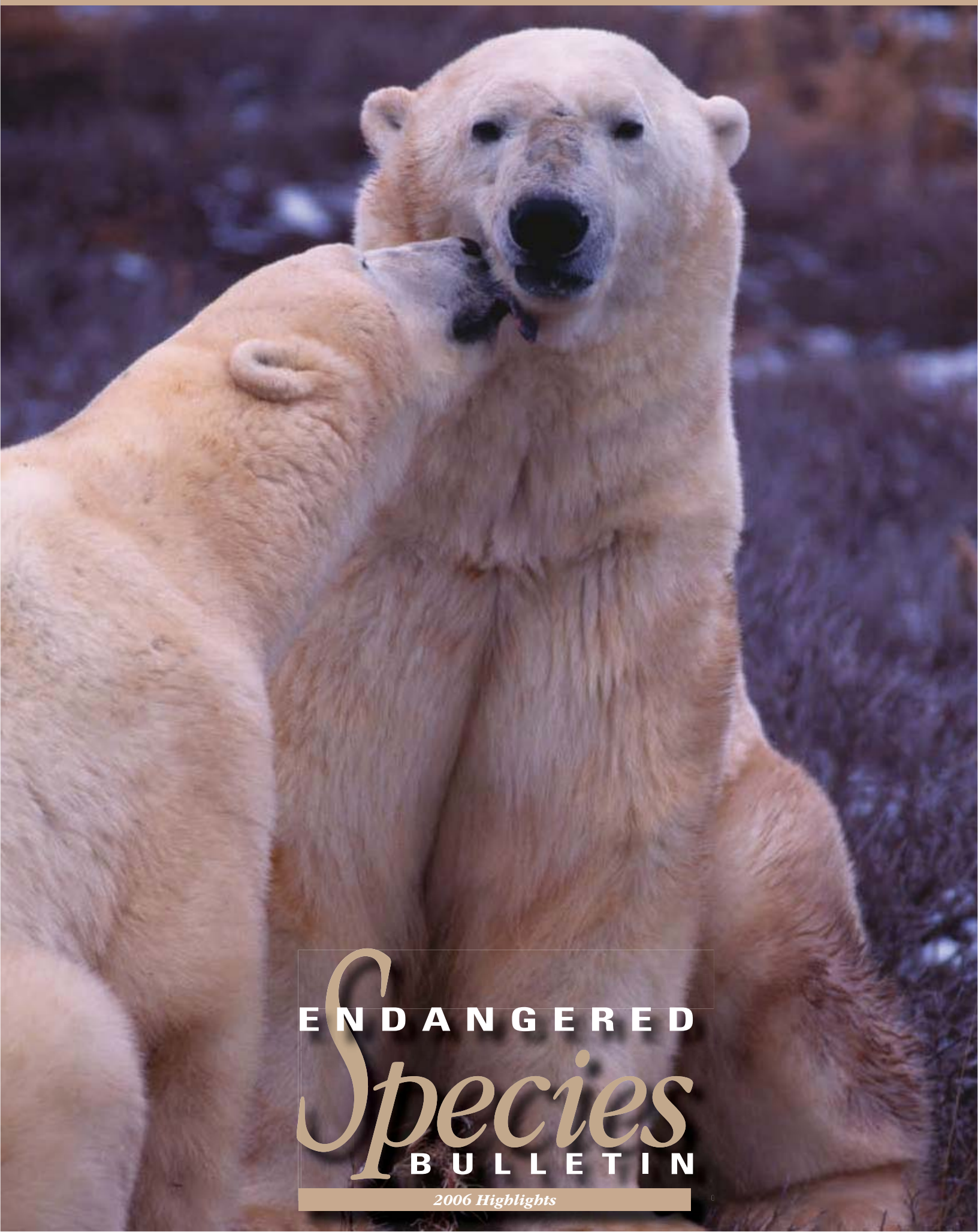
U.S. Fish & Wildlife Service



ENDANGERED Species BULLETIN

2006 Highlights

Welcome to the first annual highlights edition of the Endangered Species Bulletin. It contains selections from our three on-line 2006 editions, with updates as warranted and information on a new listing proposal. You will find articles on the endangered species recovery program, the conservation activities of the Department of Defense, and State Wildlife Action Plans.

