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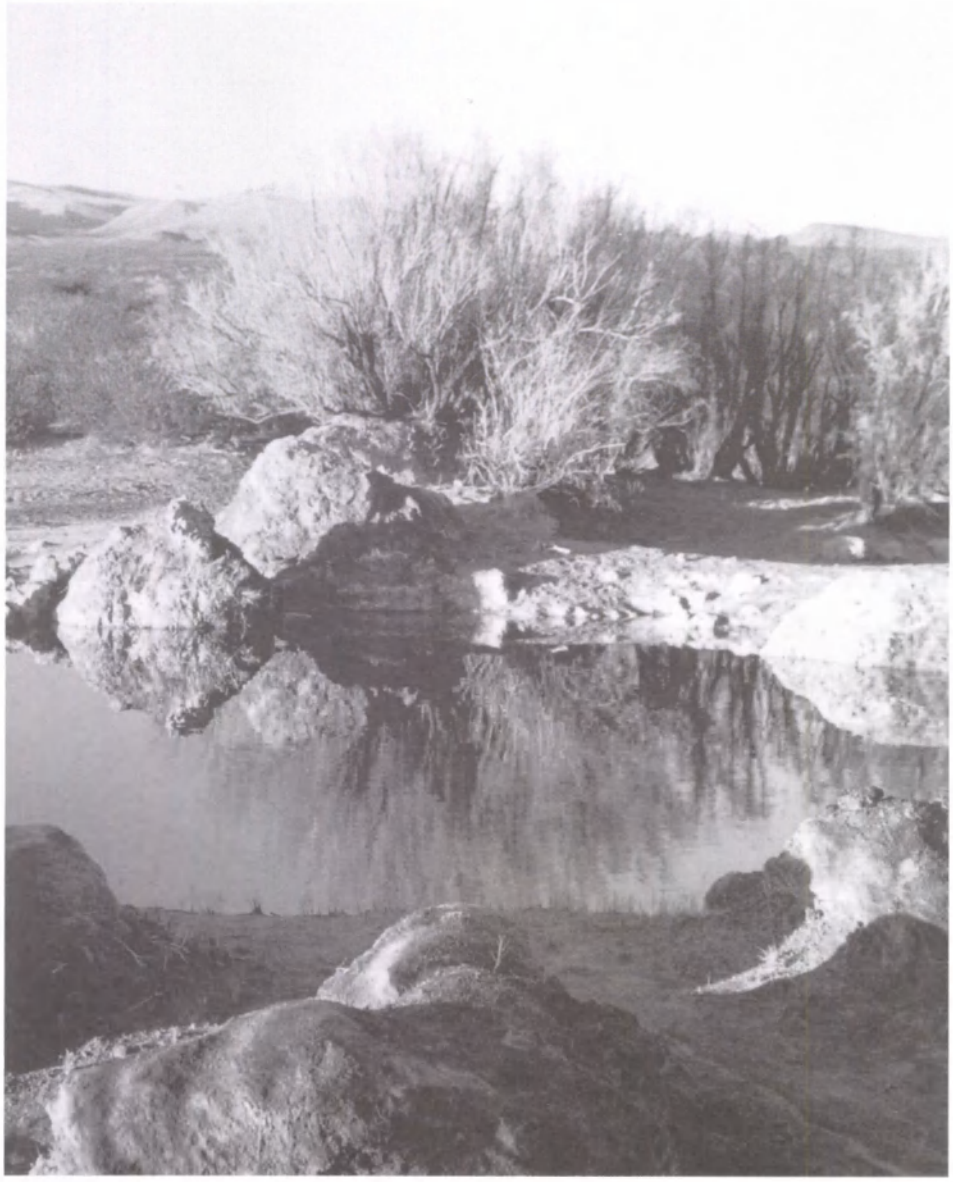

Most of the plants and animals in danger of extinction today have at least one thing in common: habitat loss. Too often, the ecosystems on which they depend have been degraded, fragmented, reduced in size, or even destroyed. The question of whether or not species will continue to decline depends on our willingness to find enough room to coexist with wildlife in the modern world. Innovative approaches to habitat restoration and enhancement are proving that compatibility is possible.

This edition of the ***Endangered Species Bulletin*** *looks at examples of cooperative habitat improvement projects involving private landowners, other concerned individuals, organizations, and a variety of agencies.*

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On the Cover
The White Sands pupfish may benefit from the fencing of this New Mexico spring to control habitat damage from feral horses.
photo by John Pittenger/New Mexico Department of Game and Fish
Left
Salt Creek on the White Sands Missile Range is one of the pupfish's most important remaining habitats.
Opposite Page
Feral horses can cause tremendous damage to desert springs. This site is now fenced for its protection.
photos by Craig L. Springer

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

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by Don MacLean

Partners for Wildlife

According to a 1995 National Academy of Sciences study, habitat loss is the greatest factor threatening the survival of many species. Urbanization and agriculture have replaced many natural plant and animal communities. But as landowners continue to face complex decisions on how best to manage their property, a growing number are voluntarily incorporating various wildlife habitat restoration techniques and realizing the associated benefits.

The Partners for Wildlife Program has been working with private landowners since 1987 in a unique and productive partnership to restore wildlife habitat on private property. It involves the cooperation of Federal, State and local government agencies; conservation organizations; educational institutions; corporations; and private landowners. Since its initiation, the Partners for Wildlife program has forged partnerships with nearly 13,000 private landowners and is approaching restoration of important ecological functions on over 300,000 acres (121,400 hectares) of previously degraded wetlands, 30,000 acres (12,140 ha) of native prairie, 350 miles (563 kilometers) of riparian habitat, and 40 miles (64 km) of in-stream aquatic habitat. Although nontidal wetland restoration projects predominate, other habitats restored include bottomland

Don MacLean/FWS

The U.S. Fish and Wildlife Service (FWS) is working cooperatively with property owners to restore wildlife habitat on private lands through the Partners for Wildlife Program and a number of U.S. Department of Agriculture programs. The Partners program in particular continues to grow in popularity. With its broad restoration guidelines, the program has great potential to restore habitat for endangered, threatened, and candidate species. It is already contributing to habitat restoration for at-risk species in many areas of the country; approximately 15 percent of the projects implemented in 1995 directly benefited listed or candidate species. The percentage of these projects varies among FWS regions. In the west, where more opportunities exist, approximately 85 percent of the 1995 projects have improved habitat for listed and candidate species.

To promote even greater participation in the Partners program, the FWS has developed a "safe harbor" policy for landowners who undertake conservation actions on behalf of threatened and endangered species. Under this policy, landowners are given assurance that restored habitats may be returned to pre-restoration conditions when cooperative agreements expire—even if listed species become established on the lands—under certain conditions. (See *Bulletin* Vol. XX, No. 1.)

Wetland and riparian habitats restored in the Mission and Blackfoot Valleys and along Montana's Rocky Mountain Front Range have provided additional habitat for threatened grizzly bears *(Ursus arctos)*. To the south, near Centennial, Wyoming, wetlands that were historic habitat for the endangered Wyoming toad *(Bufo hemiophrys baxteri)* and the boreal toad *(Bufo boreas boreas)*, a species of concern, have been restored and protected.

Threatened and endangered plants have also benefited from the Partners program. In Jackson County, Iowa, Partners' funds were used to restore the hydrology of a small wetland called Baldwin Marsh. This marsh is one of only two known locations in the State supporting the threatened eastern prairie fringed orchid *(Platanthera leucophaea)*.

Other targets of restoration activities include aquatic species. In the Little Tennessee River, the Partners program has worked with the Tennessee River Watershed Association, Natural Resources Conservation Service, and Southwestern Resource Conservation and Development Council to restore riparian areas adjacent to sensitive aquatic habitats. Activities have included cattle fencing, bank stabilization using bioengineering techniques (root wads, tree revetments, etc.), and riparian tree planting. Two endangered species, the little-wing pearly mussel *(Pegias fabula)* and Appalachian elktoe *(Alasmidonta raveneliana)*, as well as the threatened spotfin chub *(Hyopsis monacha)*, have benefited from this project.

In many cases, restoring a rare habitat benefits more than one vulnerable species, including plants and State-listed species. At the Casa de Patos project in California, approximately 450 acres (182 hectares) of leveled rice fields were recontoured and restored to natural conditions. Tens of thousands of ducks, geese, swans, sandhill cranes, and shorebirds that use the restored area now have improved habitat, along with the threatened giant garter snake *(Thamnophis gigas)* and the Swainson's hawk *(Buteo swainsoni)*, a state-listed species. The site is also habitat for the white-faced ibis *(Plegadis chibi)*, a species of concern, and the California hibiscus *(Hibiscus lasiocarpus)*, a candidate for Federal listing.

In Kansas, private landowners and the FWS have joined forces to restore and protect habitats for both State- and Federal-listed species at the only outcropping of the Ozarkian Plateau and its cave system in the State. Restricting vehicular access, which allowed the surface habitat to recover from disturbance and compaction, improved conditions for State-listed species like the eastern blue dogbane *(Amsonia tabernaemontana)*, whorled milkweed *(Asclepias quadrifolia)*, bog aster *(Aster paludosus)*, and hirsute sedge *(Carex hirsutella)*, along with 43 other plants, 7 fish, 3 mammals, 2 amphibians, and a neotropical migratory songbird. Cave species that have benefited from the project include the cave salamander *(Eurycea lucifuga)*, graybelly salamander *(Eurycea multiplicata griseogaster)*, grotto salamander *(Typhlotriton spelaeus)*, and endangered gray bat *(Myotis grisescens)*.

The opportunities for creative partnerships to restore wildlife habitat are endless. We are just beginning to realize the potential.

Don MacLean is a biologist for the Branch of Habitat Restoration in the FWS Division of Habitat Conservation in Washington, D.C. For more information about the Partners for Wildlife Program, contact the Division at 703/358-2201.

hardwood forests, prairie potholes, native prairie, riparian woodlands, tidal wetlands, and such unique areas as cienegas and bosques (desert wetlands and woodlands, respectively). Program guidelines permit the restoration of any habitat that would benefit Federal trust species, including threatened or endangered plants and animals.

Don MacLean/FWS

Opposite Page

At this site in Butte County, California, grading machinery was linked with laser-guided surveying equipment to make fields as level as possible for maximum rice production. Natural wetland functions were diminished greatly as a result.

Above

The same technology used to level fields can be used to "delevel" the land, producing a more natural topography and restoring important wetland values. This site shows a former laser-leveled field one year after its restoration.

by Debra Schlafmann

A Farmer Sows Wildlife Habitat

John Anderson is a veterinarian who put down his scalpel and put on his overalls. Although he spent most of his career at the University of California—Davis in primate research, John worked during his spare time on his 500-acre (200-hectare) farm with his family. His love for farming grew and he now devotes his entire time to the farm. But he is much more than a farmer.

After experimenting on his own land, John is now one of the most renowned authorities on native plant restoration in central California. He is Director of the Yolo County Resource Conservation District, is active with the Yolo Basin Foundation (a non-profit corporation dedicated to educating people about wetlands and wildlife), and is a board member of the California Native Grass Association. The California Department of Forestry has acknowledged his efforts with an "Outstanding Forestland Stewards Award."

The Andersons' place, Hedgerow Farms, is located in the rich farmland of California's Sacramento Valley. At times, especially during the winter, the farms along the main road to their operation are devoid of any vegetation. "Clean farming" practices, in which all vegetation other than crops is removed mechanically or by herbicides, have been adopted by many California farmers as a means to control unwanted plants. If you drive along such a field after harvest, all that remains is a barren landscape of bare dirt, making it feel a

FWS photo

John Anderson of Hedgerow Farms and Debra Schlafmann at one of the farm's wildlife habitat borders.

bit as if you are on the moon. But if you continue, you suddenly come across a plenitude of plants along roadsides, in wide ditches, and between row crop fields. The sounds of birds calling, frogs singing, and insects buzzing announce that you have reached Hedgerow Farms.

