few years, the status of the Delhi Sands flower-loving fly has dramatically declined. The FWS listed it as endangered on September 23, 1993, citing habitat loss and degradation, trash dumping, and the use of agricultural pesticides as the primary threats to this species. These threats are expected to continue. Western Riverside County currently supports a population of about 800,000 people, and it is estimated that the population could reach 1.4 million people by 2010. Virtually all known populations of the Delhi Sands flower-loving fly occur on small, isolated remnants of habitat surrounded by incompatible land uses. Of the 12 known populations, all are threatened by pending developments and/or active project proposals. The largest known population occurs in a 350-acre (148-hectare) area largely owned by two sand and gravel mining companies. Due to its size, land use history, and ecosystem values (blowing sand and shifting dunes), the creation of a core reserve at this site could represent the last opportunity to save the Delhi Sands flower-loving fly from extinction. A reserve could be designed to withstand development and grading influences from the surrounding land uses without the use of intensive management. Incidentally, the site falls within the State-designated Agua Mansa Enterprise Zone, which confers significant tax and other economic incentives for commercial development.

The FWS has completed a recovery plan for the Delhi Sands flower-loving fly. The plan recommends that three recovery units be established within the fly's historical range. The species' recovery will depend on the ability of the FWS to work effectively with private land owners to preserve and enhance



**Male Delhi Sands flower-loving fly**

Photo by B. Moose Peterson/WRP©

currently occupied habitat and implement a habitat restoration program.

The FWS is working with local agencies and private parties to save the species and its unusual habitat. If this effort is not successful, another creature will disappear from southern California forever. Some people will not miss the Delhi Sands flower-loving fly, but they may very well miss the other plants and animals that depend upon the important ecological role this unique insect plays. The complex and delicate web of interrelationships among plants, animals, and their environments are still relatively unknown and the subject of much research. It has been estimated, however, that the disappearance of even one species in an ecosystem can cause a chain reaction that can trigger the extinction of up to 30 other species. The more we know and understand about our environment, the better equipped we will be to conserve our natural resources, including those whose importance is not always evident.

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*Shaunetta Grandberry is a Fish and Wildlife Biologist with the FWS Carlsbad, California, Office, and Chris Nagano, formerly with the Carlsbad Office, is now the Supervisory Fish and Wildlife Biologist at the Albuquerque, New Mexico, Field Office.*

by Rena R. Borkhataria

# Roseate Tern Recovery: Progress and Challenges



**Adult roseate tern in flight**  
Photo by Patrick J. Lynch

Described by naturalist Arthur Cleveland Bent as “one of nature’s loveliest productions,” the endangered roseate tern (*Sterna dougallii*) is making a gradual comeback in the northeastern United States. While the roseate tern is a species with a worldwide distribution, only two discrete populations breed in the Western Hemisphere. One occurs along the northeastern coast of the United States from New York to Maine and northward into adjacent portions of Canada. The other population breeds on islands in the Caribbean Sea.

Historically, roseate terns nested on islands along the northeastern coast of North America from Virginia to Nova Scotia. Following commercial hunting for the millinery trade in the late 19th century, roseate tern populations were greatly reduced. In 1890, roughly 2,000 pairs are thought to have nested in the Northeast. With protection, the northeastern population of roseate terns increased to approximately 8,500 pairs in the 1930’s but declined subsequently due to encroachment by gulls and habitat loss. By 1952, the northeastern population had fallen to about 4,500 pairs, and it declined further to about 2,500 pairs by 1977. On November 2, 1987, the U.S. Fish and Wildlife Service (FWS) listed the northeastern breeding population as endangered and the Caribbean population as threatened. Today, approximately 3,382 pairs of roseate terns nest in the northeastern U.S.

Roseate terns are medium-sized sea terns that superficially resemble the common tern (*Sterna hirundo*), a species with which it invariably nests in the Northeast. Although roseate terns

must compete with common terns for food, they benefit from the early warnings and anti-predator defense provided by common terns. The roseate tern can be distinguished from the common tern by its lighter gray back and wings, longer outer tail feathers, and pinkish (roseate) underparts. The bill of the roseate tern is black during the early part of the breeding season but turns orange-red at its base as the breeding season progresses.