ENDANGERED Species BULLETIN

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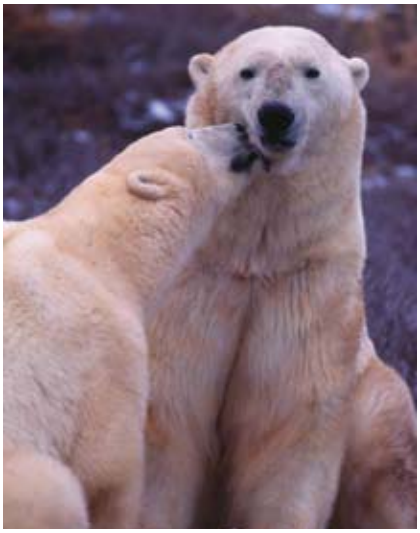

On the Cover
Polar bears (*Ursus maritimus*) were proposed recently for listing as a threatened species due to studies indicating that their sea ice habitat is literally melting away.
Orbis photo

Opposite page: The rare Sandhills lily (*Lilium pyrophilum*) grows in fire-maintained habitats on Fort Bragg, North Carolina.
Photo by Elizabeth J. Evans

The Endangered Species Bulletin is now an on-line publication. Three electronic editions are posted each year at www.fws.gov/endangered/bulletin.html, and one print edition of highlights will be published each year. To be notified when a new on-line edition has been posted, you can sign up for our list-serv by clicking on "E-Mail List" on the Bulletin web page.

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

The Bulletin is reprinted by the University of Michigan as part of its own publication, the Endangered Species UPDATE. To subscribe, write the Endangered Species UPDATE, School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI 48109-1115; or call 734-763-3243.

Please send us your comments and ideas! E-mail them to us at esb@fws.gov.

IN THIS ISSUE

Overcoming Challenges to Species Recovery

by Michelle Morgan, Krishna Gifford, Elena Babij, Debby Crouse, Kelly Hornaday, Mary Klee, and Martha Balis-Larsen

© B. Moose Peterson/WRP

In 1973, when the Endangered Species Act (ESA) became law, the endangered and threatened species list numbered only 77 species, none of which were invertebrates or plants, and iconic species such as the bald eagle (*Haliaeetus leucocephalus*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*) were very rare and severely reduced in range within the conterminous United States. These creatures symbolize why the ESA was voted into law by an overwhelming majority in Congress, and with such a clear purpose: "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species…."

Now, after 32 years of the ESA, let's take another look at the species mentioned above. The bald eagle can be seen flying throughout all of the lower 48 states again. Gray wolves have met their recovery targets in Idaho, Montana, and Wyoming, as well as Wisconsin, Michigan, and Minnesota. A healthy population of grizzly bears now inhabits Yellowstone National Park, and it has been proposed for removal from the list of threatened and endangered species.

Stabilizing and recovering species is far from easy. There are many biological, financial, and social challenges to overcome. However, we have achieved considerable success in these endeavors, due primarily to the use of creative partnerships. Our partners include foreign governments, other federal agencies, state governments, private landowners, the business community, and various non-governmental organizations.

We also apply an ecosystem-based approach to conservation, addressing a conservation issue at the landscape level rather than just concentrating on specific problems at hand. Each ecosystem contains an interconnected framework of biological and physical processes. Damage to the framework can affect the ecosystem's ability to support a diversity of life. The damage can be caused by natural events, such as hurricanes or volcanoes, and it can take the form of human impacts, such as habitat loss or chemical contamination. These impacts can be serious problems for species. Despite these many setbacks along the road to survival and recovery, we continue to move forward.