In 1976, John began integrating wildlife habitat borders or hedgerows into intensive rowcrop farming, and several years later he began experimenting with perennial native grasses, which had been missing from much of the California landscape for nearly a century. Hedgerow Farms focused on recreating lost California prairie savannas, riparian zones, and wetlands on its non-farmed areas. John contacted the Fish and Wildlife Service (FWS) in 1991 to see if the Partners for Wildlife program would assist with his plans. With help from the FWS and many other partners, John restored over 1 mile (1.6 kilometers) of riparian habitat, 12 acres (4.8 ha) of seasonal wetlands (including vernal pool habitat), 50 acres (20 ha) of native grasses, and at least 9 multi-species hedgerows between or on the edges of crop fields. He has incorporated more than 70 species of native perennial grasses, forbs, sedges, rushes, shrubs, and trees on Hedgerow Farms. Within the riparian corridor and hedgerows, John has planted valley oak, cottonwood, willow, toyon, buckeye, wild rose, elderberry, and other species. The benefits of the revegetation have been numerous and wildlife populations have exploded. When questioned about possibly attracting the endangered valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)* by planting elderberries, John responded, "We are not concerned that the elderberry attracts an endangered insect. We are anxious to show that farming is compatible with it."

Including the 200 acres (80 ha) in native grass seed production and 165 acres (66 ha) of row crops, the farm has approximately 8 acres (3.2 ha) of hedgerows, which are essentially year-round "habitat highways" for numerous animals, including deer, foxes, bears, and coyotes. They act as a web, connecting ponds, sloughs, other wetlands, canals, roadside prairies, and native grass fields. These systems also support a great number of beneficial insects important in controlling pests in the adjacent row crops.

Since restoration activities began, wildlife habitat on Hedgerow Farms has been used by over 100 species of birds, including such uncommon birds as the Swainson's hawk *(Buteo swainsoni)* and the loggerhead shrike *(Lanius ludovicianus)*. The giant garter snake *(Thamnophis gigas)*, a threatened species, very likely will find a home on the farm, along with a number of amphibians and beneficial insects. Although no one yet knows whether valley elderberry longhorn beetles have become established on Hedgerow Farms, John will continue planting habitat for them. Hedgerow Farms is working with the appropriate State and Federal agencies, including the FWS, to establish a "safe harbor" agreement, with the potential to attract up to 10 State- and Federal-listed species. Such plans encourage landowners to practice good stewardship that will attract endangered wildlife to their land but allow them to convert the land to other uses in the future without penalty.

The Andersons have committed Hedgerow Farms to serve as an educational and demonstration farm. As a result, the farm has hosted six habitat restoration workshops since 1989, numerous University of California classes have used it for field trips, and people regularly ask for tours. As John says, "Hedgerow Farms represents the perfect dovetailing of conventional agriculture and restoration ecology."

Debra Schlafmann is the FWS State Coordinator for the Partners for Wildlife program in California.

Partners for Wildlife

The partners who have contributed to habitat restoration at Hedgerow Farms include the U.S. Fish and Wildlife Service, Yolo County Resource Conservation District, Yolo County Flood Control and Water Conservation District, USDA's Natural Resource Conservation Service, California Department of Fish and Game, California Department of Forestry, and University of California Cooperative Extension Service.

by Cindy Chaffee

Fish Creek Preservation

An innovative public/private partnership has been developed to protect rare and endangered species present in Fish Creek. A tributary of the St. Joseph River in extreme northeastern Indiana and northwestern Ohio, Fish Creek is a center of aquatic biodiversity. Landowners, the Farm Services Agency, Indiana Department of Environmental Management, Indiana Department of Natural Resources, Natural Resource Conservation Service, Ohio Department of Natural Resources, Ohio Environmental Protection Agency, local Soil and Water Conservation Districts, TNC, U.S. Department of Agriculture, and the U.S. Fish and Wildlife Service (FWS) are cooperating in an effort—the Fish Creek Preservation Project—to conserve and protect this rich ecosystem.

Fish Creek supports 43 species of fish and 31 species of freshwater mussels, including 3 endangered species: the white cat's paw pearly mussel *(Epioblasma obliquata perobliqua)*, northern riffleshell mussel *(Epioblasma torulosa rangiana)*, and clubshell mussel *(Pleurobema clava)*. The salamander mussel *(Simpsonaias ambigua)*, rayed bean *(Villosa fabalis)*, and purple lilliput *(Toxolasma lividus)*, considered species of concern, are also found in Fish Creek. The white cat's paw, according to the most recent scientific records, continues to survive nowhere else but in Fish Creek (Hoggarth 1990). In recognizing the values of Fish Creek, The Nature Conservancy (TNC) calls it "... the best remaining example of the unique riverine community that once characterized the western Lake Erie basin" (TNC, 1993; Unsworth and Snell, 1994).

Fish Creek appears to be at the threshold between sustainable high water quality/ecological integrity and the more typical slide towards degradation. For example, several mussel species are known to occur only as mature adults, with little evidence of recent successful reproduction, and others have declined in numbers

FWS photo

Like most midwestern streams, Fish Creek is threatened by pollution from certain land uses within its watershed. In its Fish Creek Bioreserve Project Strategic Plan, TNC identifies the primary threats as those that degrade water quality, water quantity, and habitat structure. Agriculture is the primary land use within Fish Creek's 110-square-mile (260-square-kilometer) drainage. Wide-scale conversion of deciduous forests to intensive row crop production has led to increased erosion and water quality degradation from the runoff of soil particles and chemical pollutants (such as insecticides, herbicides, and fertilizers). These contaminants may produce chronic and/or acute effects in aquatic organisms.

Mussels and the host fish upon which mussel larvae depend are especially vulnerable to such "non-point source" pollutants as agricultural runoff. Increased soil erosion results in stream bed siltation, which may directly smother some mussels or indirectly reduce population levels by degrading the habitat needed by their host fish. A loss of riparian vegetation also decreases terrestrial and aquatic habitat structure, reduces shade (which may increase peak summer water temperatures), and enhances stream bank erosion potential. A decline in native vegetation and wetlands also reduces groundwater recharge, which can further reduce stream flows during periods of little rain.

To reverse the decline of native vegetation in the watershed and maintain water quality, the FWS Bloomington, Indiana, Field Office has secured $30,000 from the FWS Partners for Wildlife Program for restoring riparian habitat along Fish Creek. Of this total, $25,000 has been contributed to the TNC reforestation project for replanting 100 acres (40 hectares) in the lower two-thirds of the creek, where the endangered mussels are found. Reforestation will improve aquatic habitat for three endangered mussels and four species of concern (three mussels and one reptile). Previous to the Partners for Wildlife contribution, TNC had reforested approximately 130 acres (53 ha) and secured $20,000 for additional plantings. Cooperators in the Fish Creek reforestation efforts include TNC, FWS, U.S. Forest Service, U.S. Environmental Protection Agency, and Indiana Department of Natural Resources.

The remaining $5,000 in Partners for Wildlife contributions funded a project to secure high quality mussel and fish habitat by restoring an area previously used for livestock grazing and watering. A fence was constructed to keep livestock from the stream and riparian area, a new livestock watering point was developed, and the riparian area was replanted in trees. TNC will manage the reforested area for 3 years while it is being restored. This project will protect stream banks and substrate in an area that supports at least 14 of the 31 mussel species found in Fish Creek, and will reduce excess nutrient and sediment loading downstream. It will especially benefit the endangered clubshell mussel, which occurs immediately downstream of the project area.

Cindy Chaffee is a wildlife biologist in the FWS Bloomington, Indiana, Field Office.

References

Hoggarth, Michael. 1990. Recovery Plan for the White Cat's Paw Pearly Mussel. U.S. Fish and Wildlife Service.

The Nature Conservancy. 1993. Fish Creek (Indiana, Ohio) Bioreserve Project: Strategic Plan - Draft. Indiana Field Office.

Unsworth, R.E., and E.W. Snell. 1994. Preliminary Economic Evaluation of Natural Resource Damages to Fish Creek, draft memorandum reporting on the preliminary economic evaluation.

or range. On the positive side, the entire historically reported mussel community and almost all of the original fish community remain in the system at some level, and recruitment is evident for most species. However, if conservation practices are not implemented quickly in critical areas where trees and other vegetative cover are absent, water quality degradation will eventually exceed the tolerance of stream organisms.

Fish Creek encompasses approximately 30 miles (48 kilometers) of primary stream channel, and 90 miles (145 km) of tributaries and drainage ditches. Filter strips of trees along these channels will reduce the amount of sediment entering the water. TNC has launched a voluntary reforestation project using native hardwood seedlings suitable for each site, based on soil types and the landowner's objectives. After the seedlings are established, the landowner enters the "new forest" into TNC's Classified Forest Program. By doing so, the landowner receives property tax reductions if the land is kept in forest. If the land is later deforested, however, the savings received from the tax reduction will have to be repaid.

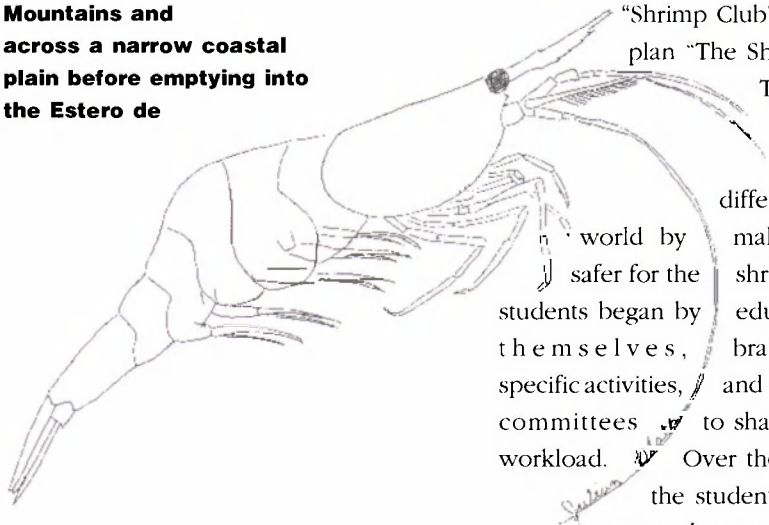
by Daniel Strait

Partnerships for a Shrimp

One of the Fish and Wildlife Service's (FWS) most unusual, yet satisfying Partners for Wildlife projects has evolved near the small town of Two Rock in a coastal dairy-producing region of Sonoma County in northern California. At the heart of the partnership are the students of Brookside School and the affection they have for an endangered crustacean, the California freshwater shrimp *(Syncaris pacifica)*.

The California freshwater shrimp (*Syncaris pacifica*) is a 2.5-inch (5-centimeter) decapod crustacean. It is the only extant species in its genus on the Pacific Coast, and represents one of two surviving genera in the family Atyidae. California freshwater shrimp are endemic to gentle gradient, low elevation, freshwater streams in Marin, Napa, and Sonoma Counties in California. A true freshwater shrimp, it inhabits quiet portions of tree-lined streams with underwater vegetation and exposed tree roots. Once common in the streams of the three counties, S. *pacifica* now occurs only within restricted portions of 15 streams.