The decline of the northeastern population of roseate terns and its subsequent listing as endangered prompted intensive study into the causes of its endangerment and possible strategies for its recovery. The two main factors identified as limiting to roseate terns in the Northeast were loss of nesting sites and predation. Many islands that traditionally were used as nesting sites by roseate terns have been taken over by herring gulls (*Larus argentatus*) and great black-backed gulls (*L. marinus*). Other islands were lost to erosion. The loss of these islands to gulls or erosion forced roseate terns to nest at

sites either on or close to the mainland, where they are more vulnerable to human disturbance and to predators such as great horned owls (*Bubo virginianus*), black-crowned night-herons (*Nycticorax nycticorax*), weasels (*Mustela frenata*), raccoons (*Procyon lotor*), rats (*Rattus norvegicus*), and red foxes (*Vulpes vulpes*). In addition to habitat loss and predation, roseate tern productivity may be limited by food availability near nesting sites, storm events, and an imbalanced sex ratio with females outnumbering males. They may also face hazards while wintering at sea or off the coast of South America.

Displacement by herring and great black-backed gulls probably has been the primary cause of the concentration of roseate terns into a few major colony sites, as well as an important factor in their overall decline in the Northeast since the 1930's. These large and aggressive gulls arrive on the nesting grounds weeks before the terns, then establish territories and vigorously defend them. This results in the displacement of terns from their traditionally preferred sites to sites that are closer to the mainland and therefore more vulnerable to mainland predators. For this reason, it is important to protect roseate tern colonies by discouraging or removing competing gulls from tern nesting sites.

While most seabirds rely on live fish for food, herring and great black-backed gulls are scavengers, obtaining food from landfills and the by-catch of fisheries. Open landfills are an important source of food for gulls, especially during stressful winters. Access to this human-supplied food source gives gulls a competitive advantage over seabirds that must forage in more natural settings, allowing gulls to expand their range and breed in areas where they historically had not nested. Although the modernization of landfills has denied much of this advantage, gulls continue to occupy many of the traditional nesting sites of roseate terns.



The FWS and State wildlife management agencies employ a variety of means to reduce competition from gulls. Strategies include nest and egg destruction, shooting gulls prior to tern arrival, harassment to drive gulls away, cage traps, and gull toxicant 1339. In order to achieve long-term success in controlling gull numbers, efforts must be undertaken annually to limit the nesting success of gulls. Once gulls have been displaced from islands that terns historically occupied, terns can be attracted back to these sites through the use of decoys and tape-recorded calls. Because roseate terns are always found in association with common terns in the Northeast, efforts to attract terns often focus on the common tern.

Recovery efforts also make use of habitat modification and artificial nesting sites. Unlike the common tern, which nests in the open, roseate terns nest under or adjacent to structures that provide shelter or cover. These structures include clumps of vegetation, driftwood, rocks, or man-made objects. Dr. Jeff Spindel, a biologist at the Patuxent Wildlife Research Center of the U.S. Geological Survey, heads roseate tern research and recovery efforts at Falkner Island, part of the Stewart B. McKinney National Wildlife Refuge in Connecticut.

**Adult roseate tern, at left, with mostly black bill, and a common tern. In the northeastern United States, roseate terns always nest with common terns. They benefit from the colony site defense provided by the more aggressive common terns, but they also must compete with common terns for both nest sites and for food (small fish).**

*Photo by Howard R. Spindel*



**Jim Zingo, a Ph.D. candidate with the University of Massachusetts Cooperative Fish and Wildlife Research Unit in Amherst, weighs a roseate tern chick. Our ability to estimate reproductive success and to predict the survival of each chick to fledgling is improved by knowing how healthy each chick is. We do this by monitoring their daily mass.**  
 Photo by Diana R. Spendelow

**(right) An adult roseate tern, handed with a six band combination for individual identification. About 95 per cent of the adults at this site have been banded for use in studies of behavior and population dynamics that are producing new knowledge for improving restoration at this and other sites.**  
 Photo by James M. Zingo

He found that roseate terns nesting in the shelter of wooden boards, tires, and driftwood on Falkner Island had greater reproductive success than those nesting in natural, unmodified sites. In 1997, Falkner Island had the fifth largest colony of roseate terns in the Northeast. During the peak period count, 136 pairs of roseate terns were found nesting on the island.