One of the biggest challenges the Fish and Wildlife Service faces in recovering listed species is the sheer number of species needing help. In addition to the 1,256 U.S. plant and animal species listed as of November 8, 2005, there are

George Andrejko/Arizona Game & Fish Dept.

For video of the bald eagle and other species, go to http://www.fws.gov/video/ and click on B-Roll.

286 candidate[1] species. Thousands more are considered "species of concern" or "critically imperiled" by states, environmental groups, and scientists. To plan and implement recovery actions for all listed species, the Service's Endangered Species Recovery Program received $58 million in FY 2005, an average of $46,400 per species. If you subtract the amount of money earmarked for specific projects, that leaves a total of $44.1 million, or $36,880 per species.

How do we make progress in the face of overwhelming odds and declining resources? By taking one species at a time, maximizing our partnerships, and promoting creativity. Since 1973, we have removed from the list (delisted) 10 domestic species due to recovery. Some would say that this is a poor success rate. However, success cannot be measured merely in delisting statistics. We have also downlisted 16 species from endangered to the less critical classification of threatened, stabilized or improved another 350 species, and, more importantly, we have prevented approximately 900 species from going over the brink into extinction. That's actually a good success rate! And when we stand back and review the history of species like the bald eagle, gray wolf, and grizzly bear, we know that every small stride adds up over the years.

The following are a few examples of other species faced with interesting recovery challenges and what's being done to improve their status:

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle (*Lepidochelys kempii*) spends many of its juvenile years foraging in U.S. waters and was once know to nest only at Rancho Nuevo in Tamaulipas, Mexico. A 1940s film showed a single arribada (mass nesting emergence) of an estimated 40,000 female Kemp's ridleys on one day. Despite Mexico's protective efforts, the number of nesting turtles fell to about 5,000 females by 1968. The Kemp's ridley was listed by the U.S. in 1970 as endangered due to threats that included the take of eggs and adults for human use, and incidental capture and drowning in shrimp trawls.

In 1978, the Service joined Mexico in an international conservation program that has attracted additional partners through the years. Nesting numbers continued to decline, however, to a low of only 702 nests documented for the

1 Candidates are those species for which we have enough information to list as threatened or endangered, but are precluded from doing so by higher priority workload.

National Park Service

Kemp's ridley sea turtle hatchlings

National Park Service

Donna Shaver, Chief of the Division of Sea Turtle Science and Recovery at Padre Island National Seashore, releases Kemp's ridley sea turtle hatchlings there. The public is often invited to observe these hatchling releases.

entire season in 1985. By the late 1980s, however, nesting numbers had begun to increase. During the 2003 nesting season, more than 8,288 nests were documented in Mexico, with a small scattering of nests in Texas as well. Since Kemp's ridley females nest 2 or 3 times each season, the nests represent perhaps 2,700 to 4,000 females. The Kemp's Ridley Recovery Plan identifies one of the downlisting criteria as attaining a population of at least 10,000 females nesting in a season. After a narrow brush with extinction, the progress towards recovery is heartening.

With slowly maturing species, it can take years to reverse a population decline. The recovery of some species is also "conservation dependent." For them, certain management activities will be needed in perpetuity to address difficult threats and ensure the species does not simply decline again to endangerment if it is delisted. For the sea turtle, both protection of females on the nesting beach, as well as protection from incidental capture and drowning in fishing trawls, will be necessary on a continuing basis in order to ensure long-term recovery.

Tinian Monarch

The Tinian monarch (*Monarcha takatsukasae*), a small bird from the island of Tinian in the Commonwealth of the Northern Mariana Islands, was one of the original species listed under the ESA.[2] It was listed as endangered due to critically low population numbers caused by the destruction of its habitat from World War II activities and pre-war agricultural practices. However, surveys in the late 1990s showed that the amount and density of forest habitat had increased and the bird's population numbers had rebounded. It was delisted on September 21, 2004.