The California freshwater shrimp has an extremely limited range. One of its few remaining habitats is Stempie Creek, a perennial stream that flows from the foothills of the Sonoma Mountains and across a narrow coastal plain before emptying into the Estero de



Drawing by Julian Plath, a student at Brookside School and a member of the Shrimp Club.

In 1993, the 4th grade class of Brookside School in San Anselmo, California, began discussing the plight of endangered species. The students' concern about the loss of wildlife led them to take action by "adopting" an endangered species. They wanted to select a species that was local, one that was not getting much attention, and one that had no one fighting for it. After considering a number of species, the students decided on the California freshwater shrimp. They formed a "Shrimp Club" and set out to plan "The Shrimp Project." Their goal was to try and make a difference in their world by making the world safer for the shrimp. The students began by educating themselves, brainstorming for specific activities, and establishing committees to share the workload. Over the last 2 years, the students have worked on creek restoration; met and collaborated with ranchers, biologists, vineyard owners, and environmentalists; marketed student-designed shrimp T-shirts and sweatshirts; designed murals; sent out letters, information packets, newsletters, and press releases; defended shrimp conservation before the University of California Regents and the City of Santa Rosa; and traveled to Sacramento and Washington, D.C., to lobby for the shrimp.

But the students weren't done yet. As part of an application for the national Anheuser Busch "A Pledge and A Promise" environmental award, they developed a Shrimp Information Packet, which won a first place award in the K-5 category and the Grand Prize in the K-College category. The monetary award of $32,500 provided money to be used for native plants, fencing, cattle bridges, and operating expenses for shrimp habitat improvement projects in the Stemple Creek watershed. Other grants the Shrimp Project has received include $2,500 from Bank of America, $32,000 from the Marin Community Foundation, a matching grant of $35,000 from the National Fish and Wildlife Foundation, and a $10,000 grant from the Center for Ecoliteracy. The Project has been supported since its inception by a Brookside partnership with the Autodesk Foundation.

Which brings us to the partnership with the Fish and Wildlife Service (FWS). In 1994, the staff of the FWS State Private Lands Office in Sacramento

was approached by a representative of Paul Martin, a dairy operator from the Two Rock area. Paul, his wife Jill, and daughter Betsy had worked with the Shrimp Club to rehabilitate a portion of Stemple Creek that crosses their property by fencing-off most of the creek and by planting native riparian trees, shrubs, and native perennial grasses on the banks of the creek. Betsy is active with the Future Farmers of America and led the "Shrimp Kids" in their rehabilitation work. The remaining task was to finish fencing-off the creek in a way that would allow cattle to cross from one pasture to another without entering the creek. Paul proposed a solution; place the bed of an old railroad flatcar across the creek to act as a cattle bridge, and fence-off and gate the remaining unprotected portion of the creek. Additional plantings of riparian trees, shrubs, and native grasses would be included as part of the project. An FWS biologist examined the project site, found that the project would result in the restoration or enhancement of approximately 4,000 feet (1,220 meters) of Stemple Creek, and confirmed that the project would improve the quality of shrimp habitat. Because of the broad range of benefits that would result from the project, the FWS chose to help fund the project through the Partners for Wildlife Program. The financing was arranged as follows: of the total project cost of $12,900, the FWS will pay 50 percent ($6,450), the USDA Farm Service Agency and the Shrimp Club of Brookside School will each pay 20 percent ($2,580), and the landowner will pay 10 percent ($1,290). Members of the Shrimp Club will plant the trees, shrubs, and native grass plugs by hand. The project is scheduled for completion by the summer of 1996.

How do the students of the Brookside School feel about their experiences with the Shrimp Project? It's clear that the Shrimp Project has gone beyond just a learning experience. The students' adoption of the shrimp and their involvement in

Students examine a California freshwater shrimp during a rainy field trip.

San Antonio, an estuarine delta in the Gulf of the Farallones National Marine Sanctuary and the Central California Coast Biosphere Reserve. The Stemple Creek watershed encompasses 50 square miles (130 square kilometers), almost all of which is in agricultural production. Dairies and livestock ranches are the mainstay of the watershed's economy. Most of the Stemple Creek drainage is gently-sloped grassland. Willows *(Salix sp.)* once grew thickly along the creek, and oaks *(Quercus sp.)* and California bays *(Umbellularia californica)* still grow along its tributaries and in the headwaters area. In the past, dairy and livestock operators allowed their animals direct access to the creek. The resulting impacts on vulnerable riparian habitat contributed to erosion of the creek banks, deposition of sediment in the creek channel, and the loss of shrimp habitat. Other threats to the shrimp include habitat degradation from suspended solids in the water column, reductions in the amount of aquatic vegetation that provides cover from predators and food for the shrimp, increased water temperatures due to decreased shading, and pollution from animal waste. The water quality is now so poor that people who grew up swimming and fishing in the creek no longer let their children play in it.

projects to improve habitat for the shrimp have opened their eyes to all sorts of new possibilities. "I learned a lot from the Shrimp Project" says Lucia, a Brookside School student, "and one of the main things was that kids can really do a lot to save the earth. If every class in the world helped one species, the world would be a much better place." Another Brookside student, Megan, put it this way: "I learned that there are a lot of animals in the world that we really don't know about. And we can make a difference in the world. I feel proud and honored to be a part in this."

Innovative initiatives and voluntary measures undertaken jointly by agencies, landowners, and community organizations often hold the best hope for species recovery while minimizing impacts to private landowners. The projects being carried out by the Shrimp Club of Brookside School are a prime example of this type of approach. Once again, it is the children, with their enthusiasm, imagination, and willingness to experiment, that are helping adults find answers. In the words of dairy producer Paul Martin, "The Shrimp Project has been accepted by the farmers in my area because they (the students) have been taught to respect a farmer and his property and work cooperatively. If the Endangered Species Act were to be implemented like these kids and their teachers work, we'd all be better off."

Daniel Strait is a biologist with the FWS private lands office in Sacramento, California.

Barbara Comnes Photos©

At a native plant nursery, fourth graders select plants for habitat restoration.

For further information about the project, write to:
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A Passion for Birds

by Hilary Vinson

"Sharing A Passion For Birds" was the 1995 theme for International Migratory Bird Day, an event sponsored by Partners In Flight, or *Aves de las Americas*. Partners In Flight is an organization of numerous Federal and State natural resource agencies, nongovernmental conservation organizations, and private-sector interests. Its goal is "preventive medicine"—saving species (and their habitat) *before* they become endangered.

Partners In Flight established five committees to accomplish its migratory bird conservation goals. The Information and Education (I&E) Committee assumed the task of increasing the public's knowledge of migratory birds and their plight. In 1993, with this goal in mind, the I&E Committee established a new and exciting event to be held the second Saturday of each May: International Migratory Bird Day. Interest in this event is increasing every year as more and more people begin "Sharing A Passion For Birds."

In 1995, the North Carolina Partners In Flight teamed up with the North Carolina Zoological Park in Asheboro to plan an International Migratory Bird Day event at the zoo. The Fish and Wildlife Service's Asheville Field Office took the lead, organizing exhibits, exhibitors, and volunteers. In return, the zoo offered space and distributed media announcements State-wide. Thirteen North Carolina Partners In Flight cooperators helped plan, set up, and manage the day's event. Approximately 8,000 people visited the zoo on May 13, and about 10 percent participated in our activities. Information packets, brochures and posters were available to visitors. Exhibits included a Partners In Flight display, a map of migration routes, examples of migratory birds of the North Carolina national forests, specimens from the North Carolina Museum of Natural Sciences, and native plants for the backyard. Children and adults enjoyed a variety of activities including birdwatching, making "play" binoculars, learning how to use real binoculars, face painting, and watching videos about migratory birds (one for children, one for adults). The North Carolina Chapter of the Wildlife Society sold International Migratory Bird Day t-shirts and posters to help raise funds for North Carolina Partners In Flight education and outreach projects. It was fun for everyone!

Hilary Vinson is a biologist in the FWS Asheville Field Office.

Of specific concern to Partners In Flight are Neotropical migratory birds, or those birds that winter in Central and South America, Mexico, and the Caribbean, and migrate to North America to breed in the spring. These birds have declined drastically over the past decade because of habitat loss and fragmentation on both their wintering and breeding grounds. Although birdwatching has become a national pastime, few people are aware that populations of some of their favorite birds are declining.

David Dell

Approximately 800 zoo visitors learned about migratory birds at last May's event.

by Jeffrey B. Combs and
Linda L. Hallock

Interagency Blast for Wetlands

When early settlers reached the American Northwest, they began to drain and plow the region's small wetlands and riparian zones. These wetlands once trapped sediments, stored water, cycled nutrients, maintained plant communities, and provided valuable habitat for large populations of wildlife. As habitat loss continued into recent times, many species declined to the point that some—including the spotted frog *(Rana pretiosa)*, olive-sided flycatcher *(Contopus borealis)*, and several bat species—are now candidates for listing under the Endangered Species Act or are considered species of concern.

FWS photo

The Fish and Wildlife Service (FWS) is addressing the issue of habitat loss by working with private landowners in cooperative efforts such as the Washington State Ecosystems Conservation Program. Through this program, the FWS provides cost-sharing and technical assistance for wetland, riparian, and upland habitat restoration and enhancement projects on private lands.

One recipient of technical and financial assistance is Steve Wilson, a landowner in Pend Oreille County, Washington. His land includes approximately 200 acres (80 hectares) of former permanent or seasonally flooded wetlands that were drained in the 1920's. At that time, farmers used drain tiles and ditches to convert the area to pasture and hay fields. Now, the current owner wants to return the pasture to a functional wetland. Restoring the historic hydrology will result in increased amphibian, shorebird, neotropical migrant, and waterfowl habitat. A wide variety of wetland, riparian, and upland native vegetation can be found throughout the site. During recent visits, FWS biologists observed several spotted frogs and their egg masses in existing areas of permanent wetlands.

In September 1995, during the initial phase of the project, seven open water areas were created by the use of explosives. The surface area of these potholes ranges from 5,600 to 7,500 square feet (520 to 700 square meters) in a variety of irregular shapes, depending on the number and configuration of the explosive charges. The drainage tile lines and channels were obliterated, restoring the natural hydrology. Heavy equipment is being used to finish shaping and grading the excavation. Steve Wilson will complete this enhancement/restoration by planting native trees and shrubs in the seasonal wetlands and transitional zones.

This initial work will result in 40 acres (16 ha) of permanently flooded wetlands interspersed among 60 acres (24 ha) of seasonal wetlands, with 100 acres (40 ha) remaining in upland grasses. This mix of permanent and seasonally flooded wetlands adjacent to upland grasses will provide prime habitat for spotted frogs, shorebirds, neotropical migratory birds, and waterfowl, as well as important forage opportunities for several bat species.

The Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, Natural Resources Conservation Service, Pend Oreille Conservation District, and Kalispel Tribe helped plan the project and provided funding, labor, and technical assistance.

Through cooperative programs such as Washington State Ecosystems Conservation Program, the FWS will continue to work with other agencies and willing private landowners like Steve Wilson to reach the national goal of "no net loss of wetlands."

Jeffrey Combs and Linda Hallock are biologists with the FWS Upper Columbia River Basin Field Office in Spokane, Washington.

Opposite
With the cooperation of landowner Steve Wilson, explosives were used to restore wetland habitat.

Below
The olive-sided flycatcher is one of the species that will benefit from the restoration project.

B. Small/VIREO©

Ecosystem Showcase

by Mary Anne Young

Refuges are a showcase for the Fish and Wildlife Service's (FWS) ecosystem approach to wildlife conservation. Since management decisions on refuges often affect adjacent lands, the system has opportunities to exemplify the use of good science and collaboration with partners. Refuges work in concert with Wilderness Areas, Research Natural Areas, Wild and Scenic Rivers, RAMSAR wetlands, National Natural Landmarks, Biosphere Reserves, and Western Hemispheric Shorebird Reserves to provide protection for unique ecological communities.