The Stewart B. McKinney NWR is not the only refuge with nesting roseate terns. Petit Manan Island, part of the Petit Manan NWR on the coast of Maine, had 29 nesting pairs in 1997, and Monomoy NWR off the Massachusetts coast had 42 nesting

pairs in 1998. However, the majority of roseate terns in the Northeast do not nest on NWR lands. Great Gull Island, New York, and Bird and Ram Islands, Massachusetts, support the three largest colonies in the Northeast, accounting for 2,577 of the 3,382 nesting pairs counted in 1997. These sites are owned by State or local government agencies or private conservation organizations.

Cooperation has been key in roseate tern recovery efforts. Dr. Spendelow coordinates the Cooperative Long-term Roseate Tern Metapopulation Project, a comprehensive research project in the Massachusetts-Connecticut-New York area. Scientists throughout the Northeast have been working together on this project since 1987 to study the population dynamics and ecology of the roseate tern. Their efforts are supported by the FWS, the Biological Resources

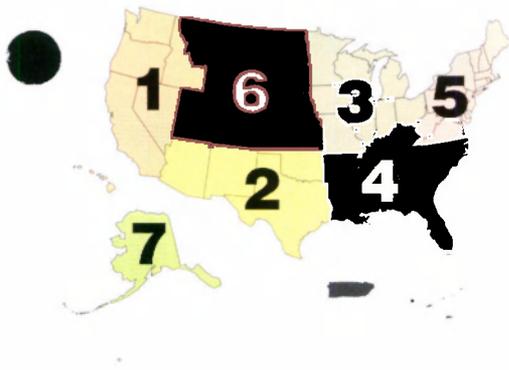
Division of the U.S. Geological Survey, State and local agencies, and private conservation organizations. Through creative partnerships and the efforts of dedicated biologists, the FWS hopes to achieve its primary recovery objective of increasing the Northeast population of roseate terns to 5,000 breeding pairs distributed among at least six highly productive large colonies.

*Rena R. Borkhataria recently completed a Harry S Truman Foundation Summer Internship with the FWS Division of Endangered Species in Arlington, Virginia. She is currently pursuing a Master's degree in zoology through the North Carolina Cooperative Fish and Wildlife Research Unit at North Carolina State University in Raleigh.*

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Regional endangered species staffers have reported the following news:

## Region 1

**Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*)** In April, Fish and Wildlife Service (FWS) biologist Rick Vetter worked with the Oregon Department of Fish and Wildlife (ODFW), a private landowner, and volunteers in the Alvord Desert region to retrieve 3,000 Lahontan cutthroat trout. Due to a fish screen failure, the trout had escaped from suitable habitat at Mann Lake into 2.5 miles (4 kilometers) of irrigation ditch and an adjacent creek. Biologists used electroshocking equipment to stun the fish for capture and transport back to Mann Lake. The FWS is working with ODFW and the landowner on a Partners for Fish and Wildlife project that will prevent the threatened trout from migrating up into this irrigation ditch in the future.

**California Condor (*Gymnogyps californianus*)** There are a number of condor updates to report. To begin, several of the free-flying condors in southern California have been exploring some new territory. In late April, Hopper Mountain National Wildlife Refuge Complex (Refuge Complex) received reports of condors at the U.S. Forest Service Ranger Station at Figueroa Mountain and on surrounding ranch lands. A group of condors also visited the Ojai Valley, California, home of actor Larry Hagman on April 28. Mr. Hagman was extremely gracious and granted Refuge Complex biologists access to his property. The Refuge Complex sent thank you notes and enameled condor pins to Mr. Hagman and the other ranchers who offered their assistance. Other areas frequented by the condors include the Tehachapi Mountains and portions of the Sequoia National Forest in Tulare County, California.