However, while the original threats to the species had been abated, a new threat looms on the horizon: the nonnative, highly invasive brown tree snake (*Boiga irregularis*). While the snake has not established itself on Tinian, there have been several confirmed sightings, and it is responsible for decimating bird populations on other islands

2 The Commonwealth is an island group in the western Pacific that is in political union with the U.S. and is therefore covered under the ESA.

U.S. Navy

Tinian monarch

within the Marianas. To counter this potential challenge and to comply with the five-year post-delisting monitoring requirement of the ESA, an aggressive monitoring program has been developed in cooperation with the Commonwealth, the U.S. Geological Survey/Biological Resources Discipline, U.S. Department of Agriculture/Wildlife Services, and the Department of the Navy. The plan includes monitoring the bird's population numbers, monitoring the snake, monitoring land use, and recommendations for increasing efforts to prevent the snakes from spreading. One of the components of the plan includes building a snake barrier around Tinian's port to prevent any snakes that may come in on shipments from leaving the quarantine area. The plan is now being put in place, and the next five years of monitoring will show how successfully we can overcome the challenge of invasive species and keep our recovered species from returning to the list.

Kirtland's Warbler

Migratory birds have their own recovery challenges. These species may travel long distances from wintering grounds in other countries to nest in the U.S. The Kirtland's warbler (*Dendroica kirtlandii*) is one of these. This bird is considered endangered across its entire range. After breeding in the jack pine plains of Michigan's lower peninsula, it winters in the Bahamas. Limited habitat and brood parasitism by brown-headed cowbirds are two reasons why the warbler is endangered. Managing these problems in the warbler's breeding area has been the focus of combined efforts by the Fish and Wildlife Service, Forest Service, Michigan Department of Natural Resources, and non-governmental organizations such as The Nature Conservancy (TNC). Conservation actions have been very successful so far, although continued work is required to maintain the population in the breeding grounds.

However, the Kirtland's warbler spends about eight months of each year in its wintering areas. Little is known about its wintering biology, and efforts to learn more have been difficult. In fall and winter, this bird has dull brown plumage, making it well camouflaged, and its behavior is inconspicuous. A joint research project involving TNC, the Bahamas National Trust, and the Forest Service is trying to gain a better understanding of the species' winter habitat requirements and conservation needs.

Flies, rats, and beetles—oh, my!

Mention the term "endangered species" and most people think of wolves, grizzly bears, sea otters, and bald eagles, or perhaps even sea turtles or salmon. But the vast majority of listed species aren't large, cute, or showy. In fact, most are downright small and inconspicuous. More than half of the listed species in the U.S. are plants, many with very restricted ranges and specific habitat requirements. Of the 527 listed animals in the U.S. (as of November 17, 2005), more than 170 are invertebrates (including mussels, beetles, crayfish, and spiders, to name a few), 57 species are amphibians and reptiles, and 114 are fish (most of which are small species occurring in only a few drainages or basins). The 90 listed birds include such large and impressive species as the bald eagle and California condor (*Gymnogyps californianus*), but many are small and less well-known. The 78 listed mammals include 29 rodents, 3 rabbits, 1 shrew, and 9 bats.

Less charismatic species often face challenges to recovery not experienced by their more captivating counterparts. Because many species are lesser known, small, and inconspicuous, they are often overlooked by landowners, managers, and potential conservation partners. For species with very restricted ranges, the pool of potential partners and interested public is limited, resulting in fewer opportunities and less funding for recovery. The roles of many non-charismatic species in their environment also are not obvious or easily recognized except to scientists, and the public may not care about or see the benefits of recovery efforts.