Refuges are also important in the implementation of several national initiatives, such as those relating to invasive weeds. Many ecosystems of great natural beauty and value are falling prey to the spread of non-native aquatic and terrestrial plant species. Approximately 3 million acres (1.22 million ha) on over 200 refuges are infested with exotic weeds. Refuges play a crucial role in controlling the spread of invasive plants on and off FWS land. For example, the FWS is attempting to control the Brazilian pepper, Australian pine, and water hyacinth in order to restore the integrity of South Florida ecosystems and protect habitat for threatened species.

The National Wildlife Refuge System is a unique collection of vital animal and plant habitats managed by the Fish and Wildlife Service (FWS). Most major ecosystems in the United States and its territories, from Alaska to Puerto Rico and Maine to American Samoa, are represented within the 508 refuges, which total approximately 92 million acres (37.23 million hectares). They play a global role in maintaining ecological integrity, conserving biological diversity, and providing havens for a variety of life.

One of the system's most important roles is endangered species conservation, both on and off FWS land. Of the 960 listed species nationwide, 24 percent occur on National Wildlife Refuges. Fifty-five refuges were acquired specifically for endangered species and 462,000 acres (186,970 ha) of designated critical habitat span 51 refuges. Refuges provide an opportunity for intensive habitat management, if necessary, and for experimentation with recovery methods under controlled conditions. Habitat management for endangered species on our National Wildlife Refuges can serve as models for adjacent landowners.

Examples of habitat restoration vary from traditional wildlife management methods to new, innovative strategies. An effort is underway to standardize vegetation mapping throughout the refuge system in concert with the national Gap Analysis Program. Under the ecosystem approach, the FWS is using its Geographic Information System (GIS) capabilities to map vegetation on Chincoteague NWR in Virginia. These GIS analyses will be used to identify acquisition needs as well as potential transplantation and buffer sites for threatened and endangered species like the piping plover *(Charadrius melodus)*, bald eagle *(Haliaeetus leucocephalus)*, and Delmarva Peninsula fox squirrel *(Sciurus niger cinereus)*.

Refuges manipulate water regimes to enhance habitat for species like the Everglade snail kite *(Rostrhamus sociabilis plumbeus)* or the western prairie fringed orchid *(Platanthera praeclara)*. Beach areas are secured and restored to protect nesting sea turtles. Restoration and management of pine savannas, using techniques like fire and mechanical removal of trees, are an integral part of habitat management on the Mississippi Sandhill Crane NWR. Prescribed fire on the Okeefenokee NWR in Georgia is helping to restore the long-leaf pine habitat vital to conservation of the gopher tortoise *(Gopherus polyphemus)*, eastern indigo snake *(Drymarchon corais couperi)*, and the red cockaded woodpecker *(Picoides borealis)*.

The first units of the Big Muddy NWR were established following the disastrous 1993 midwest flood. Former agricultural lands damaged by the flood are being restored as wildlife habitat to reconnect the Missouri river with its flood plain from Kansas City to St. Louis, Missouri. Restoration of this area will benefit many FWS trust species, including the endangered pallid sturgeon *(Scaphirhynchus albus)*. The river should be able to function naturally on these tracts without adversely affecting adjacent lands.

The National Wildlife Refuge System will celebrate its 100th birthday in 2003. As that date approaches, the FWS is considering ways in which to enhance the restoration and management of wildlife habitat on these special lands.

Mary Anne Young is a biologist in the FWS Division of Wildlife Refuges in Washington, D.C.

Life in the Oak Barrens

by Richard King

Necedah National Wildlife Refuge in central Wisconsin protects a biologically-rich type of habitat resulting from the region's unusual geologic history. During the Pleistocene, glacial Lake Wisconsin covered what is now the refuge with up to 60 feet (18.6 meters) of water. This was no ordinary lake. It was over 1,000,000 acres (404,700 hectares) in size. Sand deposits on the former lake bed are as deep as 165 feet (50 m). As the lake receded, windblown sand from its bed was deposited across much of southern Wisconsin. The nutrient-poor soils produced rare habitat types but could not sustain agriculture. After failing to make these lands economically productive, settlers disparaged them as "barrens." What people did not realize about these seemingly worthless areas was that they teemed with an abundance of unique plants and animals.

Oak barrens comprise one of four savanna habitat types in Wisconsin. The other three are pine barrens, oak openings, and cedar glades. Oak barrens are distinguished by the abundance of blueberries *(Vaccinium angustifolium)*, sweetferns *(Myrica asplenifolia)*, and plants in the milkweed family (Asclepiadaceae) within the herbaceous layer. They also differ from pine barrens by the dominance of Hill's oak *(Quercus ellipsoidalis)* in both the shrub and tree layers. Oak barrens constituted almost 12 percent of Wisconsin's total land base or 4.1 million acres (1.6 million ha) at the time of the original land surveys. Today, this ecosystem type has shrunk to 50,000 acres (20,235 ha), or 0.14 percent of the land base.

Many species that depend on barrens habitat have begun to disappear with it. A well known example is the Karner blue butterfly *(Lycaeides melissa samuelis)*, which was listed in 1992 as endangered. The status of several barrens-associated species, including the phlox moth *(Schinic indiana)*, eastern massasauga rattlesnake *(Sistrurus catenatus catenatus)*, Blanding's turtle *(Emydoidea blandingii)*, loggerhead shrike *(Lanius ludovicianus)*, and prairie flame flower *(Talinum rugospermum)*, are being reviewed to determine if they need protection. Barrens are known for their high level of species diversity. Over 110 bird species have been documented using Wisconsin's barrens as breeding habitat, and 44 species of butterflies can be found on the barrens of Necedah National Wildlife Refuge (NWR). Three amphibians and 14 reptile species also are known to use barrens habitat.

In 1939, when Necedah NWR was established, most of its upland habitat was in an open barrens state due to frequent fires. The refuge soon began fire prevention and control efforts, which allowed vegetative succession to proceed unchecked. By the early 1960's, nearly all of the former barrens habitat had become closed-canopy forest. From 1965 to 1973, the refuge employed logging to restore approximately 700 acres (283 ha) of barrens habitat. Both clear cutting and selective cutting were used. Following the timber sales, each unit was burned on a 3- to 5-year rotation. Results of those early restoration activities were excellent. All of the refuge's known populations of Karner blue butterflies, with one exception, occur on restored barrens.

The refuge is in the process of restoring an additional 3,000 acres (1,215 ha) of barrens habitat. Recovery of the Karner blue butterfly is ample justification for the restorations, but the refuge is taking an ecosystem approach instead of featuring any one species.

The geologic history of the region doomed it to agricultural failure, but property once abandoned as wasteland has become one of the jewels of the National Wildlife Refuge System.

Richard King is a wildlife biologist at Necedah NWR.

Eric Epstein

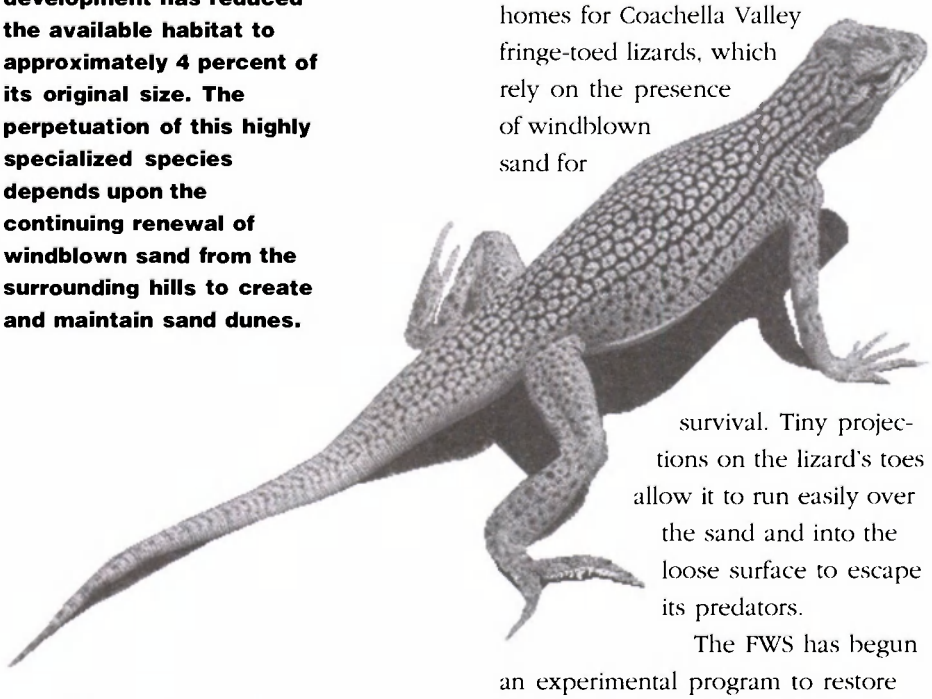
by Ken Sturm

The Dunes of Coachella

The Coachella National Wildlife Refuge (NWR), a 3,254-acre (1,317-hectare) refuge approximately 10 miles (16 kilometers) east of Palm Springs in California's Mojave Desert, was established in 1985 as part of the 19,000-acre (7,690-ha) Coachella Valley Preserve. The refuge protects habitat vital to the survival of the threatened Coachella Valley fringe-toed lizard *(Uma inornata)*. Historically, the range of the Coachella Valley fringe-toed lizard encompassed nearly all of the valley floor, from San Gorgonio Pass to the Salton Sea, extending northeast to include a portion of the Indio Hills. However, increasing development has reduced the available habitat to approximately 4 percent of its original size. The perpetuation of this highly specialized species depends upon the continuing renewal of windblown sand from the surrounding hills to create and maintain sand dunes.

The Coachella Valley Preserve is managed jointly by the Fish and Wildlife Service (FWS), Bureau of Land Management, California Department of Fish and Game, California Department of Parks and Recreation, and The Nature Conservancy. Each of these organizations owns and is responsible for various parts of the Preserve, although many of the routine maintenance activities are performed by the Preserve Director, who is funded by The Nature Conservancy.

As the human population in the valley grows, the Preserve becomes increasingly important in protecting an array of desert ecosystems. Within the portion of the Preserve owned by the FWS are sand dune ecosystems that receive their sediment from the Little San Bernardino Mountains. These natural and increasingly rare dune areas on the refuge are some of the last homes for Coachella Valley fringe-toed lizards, which rely on the presence of windblown sand for survival. Tiny projections on the lizard's toes allow it to run easily over the sand and into the loose surface to escape its predators.



Original photo by William R. Radke

The FWS has begun an experimental program to restore dune ecosystems. Vineyards and other agricultural lands purchased for the refuge are being rehabilitated so that they can revert back to natural desert habitat. Refuge staff have also begun creating artificial dunes in some of this reclaimed area in hopes of trapping windblown sand for the lizards.

To date, five dunes have been created by using earth moving equipment to push existing sediment. The dunes are oriented so that free-moving sand (known as blow sand) from the mountains will hit the long edge of the dune to catch moving sediments. After all the vineyards are removed, more artificial dunes will be constructed. Non-native trees (such as salt cedar and eucalyptus) in the reclaimed area then will be removed to allow blow sand to accumulate on the dunes rather than near the trees. Removal of exotic trees also is essential to eliminate potential perch sites for raptors that would feed on lizards in the area.