In late April, one of the youngest reintroduced condors

(identified as #53) made a significant flight east from Lion Canyon in the Los Padres National Forest and ended up on the outskirts of Santa Paula, California, near an equestrian facility. The initial sighting of #53 in this area was made by a local horse trainer. Other ranchers in the area also placed calls to the office. Refuge Complex Acting Deputy Project Leader Chris Barr traveled to the area and successfully captured the bird on April 30. The bird was transported back to the Lion Canyon area and re-released. This condor appeared healthy and was feeding normally after its re-release at Lion Canyon, but on May 20 Refuge Complex biologists observed the bird favoring its right leg. Wildlife Biologist Mike Barth captured the bird on June 2, and a preliminary assessment of the injury indicated that the bird had suffered a severe compound fracture of its leg. The condor was transported to the Los Angeles Zoo Veterinary Hospital, where x-rays revealed the presence of small metallic fragments around the wound site. Samples of the fragments were sent to the FWS National Wildlife Forensics Laboratory in Ashland, Oregon. Tests performed at the lab indicated that the fragments were from a bullet. The FWS Law Enforcement office in Torrance, California, was contacted. Condor #53 underwent two surgical procedures at the zoo to stabilize the leg and to treat it for an infection, but it died on August 9. A necropsy was performed, but results of blood and tissue analyses were still pending as of August 20 and no definitive cause of death had been determined.

On May 1, refuge biologists monitoring condors at Lion Canyon observed condor #05 behaving oddly. The bird appeared weak and was unable to fly or land properly. It was captured and immediately taken to a veterinary clinic in Frazier Park, California, that is approved to provide assistance to the refuge. The following morning, the bird was transported to the Los Angeles Zoo's Veterinary Hospital for further examination. Tests performed on #05 revealed a blood lead level of 291.4 µg/dl, far in excess of the 100 µg/dl level considered fatal to condors. The bird immediately underwent intensive supportive care, including chelation treatment for the lead. Because its crop was no longer able to pass food, the hospital inserted a feeding tube to provide nourishment. By mid-June, the feeding tube was removed and the bird was able to pass small quantities of meat through its crop. As of August 20, the bird was feeding normally. It has been transferred from the hospital into a flight pen with other condors, where it continues to gain strength and put on weight.

On July 17, two wild condors were found dead in a natural

pot hole filled with water that is located on a large sandstone outcrop at the head of Lion Canyon. The condors, ages 1 and 2, may have entered the pot hole to drink or bathe and drowned when they were unable to exit the steep-sided cavity. A necropsy conducted at the San Diego Zoo the next day did not reveal any data contrary to the conclusion of death by drowning. The condors were last seen alive on July 10 and were found when a field biologist picked up a signal from a submerged radio.

Currently, there are 33 condors in the wild—18 in California and 15 in northern Arizona. A total of 19 chicks were hatched from the captive breeding flocks this year. The total population of California condors now stands at 149 (this includes both wild and captive populations).

**Wildflower Show** FWS Roseburg, Oregon, Field Office staff participated in the 32nd Annual Glide Wildflower Show on the weekend of April 25-26 in Glide, Oregon. The show included a display featuring the rough popcornflower (*Plagiobothrys birtus*), which was proposed in November 1997 for listing as endangered. Informational handouts and color pictures of the plant were available for public distribution. Interestingly, several landowners expressed a desire to provide habitat for establishing additional populations of the plant on their property.

The Glide Wildflower Show is one of the oldest as well as the largest show of its type in the Pacific Northwest. Attendance this year was comparable to past figures of approximately 3,000. Over 300 school children toured the exhibit on April 27.

**Western Snowy Plover (*Charadrius alexandrinus nivosus*)** Outdoor education specialists and plover biologists from the Bureau of Land Management, U.S. Forest Service, Oregon Department of Fish and Wildlife, Oregon State Parks, and FWS Oregon Coastal Field Office have developed a slide show to educate beach visitors about plover conservation. With a simple script designed to be presented by a volunteer, the show provides basic information about the plover, the reasons for its decline, and keys to its recovery, particularly the contributions that can be made by beach visitors. We are hopeful that this approach will reach people effectively and improve compliance with plover protection measures.