Ron Austing

Kirtland's warbler

© B. Moose Peterson/WRP

Delhi Sands flower-loving fly

© B. Moose Peterson/WRP

Kangaroo rat

Many non-charismatic listed species also have image problems. Bats, spiders, and snakes don't usually elicit popular support. Some species also suffer from unfortunate associations with disliked animals. The six listed species of kangaroo rats, two species of woodrats, and one rice rat bear little resemblance or relationship to a common pest species but tend to suffer because of their common names.

Threats affecting many non-charismatic species also may be less manageable. Banning DDT was a relatively straightforward and successful recovery action for peregrine falcons (*Falco peregrinus*), bald eagles, and brown pelicans (*Pelecanus occidentalis*), and the end of deliberate persecution made it possible to restore gray wolves. But for most species, the loss or degradation of habitat is the major threat, and one that is difficult to reverse.

For example, the Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) is an insect endemic to the Colton Dunes ecosystem, which once covered over 40 square miles (104 sq. kilometers) in Riverside and San Bernardino counties in California. The Colton Dunes were created largely as a result of sand blown by the Santa Ana winds into the canyons of the San Gabriel and San Bernardino mountains. The species surviving in this unusual habitat have had to adapt to an ever-changing substrate, as the winds vary each year. For the Delhi Sands flower-loving fly, spending most of its life underground seems to be the best way to cope with its dynamic environment. As its name implies, this insect depends on wildflower nectar during its brief above-ground phase. Like a hummingbird, the colorful fly hovers at flowers, and it feeds through a long proboscis (tubular protrusion of mouth). Due to widespread loss of habitat, primarily the result of agriculture conversion and urbanization, the Delhi Sands flower-loving fly is now restricted to less than two percent of its former range. Despite its interesting life history, the biggest challenge to recovery of this species is the fact that it is a fly, an insect that many people consider a pest.

Ivory-billed Woodpecker

Until its rediscovery on the Cache River National Wildlife Refuge in Arkansas of 2004, most people would have said that the ivory-billed woodpecker (*Campephilus principalis*) was extinct. Despite previous surveys, there had not been a confirmed sighting since the 1930s. How could a species go undetected for so long? There were two main reasons; it was uncommon to begin with, and it inhabits remote, swampy, bottomland habitats.

The rediscovery led to a partnership that includes the Nature Conservancy of Arkansas, Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission, Cornell University, and the Service. A recovery team was quickly formed and has completed a recovery outline (interim conservation strategy that focuses recovery efforts until a full recovery plan can be drafted). The "Big Thicket" partnership will continue with efforts to carry out additional surveys in other suitable habitat, conserve and manage existing habitat, and conduct necessary research. In the meantime, the rediscovery provides hope that we may have a second chance to recover this and other very rare creatures.

Crafting a Solution

So, how do we garner support for listed species, including the ones "only a mother could love"? Teamwork is probably the most important tool we have at our disposal for overcoming the myriad of challenges facing species' recovery. Working in cooperation with a variety of partners that may have differing views, goals, and timelines is challenging at times. But a diversity of voices, ideas, knowledge, and experience also provides many benefits, as the partners bring their own strengths to the table. The Service's unique role continues to be coordinating and facilitating the efforts of many entities to achieve the common goal of recovering our nation's imperiled flora and fauna.

Michelle Morgan is in the Washington Office Endangered Species Program and is Chief of the Branch of Recovery and Delisting (WO-BRD). Krishna Gifford, Elena Babij, Debby Crouse, Kelly Hornaday, and Mary Klee are biologists in the WO-BRD. Martha Balis-Larsen also worked in the WO-BRD, but is now the WO Chief of the Office of Program Support.

Conservation stamps sold at www.ivory-bill-woodpecker.com support state and private work on this extremely rare bird.

USFWS

Biologists sample a pond for larval California tiger salamanders.