The first series of dunes were completed in the summer of 1993, and the second batch in the summer of 1994. To date, no Coachella Valley fringe-toed lizards have been observed in either rehabilitated area, although some desert iguanas and zebra-tail lizards have been seen on the first dunes. Native vegetation has begun to colonize these artificial dune areas, and kangaroo rats have heavily used the first set of dunes.

Artificial dune construction like this is experimental and, to our knowledge, unique. With no model to base our work on, we can only hope that the created dunes will eventually become the specialized habitat needed by the Coachella Valley fringe-toed lizard.

Ken Sturm is biologist at the Coachella NWR.

Endangered Species for $500!

DON'T PANIC...it's not an endangered species auction, but "Endangered Species Jeopardy," just one of the many exhibits featured at the 1995 North American Association for Environmental Education Conference held in Portland, Maine, in September. "Endangered Species Jeopardy" and "Endangered Species—Can We Afford To Lose Them?" were the main attractions at an exhibit sponsored by the Fish and Wildlife Service's (FWS) Asheville, North Carolina, Field Office.

The Asheville Office invited other FWS Ecological Service Offices to provide materials for the exhibit. Employees from the Asheville Office, Puerto Rico Field Office, New England Field Office, San Francisco Bay National Wildlife Refuge (sponsored by the Portland Regional Office), and New Jersey Field Office sent representatives to help staff the exhibit. We provided an array of outreach and education material, including fact sheets, brochures, species lists, articles, and educational programs. Another dimension was added to our exhibit with material printed in Spanish, distributed by the Puerto Rico Field Office. Latin American educators and American educators working with Spanish-speakers found the manatee poster, sea turtle poster, and endangered species information packets very helpful. The Asheville Office also invited a representative from the Environmental Protection Agency to distribute its educational material at the event.

People are eager to get information, but in many cases are having difficulty tracking it down. The exhibit not only provided information to the public, but the public returned the favor by letting us know where we can improve our outreach effort.

Contributors include Hilary Vinson, Asheville Field Office; Angela Graziano, New Jersey Field Office; Sandy Spakoff, San Francisco Bay NWR; and Ken Foote, Puerto Rico Field Office.

FWS photo

The Asheville Office, responsible for threatened and endangered species in North Carolina, South Carolina, Tennessee, and Kentucky, saw the conference as a great opportunity to provide information to over 1,200 educators from over 20 countries. Those who stopped at the exhibit agreed. An educator from Japan said "This [Endangered Species Jeopardy] is a good way to present the information. It is much better than you [FWS] standing here just talking about it."

Educators were very eager to see our material and exhibits. They were particularly interested in the fact sheets on endangered species and ecosystems; the list of endangered and threatened species; the booklet, "Facts about the Endangered Species Act"; the article, "Is the Endangered Species Act Endangered?"; the "Endangered Species Bulletin"; and the material in Spanish. Educators from 25 States and from Japan, Bulgaria, Poland, Venezuela, and Mexico visited the FWS exhibit. Among the comments heard were: "Good to see that this information is available. How can I get updates?" "What is the status of the Act?" "Is this 'horror story' really true?"

by Chris Best

Walker's Manioc Rediscovered

Walker's manioc is a spindly, almost vine-like subshrub known from semi-arid subtropical brush in extreme south Texas and neighboring Tamaulipas, Mexico. This plant, a member of the spurge family (Euphorbiaceae), is closely related to the cassava *(Manihot esculenta)*, an important food throughout the tropics.

photos by Chris Perez

A handful of Walker's manioc seeds.

Tom Patterson, Francisco González Medrano, Marshall Johnston, and Phil Clayton all have two things in common: they are botanists and the only living people who have discovered Walker's manioc *(Manihot walkerae)* populations in the wild.

Tom's great moment came last June 21 while serving as an Americorps member at the Lower Rio Grande Valley National Wildlife Refuge (NWR) in southern Texas. Tom and FWS plant ecologist Chris Best were conducting a vegetation survey on a portion of the refuge that an oil company proposed to clear for a drilling operation. The temperature soared to over 100°F (38°C) as Tom meandered among the spiny shrubs and cacti, gazing intently for rare species. His efforts were rewarded when he spotted the first tender sprig of a manioc seedling in the white caliche soil. Recently, Tom reflected on that discovery: "A botanist lives for those moments when you come across a rare and beautiful plant that so many others have failed to find."

Walker's manioc was first discovered in 1853 near Fort Ringold, Texas, but was thought to be a South American species. It was sighted again in 1888 on the Mexican side of the Rio Grande. In 1940, an amateur botanist named Walker collected the plant near Mission and La Joya, Texas. She sent a specimen to the University of Texas in Austin, where alert researchers recognized it as a distinct species and named it for her. The plant was seen a few more times during the 1940's, but extensive brush clearing for agriculture and development apparently obliterated all of the known locations of this unusual species. Fortunately, botanists had obtained viable cuttings from Mrs. Walker's specimens, and the clones of those plants are now safeguarded at San Antonio Botanical Gardens. In 1960, Marshall Johnston, co-author of the *Manual of Vascular Plants of Texas*, discovered Walker's manioc growing among remnant grasslands at two locations in east-central Tamaulipas, Mexico. Many years passed without further sightings in this area and the species was feared to be extinct.

In 1990, however, FWS botanist Phil Clayton found a single plant on private property near La Joya, Texas. The landowners, who wish to remain anonymous, enthusiastically and proudly protect their lone manioc, and have allowed FWS botanists to study the plant and collect seeds. In 1992, Mexican botanist Francisco González Medrano, aided by a grant from the FWS, rediscovered a small population near Johnston's 1960 find, as well as a new population in southern Tamaulipas.

Walker's manioc was listed as an endangered species in 1991. The species' recovery plan calls for propagation and reintroduction on appropri-

ate sites of the Lower Rio Grande Valley NWR. To this end, seeds from the La Joya plant and from the San Antonio Botanical Gardens have painstakingly been germinated at the refuge revegetation facility, but the gene pool appears to be too small for long-term population survival. It is not yet known whether the 300 or so Tamaulipas plants are too distantly related to be crossed with the U.S. plants. Therefore, the discovery of any additional populations that may exist is critical to recovery efforts.

By early September 1995, Tom Patterson and other botanists had discovered 104 Walker's manioc plants at two separate sites. Americorps members Brad Autrey, Robin Balaban, and Terrel Hyde pinpointed each plant with a GPS (Global Positioning System) device, which uses signals from satellites to determine a given location with great precision. Another Americorps member, Tim Simpson, imported the GPS data into the refuge GIS (Geographic Information System) computer to generate an accurate map of the manioc plants on refuge tracts. These maps were extremely important when refuge operations specialist Yvette Truitt and endangered species biologist Art Coykendall negotiated with oil company representatives about a proposed drilling site. The company, which holds mineral rights on sections of the refuge, planned to drill for oil at one of the manioc locations. Working with the FWS, company engineers found a way to reduce the drilling pad size from 5 acres (2 hectares) to 2.5 acres (1 ha), and the location was moved 350 feet (107 meters) from the proposed site to occupy a partially disturbed area with no manioc plants.

Refuge manager Mike Bryant noted both the diligence of the Americorps members and the role that modern technology played in crafting a compromise. "State law mandates landowners, including national wildlife refuges, to allow the owners of mineral rights to access and develop those minerals. On the other hand, the Endangered Species Act prohibits the take of endangered species on Federal lands. We found a way for this petroleum developer to drill a well without serious threat to the survival of the Walker's manioc population. We were also fortunate that this company was willing to cooperate and able to modify its plans."

Chris Best is a plant ecologist at the Lower Rio Grande Valley NWR.

Photos

Walker's manioc is being cultivated at the native plant nursery at Lower Rio Grande Valley NWR. Its distinctively shaped leaves are characteristic of this species. In nature, the seed capsules dry and shatter, scattering the seeds many yards away. In the nursery, bridal veil is wired to the capsules to retain the seeds.

by Bill McDonald

A Working Wilderness

We call the Malpai Borderlands a "working wilderness," an area where the natural systems that livestock and wildlife depend on are spread over a patchwork of public, private and international jurisdictions. Roughly half of the area is in private ownership and the other half is public. Our commitment to promoting responsible stewardship while protecting private property rights requires extraordinary cooperation and respect among all parties. It would be impossible for any one entity—rancher, public agency or non-profit group—to protect this region from unwise development by buying all the land. Only through cooperation between the private and public sectors will this habitat remain open and unsubdivided.

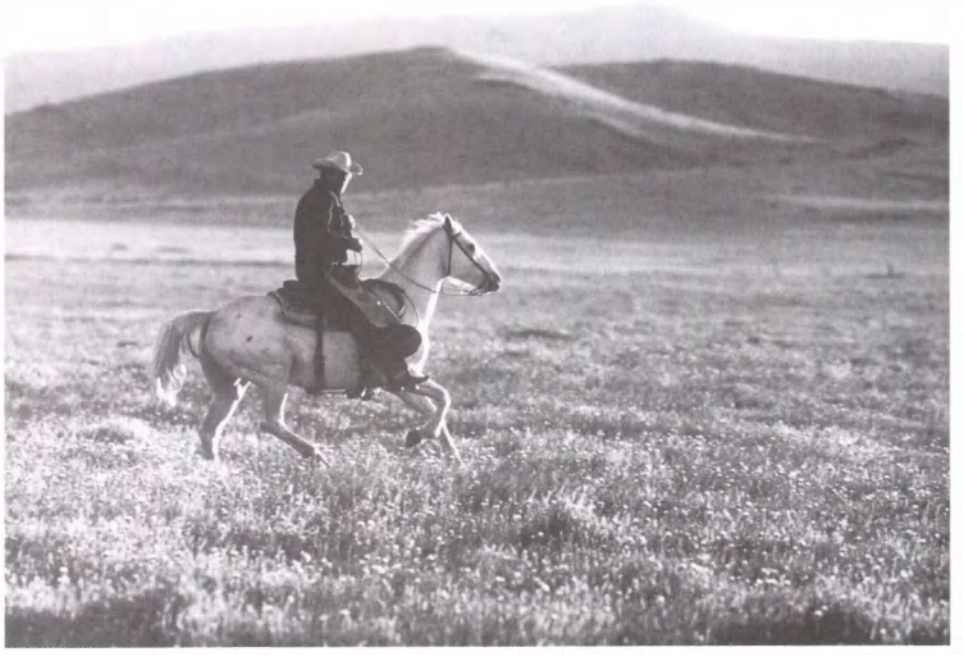
The region known as the Malpai Borderlands is one of the most biologically rich parts of North America. It borders 60 miles (97 kilometers) of Mexico in Cochise County, Arizona, and Hildago County, New Mexico. Over 300 occurrences of rare birds, mammals, and plants occur in Hildago County alone. From alpine meadows to desert grasslands, this is the much-vaunted "sky islands" country, where the temperate world meets the tropics.

Coexisting with this land for the past century has been a ranching community of fewer than 100 families. The community's stewardship has kept the land unfragmented and the biodiversity of the area largely intact. We believe that sustainable ranching provides the best hope for the plant, animal, and human communities that live here. About 2 years ago, to foster this spirit of stewardship, we formed the Malpai Borderlands Group, a private, non-profit organization composed primarily of ranchers. We are dedicated to sustaining open space and traditional ranching livelihoods on approximately one million acres (404,700 hectares) in the desert Southwest. The group blends science, a strong conservation ethic, and economic feasibility. Our vision has attracted many of the key stakeholders in our region to collaborate with us in this voluntary effort as we strive to do what's right for the land.