*Reported by LaRee Brosseau of the FWS Portland, Oregon, Regional Office.*

## Region 2

### Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

More than 3,600 nests have been recorded so far this year for the world's most endangered sea turtle, the Kemp's ridley, on Mexico's Gulf Coast south of Brownsville, Texas. The total—more than 1,200 higher than last year's 2,384 nests (an increase of 50 percent)—is the highest recorded for the species since the late 1960's.

This modern-day record provides hope that the Kemp's ridley sea turtle is continuing to recover from the brink of extinction. It is also a testament to the species' tenacity and longevity, plus the work of government agencies, support from nearby residents, and participation from a variety of other partners in Mexico and the United States.

As of June 29, more than 2,250 nests had been laid at Rancho Nuevo, Mexico, the species' main nesting beach, about 230 miles (370 km) south of Brownsville, Texas. Other nesting areas, on an 80-mile (130-km) stretch of beach with Rancho Nuevo at its center, recorded the following numbers of nests so far this year: Playa Dos 450, La Pesca 41, Tepehuajes 609, Altamira 175, Miramar 11, and Lechugillas 70. A total of 13 nests have also been found this year on Padre Island, Texas, including nine on Padre Island National Seashore—a record for the United States as well.

Despite this good news, the number of juvenile Kemp's ridleys found stranded each year on coastal beaches remains high, indicating a source of mortality that could ultimately affect numbers of nesting turtles. Thus, recovery efforts for the Kemp's ridley sea turtle include continued protection of known nesting beaches and adjacent waters, plus further reductions in mortality from incidental catch and drowning of turtles during commercial shrimping operations in the U.S. and Mexico. Biologists have a goal of ensuring a nesting population of 10,000 turtles per year before considering upgrading the status of Kemp's ridley from endangered to threatened.

*Reported by Hans Stuart and Larry A. Dunkeson of the FWS Albuquerque, New Mexico, Regional Office.*

## Region 4

### Leatherback Sea Turtle (*Dermochelys coriacea*)

In early May, FWS Director Jamie Clark and Southeast Regional Director Sam Hamilton helped project directors

and FWS staff relocate leatherback sea turtle nests at Sandy Point NWR, which is located on the southwestern tip of St. Croix in the U.S. Virgin Islands. Nests in erosion zones on the beach were moved to other areas of the beach that will not wash away. According to Refuge Manager Mike Evans, 118 female turtles constructed 720 nests last year at Sandy Point, a substantial increase from a low of 82 nests laid in 1986. One female can lay an average of about 80 eggs at a time. "A two-kilometer stretch of beach on Sandy Point has more leatherbacks nesting there than along the entire Atlantic and Gulf Coasts of the United States," said Evans.

*Reported by Elsie Davis of the FWS Atlanta, Georgia, Regional Office.*



**FWS Director Clark assists in turtle egg relocation**  
Photo by Sandy MacPherson

## Region 5

**New Jersey Surface Water Quality Standards.** In response to a June 1996 non-jeopardy biological opinion issued under section 7 of the Endangered Species Act (ESA) by the FWS New Jersey Field Office, the New Jersey Department of Environmental Protection proposed revisions to the New Jersey Surface Water Quality Standards that would strengthen protection for threatened and endangered species within New Jersey. The standards would clearly state that federally-listed species must be protected. No degradation of water quality would be permitted in waters that support federally-listed species. The FWS and the Region II of the Environmental Protection Agency worked closely with the State to develop the proposed revisions.

**Bog Asphodel (*Narthecium americanum*)** The FWS New Jersey Field Office and Edwin B. Forsythe National Wildlife Refuge forged a partnership with the Stafford Township Environmental Commission and

Southern Regional High School to restore a wetland on refuge lands supporting a population of bog asphodel, a plant that is a candidate for listing under the ESA. Working with Stafford Township botanists and ecologists and FWS biologists, students from the Ecology Club at Southern Regional High School mapped the location of bog asphodel plants and developed a management plan for the site. The students gained a first-hand understanding of the species' habitat requirements while enthusiastically clearing encroaching vegetation that threatened to shade out the bog asphodel. Over the next 5 years, students will assist biologists by monitoring the results of the project. Through educational outreach programs such as this, the Stafford Township Environmental Commission hopes to inspire a new generation of local scientists and land stewards.

**Middle Fork Holston River** The FWS Southwestern Virginia Field Office has signed an agreement with James M. Johnson, a local land owner, for a Partners for Fish and Wildlife project on the Middle Fork Holston River. Mr. Johnson owns property that includes a riparian zone approximately 2 miles (3.2 km) upstream of an area where the tan riffleshell (*Epioblasma walkeri*), an endangered mussel, is known to occur. A threatened fish, the spotfin chub, (*Cyprinella monacha*), also was recorded recently downstream. Approximately 3,000 feet (915 meters) of stream frontage will be protected by excluding livestock from the river and by planting native trees, river cane, and warm season grasses in the area between the fencing and the stream.

**Karner Blue Butterfly (*Lycaeides melissa samuelis*)** In early December, Partners for Fish and Wildlife staff from the FWS New York Field Office, along with Brett M. Gore, Biological Technician for the St. Lawrence Wetlands & Grassland Management District, received Crawler Dozer Safety Training from Steve Flanders, Equipment Safety Instructor for the Montezuma National Wildlife Refuge. At the same time, they restored important wildlife habitat. The training was conducted on a 3-acre (1.2-hectare) site in Albany, New York, that is being converted to habitat for the Karner blue butterfly, an endangered species. The site, once a paved lot used for parking tractor trailers, was purchased by the Albany Pine Bush Preserve Commission. The previous landowner had removed the asphalt prior to transferring the property to the Commission but had neglected to remove the concrete strips where the tractor trailer jacks rested. The New York Field Office's Partners for Fish and Wildlife Program

rented the bulldozer for the concrete removal. In the spring, the Commission planted wild blue lupine and nectar sources for the Karner blues. The butterfly currently occupies habitat across the street from the site.

**Fireworks Consultations** The FWS New York Field Office reviewed plans for 28 separate fireworks events leading up to this year's Fourth of July weekend. ESA section 7 consultations were conducted with the U.S. Coast Guard for the events that required a Marine Events permit. Working with the event sponsors, fireworks companies, the New York State Department of Environmental Conservation, and The Nature Conservancy, measures were included in the firework plans to protect the piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*). Both threatened species occur on Long Island beaches where firework displays can result in both direct and indirect adverse effects, especially when crowds of spectators are attracted to the beaches at night. By working together, the permit applicants and agencies were able to conserve these vulnerable species while celebrating the birth of our Nation.

**Wolves and the Adirondacks** The conservation organization Defenders of Wildlife is sponsoring a preliminary study to examine the biological and social feasibility of reintroducing gray wolves (*Canis lupus*) into the Adirondack Mountains of New York. The study is designed to provide the information needed for Adirondack residents and other involved parties to evaluate whether they desire to allow the reintroduction of wolves into the Adirondacks. The FWS New York Office and the New York State Department of Environmental Conservation are providing technical assistance to Defenders and a local citizen's advisory committee that is participating in the review and planning of any potential reintroduction. Because there is no Federal land in the Adirondacks, the New York State Department of Environmental Conservation would need to approve and take the lead on any reintroduction effort. The FWS would then work with New York in evaluating a State proposal and the likelihood of its success.

*Reported by Mark Clough of the FWS New York Field Office.*

From May through July of 1998, the Fish and Wildlife Service (FWS) published the following proposed and final listing actions under the Endangered Species Act:

### Listing Proposals

**Canada Lynx (*Lynx canadensis*)** The Canada lynx is a secretive, forest-dwelling cat of northern latitudes and high mountains. It historically inhabited much of Canada, the forests of northern tier States, and subalpine forests of the central and southern Rockies. Its range in the contiguous United States included parts of Washington, Oregon, Idaho, Montana, Utah, Wyoming, Colorado, Minnesota, Wisconsin, Michigan, New York, Vermont, New Hampshire, Maine, Pennsylvania, and Massachusetts. At present, however, the FWS is only able to confirm the presence of lynx south of Canada in Maine, Montana, Washington, and possibly Minnesota. Therefore, on July 8, the FWS proposed to list the contiguous U.S. population segment of the Canada lynx as threatened.