One of our flagship conservation projects involves a ranching family in our group, the Magoffins, who kept two critical populations of rare Chiricahua leopard frogs *(Rana chiricahuensis)* alive during the 1994 drought by hauling 1,000 gallons (3,785 liters) of water per week to the cattle stock ponds where the frogs live. This species has nearly been wiped out by the large, non-native bullfrogs *(Rana catesbiana)* and fishes that have colonized most natural water sources since being introduced to Arizona as "game" species in the early part of this century. The Chiricahua leopard frogs have discovered that cattle stock ponds, with a little human help, are "bullfrog-free zones" where they can prosper. Isolated stock ponds, prevalent on many ranches throughout the Southwest, could be one of the native frog's best chances for survival. The Magoffins are working with University of Arizona herpetologist Philip C. Rosen, who has said he is "extremely happy to have met a number of ranchers interested in conserving individual species and in preserving the great open spaces left in the Southwest." With support from the Malpai Borderlands Group, the Magoffins have been able to install a pump that supplies permanent water to one stock pond, and they are working on obtaining funds for the second.

Other wildlife enhancement efforts underway include working to obtain funds to build pronghorn *(Antilocapra*

Will van Overbeek



americana)-friendly fences where appropriate, and to put wildlife "escape ramps" in cattle stock ponds when needed. Efforts to restore riparian habitats on several ranches will benefit migrating songbirds as well as help decrease soil erosion, improve herbaceous cover and forage conditions, and increase ground water infiltration. We are also working to make research biologists available to any interested ranchers who would like more information on the rare plants and animals of the region. For the past 8 years, one ranch in our group has allowed the Fish and Wildlife Service to monitor the well-being of the Cochise pincushion cactus *(Escobaria robbinsorum)* on their property. This is an extremely rare plant coveted by cactus poachers throughout the world. It lives only in a highly specialized habitat and has an extremely small range. The results of this monitoring show that grazing at current levels does not appear to have a negative effect on the plants, and the population is stable. It is likely that the presence of the ranchers on the land will continue to deter cactus collectors.

An example of our effort to enhance the Malpai landscape was the recent Baker Burn, which resulted from a regional fire management plan that our group initiated. The grasslands of this region have been invaded over the past century by woody shrubs like snakeweed, mesquite, and acacia. Scientists speculate that this is the result of early overgrazing, climate change, and lack of fire. Our group is working hard to restore these grasslands to their former state. The Malpai Group produced the first prescribed burn for our region, coordinating the efforts of 14 public agencies and the government of Mexico. As a result, thousands of acres have benefited from a more thoughtful response to fire, and over $1 million in suppression costs have been saved. We've also embarked on experiments with native seed plantings and are managing our cattle more carefully. In addition, we are teaming up with the Animas Foundation, a private organization established to manage the biologically-rich Gray Ranch, to provide a "grass bank" as a way to pool our community's grass resources. A grass bank is a concept in which grass on one ranch can be made available to another rancher's cattle in return for a conservation easement of equal value on the first ranch. Ranchers and biologists alike believe the grass bank is a promising tool for conservation of both grasslands and ranchlands.

Bringing people together to protect the land and livelihoods in this area hasn't been easy, and much hard work remains. Yet the successes of the Malpai Borderlands Group underscore the power of the private sector to offer creative solutions to many of the thorniest land use dilemmas. The enthusiasm, support, and participation at this point exceeds our expectations. At a time when positions on land use are usually at one end of the spectrum or the other, we find ourselves in the "radical center." We invite everyone to join us there.

Bill McDonald is President of the Malpai Borderlands Group.

The Malpai Group has created a Science Advisory Committee to advise and coordinate its land management efforts. Several scientists have established permanent monitoring plots throughout the region to gather information crucial to detecting long-term change to the vegetation of the Malpai Region and the reasons for it. This information is available to interested ranchers.

Cattle stock ponds could be important to the survival of the Chiricahua leopard frog.

Peter Warren©

by Craig L. Springer

Water for a Desert Denizen

The genus *Cyprinodon* is composed of 30 known species, half of which occur in the Chihuahuan Desert of New Mexico, Texas, and northern Mexico. Pupfish have evolved to tolerate environmental conditions that would readily kill most other species of fish. They can endure wide seasonal variations in water temperature, from near freezing to 92°F (33°C), and tolerate significant daily fluctuations as well. These fish flourish in both freshwater and water three times saltier than the ocean, and persevere in the smallest of pools.

Pupfish spawn from April to September and breed with more than one mate during the spawning season. Males become quite colorful at this time; their fins turn orange-yellow and their bodies are white underneath, with a

It seems almost an anomaly to find fish in the desert. Nonetheless, fish do occur and even thrive there if they have the right habitat. A case in point is the White Sands pupfish. This species is endemic to the Tularosa Basin of south-central New Mexico—hence the origin of its scientific name, *Cyprinodon tularosa*. Although it has been known to science for only 20 years, the White Sands pupfish is a relict of the Pleistocene epoch. Some 20,000 years ago, a large body of water, Lake Otero, inundated the present-day Tularosa Basin. Over time, as the climate became more arid, the lake subsided and the Tularosa Basin was separated from other surface waters. Consequently, pupfish were isolated and left to adapt to the harsh desert environment in which their descendants remain.

Three bodies of water support the entire native population of White Sands pupfish, and all are within the White Sands Missile Range. Pupfish live in 30-mile (48-kilometer) long Salt Creek, in two small ponds supplied by an artesian flow known as Mound Springs, and in a 650-acre (263-hectare) saltgrass marsh and spring run called Malpais Spring, which emanates from the terminus of an ancient lava flow. An additional population, believed to have originated from Salt Creek stock, has been established in the Lost River on Holloman Air Force Base and White Sands National Monument.

Threats

Although restricted in distribution, the White Sands pupfish is usually abundant wherever it occurs. Unfortunately, that does not ensure the species long-term survival. Being the only native fish species in the Tularosa Basin, the White Sands pupfish has not evolved with predation or competition with non-native fishes. Pupfish are defenseless in the face of more aggressive introduced species.

Water diversion by man and the presence of feral horses could dry up pupfish habitat. In some shallow marshes, paths made by horses

Salt Creek

John Pittenger/New Mexico Department of Game and Fish

redirect water flow and erode deep channels, thus transporting water to lower elevations. Consequently, marshes used by pupfish could become dry. The stability of a pond's bank could be trampled to the point of breaching. Horses also may disrupt pupfish breeding behavior by wallowing in the water and trampling spawning areas.

The isolation afforded by geography and military custody has been both advantageous and potentially harmful to the pupfish. Without precautions, chemical contamination from activities conducted on military reservations could endanger the species' survival. While some military activities could harm the pupfish, current management of the habitat has enabled intensive study and management that might not otherwise be possible.

Achievements

The future is optimistic for the White Sands pupfish. The New Mexico Department of Game and Fish, White Sands Missile Range, Holloman Air Force Base, White Sands National Monument, and U.S. Fish and Wildlife Service recently entered into a cooperative agreement to conserve this species and preclude any need for Endangered Species Act protection (see *Bulletin* Vol. XX, No. 4). The agreement outlines each agency's obligations, identifies threats, and delineates protected habitat essential for pupfish survival. It also establishes a Conservation Team, made up of biologists from each agency, to develop a scientific monitoring program for the species and its habitat, and to direct management and research needs.

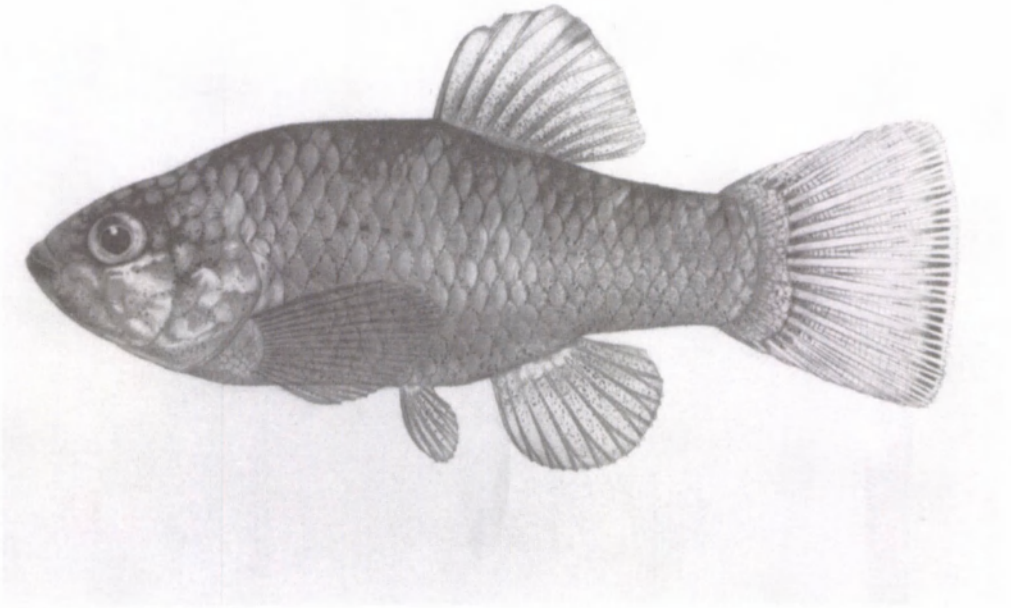
Although the agreement is just over a year old, great strides have been made. The team has drafted a fish sampling protocol, and monitoring efforts have begun. The eradication of non-native fishes is being pursued, and other waters in the area not currently inhabited by fish are being considered for expanding the pupfish's range. Holloman Air Force Base has provided funding for research, and the Missile Range has purchased needed scientific instruments. Feral horses have been removed from pupfish habitat by fencing Mound Springs and other sites where pupfish populations may be replicated. Also, water withdrawal from pupfish habitat is now prohibited.

Under the conservation agreement, all five agencies have pledged to work in a spirit of cooperation for the survival of this biological "antique."

Craig L. Springer, a fishery biologist with the FWS New Mexico Ecological Services State Office, serves as a member of the White Sands Pupfish Conservation Team.

metallic blue back. They establish a territory in shallow water for courtship and breeding purposes, and are aggressive to competing suitors. About 15 eggs are laid in a single spawning event. Fertilized eggs and larvae develop with virtually no parental care. Females produce over 6,000 eggs in a spawning season. Pupfish live up to 3 years and may become sexually mature in their first year. They can reach 2 inches (5 centimeters) in total length.

Pupfish consume a variety of foods. They readily eat vegetation, peruse the mud for insect larvae, leap out of the water for flying insects, and are even cannibalistic. They have been observed digging mud pits, presumably in search of food. Their favored fare, however, appears to be mosquito larvae.



White Sands pupfish
Joe Tomelleri

by Marie M. Bruegmann

Hawaii's Dry Forests

When most people think of Hawaii, they picture lush rain forests or long, white sand beaches. But Hawaii also has many other types of habitats, including its unique dry forests, which receive as little as 10 to 55 inches (30 to 120 centimeters) of rain per year. Their dry climate makes these forests very biologically diverse ecosystems and the most desired locations for development in the Hawaiian Islands.

As in so many other Hawaiian ecosystems, most of the native vegetation of dry forests is endemic to the islands. The North Kona area contains at least five endangered species: uhiuhi *(Caesalpinia kavaiensis)*, kauila *(Colubrina oppositifolia)*, aupaka *(Isodendrion pyrifolium)*, koki'o *(Kokia drynarioides)*, and 'aeia *(Nothocestrum breviflorum)*. The wood of the uhiuhi and kauila was used by ancient Hawaiians for spears and tools, and these trees are still valued and used today. Many more native plants in this area are considered "species of concern," and the hala pepe *(Pleomele hawaiiensis)* was proposed recently for listing as endangered (see *Bulletin* Vol. XX, No. 6).