Photo by Beverly Steveson

The listing proposal cited a number of causes for the decline of lynx populations, including the loss or modification of habitat due to such activities as logging, road construction, development of skiing facilities, and urban sprawl. Over-exploitation in the past for the fur trade and increased human-induced changes to suitable habitat that have allowed the spread of competing species.

Included in the listing proposal was a special rule that would allow regulated taking and interstate transport of lawfully obtained captive-bred lynx.

**Bull Trout (*Salvelinus confluentus*)** In the June 10 *Federal Register*, the FWS proposed to list the Coastal-Puget Sound (Washington), Jarbridge River (Idaho and

Nevada), and St. Mary-Belly River (Montana) population segments of the bull trout as threatened. The proposal includes a special rule to allow the take of bull trout under certain circumstances, which would permit continuation of recreational fisheries within the species' range.

The bull trout, a member of the char subgroup of the salmon family, is native to the Pacific Northwest, including Washington, Oregon, California, Idaho, Montana, Nevada, Alaska, and the Canadian provinces of Alberta and British Columbia. It is not in danger in parts of its range, although it is extinct in California. This species requires very cold water for egg incubation, juvenile rearing, and spawning. Threats to some bull trout populations include habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, certain past fisheries management practices, and the introduction of non-native trout species.

### Final Listing Rules

**Bull Trout** Concurrent with the June 10 listing proposal, the FWS made final an earlier proposal to list the Columbia River and Klamath River bull trout population segments as threatened. They face the same threats as the population segments proposed on June 10.

**Steelhead (*Oncorhynchus mykiss*)** Based on findings by the National Marine Fisheries Service, the FWS published a notice in the June 17 *Federal Register* formally listing several Evolutionary Significant Units (ESU) of this trout species for ESA protection. The southern California and upper Columbia River basin ESUs were listed as endangered, while the south-central California coast, central California coast, California Central Valley, Snake River basin, and lower Columbia River ESUs were listed as threatened.

**Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)** This rare mammal currently inhabits heavily vegetated riparian habitats in seven eastern Colorado counties and two counties in southeastern Wyoming. Habitat loss and degradation caused by agricultural, residential, commercial, and industrial development have reduced its range and imperil its survival. On May 13, the FWS listed the Preble's meadow jumping mouse as threatened. FWS biologists are working with State officials to develop interim regulations, authorized under section 4(d) of the ESA, that will allow certain activities to continue while a more comprehensive Habitat Conservation Plan is completed.

# BOX SCORE

Listings and Recovery Plans as of September 30, 1998

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	U.S. SPECIES W/ PLANS**
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	59	251	8	16	334	48
 BIRDS	75	178	15	6	274	77
 REPTILES	14	64	22	14	114	30
 AMPHIBIANS	9	8	7	1	25	11
 FISHES	68	11	40	0	119	88
 SNAILS	15	1	7	0	23	20
 CLAMS	61	2	8	0	71	45
 CRUSTACEANS	17	0	3	0	20	10
 INSECTS	28	4	9	0	41	26
 ARACHNIDS	5	0	0	0	5	5
<b>ANIMAL SUBTOTAL</b>	<b>351</b>	<b>519</b>	<b>119</b>	<b>37</b>	<b>1,026</b>	<b>360</b>
 FLOWERING PLANTS	531	1	123	0	655	488
 CONIFERS	2	0	1	2	5	2
 FERNS AND OTHERS	26	0	2	0	28	26
<b>PLANT SUBTOTAL</b>	<b>559</b>	<b>1</b>	<b>126</b>	<b>2</b>	<b>688</b>	<b>516</b>

GRAND TOTAL

910

TOTAL U.S. ENDANGERED: 910 (351 animals)  
 TOTAL U.S. THREATENED: 245 (119 animals)  
 TOTAL U.S. LISTED: 1155 (470 animals)\*\*\*, (

\*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

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 only for listed species that occur in the United States.  
 \*\*\*Eight 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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