While 42 percent of the rain forests in the Hawaiian Islands have been lost, over 90 percent of the dry forests have already been destroyed. The remaining dry forests have been heavily degraded by introduced plants and ungulates (hoofed animals). One of the largest remaining areas of dry forest is in the North Kona region of the island of Hawai'i, or the "Big Island." Native vegetation is represented only by small patches and scattered individuals, all separated by a dense ground cover of alien grasses. Seedlings and saplings of native trees are lacking, and the remaining fragments of dry forest contain trees that are usually large and probably very old.

Threats to the dry forests are numerous and have a tremendous cumulative effect. The greatest dangers to native forests in the North Kona area are posed by introduced plants and animals. Fountain grass competes with native plants and increases their vulnerability to fire; ungulates destroy plants and increase the disturbed habitat available for fountain grass to invade; and rats eat the seeds and seedlings of native plants, preventing regeneration. Additional threats include insect predation and competition from other alien plant species.

Fountain grass *(Pennisetum setaceum)* is a fire-adapted bunch grass that has spread rapidly over bare lava flows and open areas on the island of Hawai'i since its introduction as an ornamental plant in the early 1900's. Cattle eat this grass only when no other grasses are available. Fountain grass is particularly detrimental to Hawaii's dry forests because it is able to invade areas once dominated by native plants. This species spreads the threat of fire into areas not usually prone to burn, and interferes with the regeneration of native plants.

Although native Hawaiian plants have always been exposed to volcanic flows, fires were rare in the landscape, and native plants have not evolved the capability to survive burning. But many of the introduced plants, especially grasses, are not only adapted to survive fire but actually seem to thrive with frequent burns. These grasses, including fountain grass, also increase the amount of combustible fuel available, making it possible for fires to burn over greater areas. This dense fuel load also threatens native plant species by creating a ground cover that prevents seed germination and/or the growth of young seedlings. Control of fountain grass therefore is vital to the restoration of dry forests. Ranchers on the Big Island, many of whom maintain ranches encompassing hundreds of thousands of acres, also are concerned about fountain grass, since fires are frequent in the area

and can cause damages in the thousands of dollars.

Ungulates, including cattle and feral goats and sheep, are another serious threat to the dry forest ecosystem. These animals browse on and trample native plants (especially seedlings), aid the spread of alien plants by creating disturbed openings for seeds to become established, and spread the seeds to the site. Ungulates can be controlled through fencing and, for feral animals, hunting. On the other hand, a future project may include using cattle in a very controlled way to reduce fuel load from the fountain grass.

The threats posed to dry forests by rats are also very serious. These introduced pests prevent regeneration of native plants by eating their seeds and seedlings. Almost all fruits of the native sandalwood or 'iliahi *(Santalum paniculatum)* are destroyed by rats. In addition, rats eat the native mistletoe, *Korthalsella remyana*, probably for its moisture content.

Despite this array of threats, Hawaii's dry forests and their unique native species need not fade into the past. The Hawaii Division of Forestry and Wildlife, Hawaii Forest Industry Association, Hualalai Ranch, Kamehameha Schools Bishop Estate, National Tropical Botanical Garden, Potomac Investment Associates, and U.S. Fish and Wildlife Service have banded together in North Kona to demonstrate the restoration of a dry forest community. A 5-acre (2-hectare) site in Ka'upulehu, North Kona, was leased to the National Tropical Botanical Garden by Bishop Estate for a demonstration project.

The demonstration area is already fenced, thus eliminating further harm from ungulates. Although several alien plant species are present, controlling the major threat--fountain grass--is the primary focus. "Weed eaters" and herbicides are being used by the Hawaii Forest Industry Association, and fire breaks are being maintained around the site in an effort to stop any fires that do start in the highly flammable grass. Rat control also is being conducted to increase the chances of native seed survival.

The Ka'upulehu project is in its initial stages, and it may take many years to restore a functioning ecosystem that been degraded over decades. At the end of its first year, the partners hope to report initial success in ecosystem recovery at a site freed of fountain grass. Eventually, the techniques developed at this site may allow the people of Hawaii to restore hundreds of acres of one of its rarest habitats, the dry forest.

Marie Bruegmann is a botanist with the FWS Pacific Islands Ecoregion Office in Honolulu, Hawaii.

Monitoring will determine whether removal of fountain grass has any effect on the regeneration of native dry forest plants. A baseline survey of all native plants at the site has been conducted by National Tropical Botanical Garden staff. Since little evidence of regeneration exists in the North Kona area, seeds are being collected from this site and surrounding areas. The native plants now being grown at the National Tropical Botanical Garden and in the Division of Forestry and Wildlife's nursery near the site will be transplanted in the demonstration plot.

M.M. Bruegmann/FWS

Recovery Progress Report

by Cindy Dohner

The Endangered Species Act (ESA) directs the Secretary of the Interior to report every 2 years on the status of efforts to recover plants and animals listed under the law as threatened or endangered species. Recently, the Secretary released the third such document in the series, the *1994 Report to Congress: Endangered and Threatened Species Recovery Program*. It contains information on recovery plan development and the overall status of listed species in the United States as of September 30, 1994.

The ultimate goal of the recovery program is to restore listed species to a point where they are again secure, self-sustaining components of their ecosystems. Recovery is a complex and often lengthy process that includes (1) prioritizing the development of recovery plans, (2) determining the tasks needed to reduce or eliminate threats to listed species, (3) applying the available resources to the highest-priority species and recovery tasks, and (4) reclassifying and delisting species as appropriate. The Fish and Wildlife Service (FWS), which administers the ESA for the Secretary, believes that coordination among government agencies at every level (Federal, State, and local), conservation organizations, species experts, and major land users is a key ingredient for effectively implementing a recovery program. Such coordination allows comments from affected communities and other interests to be considered fully.

Recovery plans serve as blueprints for private and public cooperators to follow in conserving listed species and the ecosystems on which they depend. These plans identify, to the extent possible, the management tasks, recommended research, and other actions necessary to reach recovery plan goals. Strategies outlined in recovery plans may be modified when needed to incorporate new information and ensure that the species remains on the most effective path towards recovery. The plans must also identify precise, measurable criteria to determine objectively when recovery has been achieved. Recovery plans may be developed by the FWS or by individuals from other Federal agencies, State personnel, or private contractors. Draft plans are made available for public review and comment.

Despite a substantial increase in the number of species listed over the past decade, the combined recovery efforts of the FWS and other agencies, States, tribal governments, independent organizations, and private individuals have managed to limit species in decline to only 35 percent of all listed species. Recovery may take a very long time for species with severely depressed populations and full recovery for a few species in the foreseeable future is not likely.

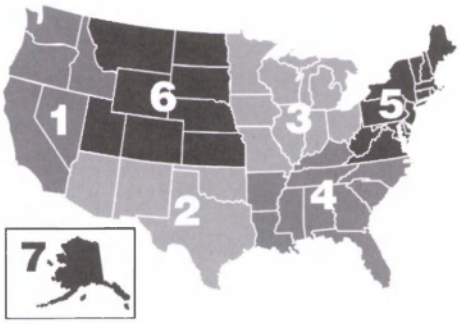
The first step on the road to recovery is to address a species' decline and prevent its extinction. Of all the species listed between 1968 and 1993, 99 percent still survive. Only 7—or less than 1 percent—have been recognized officially as extinct. Species that have been on the list the longest and therefore have benefitted the most from recovery actions generally are in the best condition. Of the 108 species listed between 1968 and 1973, 58 percent are currently known to be stable or improving in the wild.

Population trends can remain uncertain for several reasons. In many cases, these species were listed only recently, and consequently their populations have not been monitored long enough to establish clear information on population trends. The status of some species, including some that have been listed for many years, may be uncertain because of their rarity or the remoteness of their habitat, or because threats to the species occur outside the U.S. portion of their range, where protection may not be available.

Recovery of threatened and endangered species is among the most important tasks delegated to the FWS; it is also one of the most challenging. The recovery progress achieved thus far is a result of many years of research, restoration, protection, and active management. But the key ingredient is almost always the cooperation from many partners working together to achieve common goals. The biggest challenge is finding innovative conservation and management actions that benefit the species while accommodating socio-economic goals. Fortunately, the FWS and its partners have been largely successful in balancing these challenges. With persistence and time, it ***is*** possible to make a u-turn on the road to extinction.

Cindy Dohner is a biologist with the FWS Division of Endangered Species in Washington, D.C.

The *1994 Report to Congress: Endangered and Threatened Species Recovery Program* can be purchased for $4.50 from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, D.C. 20402-9328. Ask for order number S/N02401000712-5.



Region 3

The Fish and Wildlife Service's (FWS) East Lansing, Michigan, Field Office is supporting a graduate research project on the common tern *(Sterna hirundo)*, a "species of concern" in eastern Michigan. The study focuses on factors such as predation, weather, and human disturbance that affect reproduction at two tern colonies in Saginaw Bay of Lake Huron. The project also is investigating the use of nesting platforms for increasing reproductive success.

The FWS Columbia, Missouri, Field Office and Missouri Department of Conservation conducted a search in the southeastern part of the State for new sites of Hall's bulrush *(Scirpus hallii)*, another species of concern. Although no new populations were located, an impressive 2,000 plants were estimated at the one extant site in Scott County. This is the largest estimate for the species at any Missouri site and one of the largest populations in the country. The estimate confirms observations of other botanists who have noted that populations of Hall's bulrush fluctuate widely from year to year.

Region 4

The City of Wilson, North Carolina, has received FWS approval to proceed with construction of the Buckthorn Reservoir and to prepare a conservation plan for minimizing impacts on dwarf wedge mussel *(Alasmidonta heterodon)* populations in Turkey and Moccasin Creeks. A December 1994 biological opinion issued by the FWS under section 7 of the Endangered Species Act (ESA) had recommended "reasonable and prudent measures" for protection of the endangered mussel before construction begins. In response, the city has developed a plan to relocate dwarf wedge mussels from the proposed reservoir pool area in the two creeks to habitat upstream. The species requires free-flowing habitat and cannot survive in impoundments.

City officials will secure protection for stream banks and water quality in the mussel relocation area by establishing a 200-foot (60-meter) wide buffer strip on each side of the streams above the reservoir. Dwarf wedge mussel populations in the streams will be monitored over a 10-year period to determine their stability, viability, and reproductive success. The protection afforded these streams will result in a "win-win" situation for the mussel and the citizens of Wilson.

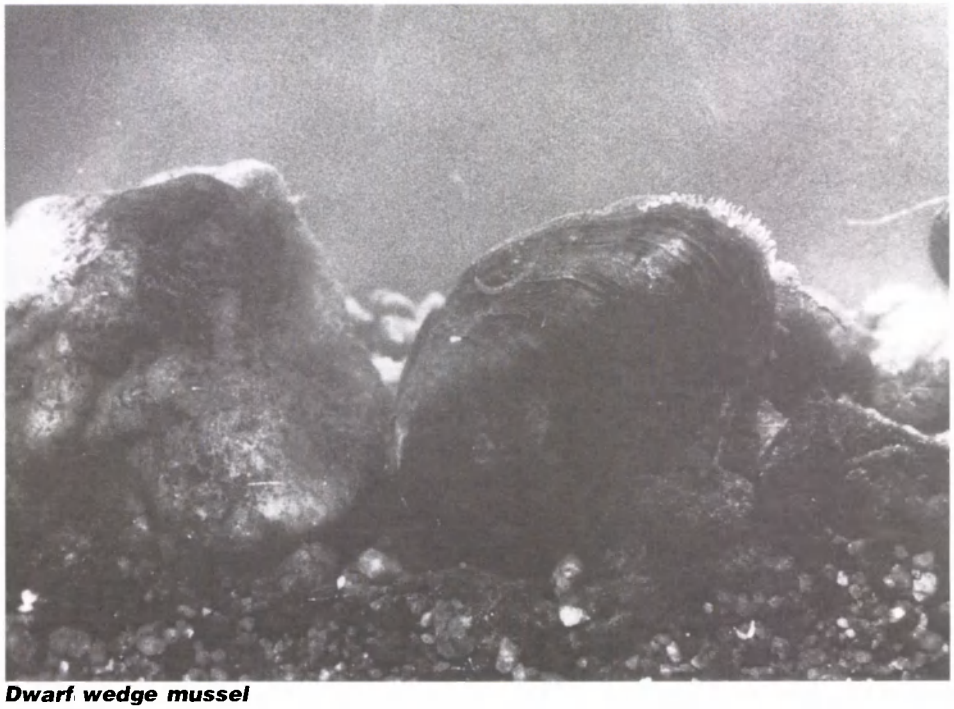
Region 5

The West Virginia Division of Natural Resources examined bat use around a known Indiana bat *(Myotis sodalis)* hibernaculum during the summer of 1995. This study, funded by the Monongahela National Forest, Fernow Experimental Forest, and West Virginia Nongame Wildlife and Natural Heritage Program, was aimed at determining if any Indiana bats remain in the vicinity of the cave during the summer. Bats were sampled using a harp trap at the cave entrance and several mist nets set nearby. A total of 837 bats of 7 species were captured between April and September, including 35 Indiana bats. The numbers of this endangered species captured by month were: June, 1; July, 5; August, 8; and September, 21. Most were males; only three females were observed.

A survey to collect additional specimens of the crystal darter *(Crystallaria asperella)* from the Elk River, West Virginia, for genetic analyses was conducted by night seining on September 20 and 21, 1995. FWS personnel collected two specimens of this fish in the vicinity of Clendenin in Kanawha County.

The dwarf wedge mussel was found recently in the Pequest River in Warren County, New Jersey. During August and September, nine valves and 11 partial valves and fragments were recovered on State property by biologists from the New Jersey Division of Fish, Game and Wildlife's Endangered and Nongame Species Program and the Division of Parks and Forestry's Natural Heritage Program. Although no live dwarf wedge mussels were observed, the species' known host fish—the tessellated darter *(Etheostoma olmstedi)*—was abundant throughout the study area. State biologists plan surveys of the area this spring of 1996, using ESA-section 6 funding.

Items for Recovery Updates and Regional News are provided by endangered species contacts in FWS regional and field offices.



Dwarf wedge mussel
Dick Biggins/FWS

Region 2

Attwater's greater prairie-chicken ***(Tympanuchus cupido attwateri)*** Sixty-five hatchlings of this critically endangered bird were produced by the three captive breeding flocks at the Fossil Rim Research Ranch, Houston Zoo, and Texas A & M University. Sixteen young males considered surplus to the breeding program were released into the wild at Attwater Prairie Chicken National Wildlife Refuge in August to test reintroduction techniques, and three of the birds were still alive in November. This pilot release provided much information on rearing and release techniques to improve survival rates in the future. Breeding facilities expect to produce over 100 chicks in 1996, and a release of males and females is planned to supplement the wild population at the refuge.

Region 3

Decurrent false aster ***(Boltonia decurrens)*** Staff from the Fish and Wildlife Service (FWS) Columbia, Missouri, Field Office recently surveyed a population of this threatened plant near the confluence of the Missouri and Mississippi Rivers. The decurrent false aster grows on floodplains, and the population in question suffered extended inundation during the major floods of 1993 and 1995. It also was almost destroyed in 1994 during the construction of a new levee. In a joint effort of the FWS, Army Corps of Engineers, and Missouri Department of Conservation to restore the site, seeds from local plants were broadcast around the borrow site in the fall of 1994. Despite the extended flooding in May and June of 1995, several hundred plants were observed growing at the site in the fall of 1995. Many apparently resulted from the direct seeding.

Partners for Wildlife The FWS Columbia Office negotiated the terms of a new Partners for Wildlife cooperative agreement with the Missouri Department of Conservation. It commits a total of $126,000 over the next 5 years to habitat restoration for listed species or listing candidates on private lands in Missouri. Earmarked projects include habitat restoration and improvement for the Niangua darter *(Etheostoma nianguae)* in the Little Niangua watershed and the construction of cave gates on private lands to protect Indiana and gray bats *(Myotis sodalis* and *Myotis grisescens*, respectively*)*. Funds also are reserved for FWS/State projects to restore or improve habitats for other listed or candidate species.

Reforestation In another habitat restoration effort, the FWS Bloomington, Indiana, Field Office received a challenge cost-share contribution from Wildlife Forever (a Minnesota-based conservation organization) and the Indiana Chapter of the National Wild Turkey Federation for a bottomland hardwood reforestation project. The site is located on former cropland adjacent to the Whitewater River in southeastern Indiana. The project should greatly enhance the riparian corridor for use by migratory songbirds and potentially the endangered Indiana bat.

Niangua darter
W.L. Pflieger

Decurrent false aster
John Schwegman

Freshwater Mussels St. Louis, Missouri, was the site for a recent 3-day symposium on freshwater mussels. Entitled "The Conservation and Management of Freshwater Mussels II—Initiatives for the Future," the symposium was sponsored by the FWS, Upper Mississippi River Conservation Committee, Mussel Mitigation Trust, and Shell Exporters of America, Inc. Papers presented by some of the approximately 230 participants centered on four major themes: surveys and status reports, life history studies, sampling methods, and environmental impacts. Although several speakers provided evidence on the continued decline of freshwater mollusks, others reported on positive activities that may contribute to the recovery of these animals. The symposium was highlighted by the unveiling of a Draft National Strategy for the Conservation of Native Freshwater Mussels. Although revisions are needed, this timely plan will help identify critical recovery activities for native North American mussels. Proceedings of the symposium will be published; contact the FWS Region 3 Office for details.

Region 4

Stock Island Tree Snail ***(Ortbalicus reses reses)*** This arboreal snail, characterized by its large, attractively marked shell, was listed in 1978 as threatened. Recent surveys have been unsuccessful in finding any Stock Island tree snails within its historical range, which includes Stock Island and Key West, Florida. With the cooperation of the Florida Game and Fresh Water Fish Commission, Stock Island Golf Course, Key West Botanical Gardens, and U.S. Navy, the FWS is taking recovery actions to reestablish this unique mollusk into part of its historical range. The FWS South Florida Ecosystem Office in Vero Beach plans to move forward with reintroductions of the snail in 1996.

Stock Island tree snail
Mark Yanno/FWS

Region 5

Virginia big-eared bat ***(Plecotus townsendii virginianus)*** In June 1995, West Virginia Division of Natural Resources personnel monitored populations of this endangered mammal at 11 summer colony sites in West Virginia. The censuses resulted in a total population estimate in these colonies of 6,338 bats (mostly adult females), an increase of 2.5 percent over the 1994 population level. Colonies ranged in size from 122 to 1,350 bats. One new site for this species was discovered following reports of big-eared bats observed by cavers. In September, biologists set up a mist net at the entrance of the cave, which is located in Grant County, and captured nine *P. t. virginianus* in about one-half hour. Bat use of this cave will be examined in more detail in 1996.

Endangered Plants Botanists located three new populations of running buffalo clover *(Trifolium stoloniferum)* in West Virginia last summer. Two populations were in Randolph County and both contained several large sub-populations. The third site was in Pocahontas County. Four new sites for the shale barren rock cress *(Arabis serotina)* also were found last summer in West Virginia.

Freshwater Mussels West Virginia Division of Natural Resources biologists also conducted surveys for two mussel taxa in the upper Greenbrier River drainage that are considered "species of concern." The green floater *(Lasmigona subviridis)* was located at two known localities and discovered at one new site, and the presence of juveniles indicated reproduction. The elktoe *(Alasmidonta marginata)* was found at two new sites. These surveys were funded by the Monongahela National Forest and the West Virginia Nongame Wildlife and Natural Heritage Program. Mussel surveys in the Middle Island Creek drainage, funded with an ESA-section 6 grant, located the endangered clubshell *(Pleurobema clava)* at three sites on Meathouse Fork.

Biologists discovered a new site for the endangered fanshell mussel *(Cyprogenia stegaria)* in the backchannel of Muskingum Island when they examined shells from a muskrat midden on the Ohio River Islands National Wildlife Refuge. The freshly dead mussels were 9 and 11 years of age. This further supports the theory that the upper Ohio River is an important recovery area for this species.

ATTENTION, 'NET SURFERS!

The Fish and Wildlife Service's (FWS) Division of Endangered Species recently launched a HomePage on the Internet's World Wide Web. Designed to offer users more exciting graphics as well as more comprehensive information on threatened and endangered species, the HomePage incorporates information from FWS offices throughout the country. The long-range plan for this screen calls for featuring a different ecosystem about every other month, highlighting one ecosystem for each of the seven FWS regions during the course of the year—so stay tuned!

Information provided on the new website is divided into four main categories: "Program," "Species," "What's New," and "Frequently Asked Questions." A great deal of information is available under each category with a click of the mouse. Under the Program category, for example, users can access a basic overview of the Endangered Species Program, the full text of the Endangered Species Act, a colorful map of the FWS regions, program contacts and policies, and recent feature stories from the *Endangered Species Bulletin*. The current *Bulletin* feature can be viewed under the "What's New" category.

Highlights of the Species category include a web version of the Lists of Endangered and Threatened Wildlife and Plants. Because these lists are large, they are broken into five index sublists: U.S. listed (1) vertebrate animals, (2) invertebrate animals, (3) flowering plants, (4) non-flowering plants, and (5) all foreign listed species. From each species in an index, a separate species profile is available that gives information about range, date of listing, critical habitat, special rules, *Federal Register* citations, etc., and some new features (e.g., availability of approved recovery plans).

The best way to learn more about this new electronic library of endangered species information is to check it out yourself. From the comfort of your own computer, simply use your Internet browser and type http://www.fws.gov at the URL prompt. Then simply scroll down and select "Endangered Species" from the list of contents. Welcome to our HomePage!

BOX SCORE

Listings and Recovery Plans as of December 31, 1995

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	SPECIES W/ PLANS
MAMMALS	55	252	9	19	335	39
BIRDS	74	178	16	6	275	72
REPTILES	14	65	19	14	112	31
AMPHIBIANS	7	8	5	1	21	11
FISHES	65	11	40	0	116	71
SNAILS	15	1	7	0	23	12
CLAMS	51	2	6	0	59	42
CRUSTACEANS	14	0	3	0	17	4
INSECTS	20	4	9	0	33	20
ARACHNIDS	5	0	0	0	5	4
ANIMAL SUBTOTAL	320	521	114	40	995	306
FLOWERING PLANTS	406	1	90	0	497	195
CONIFERS	2	0	0	2	4	1
FERNS AND OTHERS	26	0	2	0	28	12
PLANT SUBTOTAL	434	1	92	2	529	208
GRAND TOTAL	754	522	206	42	1,524*	514**

TOTAL U.S. ENDANGERED: 754 (320 animals, 434 plants)
TOTAL U.S. THREATENED: 206 (114 animals, 92 plants)
TOTAL U.S. LISTED: 960 (434 animals, 526 plants)***

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

**There are 418 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

***Four animals have dual status.

ENDANGERED Species BULLETIN

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

FIRST CLASS
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PERMIT NO. G-77