Multispecies Recovery Planning: Benefits and Challenges

by Kelly Hornaday and Valary Bloom

California clapper rail

A California clapper rail (*Rallus longirostris obsoletus*) passes warily under the boardwalk while a salt marsh harvest mouse (*Rallus longirostris obsoletus*) clings to a clump of pickleweed just a few feet away. A small crowd of people on the boardwalk whisper excitedly, thrilled at the rare opportunity to see these two endangered species. An unusually high spring tide has pushed the animals into the high marsh, uncomfortably close to humans. Humans and endangered species alike wait silently for the tide to go out.

Another less visible event also is underway, one that will have a more enduring effect on these and more than a dozen other endangered, threatened, and special status species: the preparation of the draft Tidal Marsh Ecosystem Recovery Plan.

The development of a recovery plan is the most important milestone for an endangered species; it provides the "roadmap" to a species' or ecosystem's recovery, and it defines how we measure our success towards that goal. Of the 1,264 federally-listed species, about 200 still need recovery plans, and many others need to have their recovery plans revised and updated. One way to reach the recovery planning milestone for more species in less time is to prepare multi-species recovery plans. Multi-species plans cover species that face the same threats, occur in the same area, or inhabit the same ecosystems. There are many benefits to multi-species recovery planning, but there are also many challenges.

In the case of the draft Tidal Marsh Ecosystem Recovery Plan, the primary challenge has been to integrate the wide variety of planning efforts already underway in the San Francisco Bay area into a single, cohesive, and practical recovery guide. This task is complicated enormously by the density of human occupation and associated urban infrastructure in and around the bay. However, through continual and effective communication, strong partnerships with interested stakeholders, and the sheer will of those who share the vision of a healthier tidal marsh ecosystem, the challenges are being overcome.

The table below describes some of the more common benefits and challenges of multi-species recovery planning:

When the draft Tidal Marsh Ecosystem Recovery Plan is finalized, it will be one of about 80 multispecies recovery plans covering more than 700 species. The authors of the draft Tidal Marsh Ecosystem Recovery Plan have

Benefits	Challenges
More species get recovery plans	Plans take longer to develop
By addressing threats common among species, the plan provides a comprehensive treatment of an entire ecosystem or geographic area	Plan may be large and difficult to use, or may leave out detail in order to keep the plan small
One recovery team for multiple species	Recovery team may be large and difficult to coordinate
Cost efficiencies for recovery actions that benefit multiple species or an ecosystem.	Cumulative cost estimates for multispecies plans may be large and therefore negatively perceived by the public
Can address conservation of candidate species or species of concern, potentially precluding the need to list in the future	Lack of information on many candidate species and species of concern hampers development of conservation strategies
Provides a single source of information for agencies, stakeholders, and landowners implementing actions for multiple species	For large plans, it may be difficult to avoid describing actions at a scale too large (such as ecosystem restoration, improved regulatory coordination) for individual agencies, stakeholders, and landowners to recognize and implement.
Provides opportunity to address conflicting species needs	Resolving conflicting species needs may be difficult, and information on species interactions may be lacking
Recovery strategies and corresponding actions can address threats and needs at the ecosystem and/or regional level	Larger scope of plan may come at the expense of species-specific and site-specific actions.
May utilize multiple authors to take advantage of species and/or ecosystem expertise.	Large plans with multiple authors may require considerable editing to ensure consistency
If species have similar life histories, may be able to use the same methodology for recovery criteria development.	In some cases, species may require entirely different method for recovery criteria development.

encountered most of the challenges described above. Nevertheless, the draft recovery plan is entering its final stages. Last fall, a series of meetings were held to invite the public, partners, and stakeholders to provide feedback on the draft plan and to encourage participation in its implementation. When viewed in light of the tremendous benefit of a comprehensive recovery plan for tidal marsh species of northern and central California, the challenges have been well worth the effort.

Kelly Hornaday is a fish and wildlife biologist in the Service's Arlington, Virginia, headquarters office of the Endangered Species Program (kelly_hornaday@fws.gov), and Valary Bloom is a fish and wildlife biologist in the Service's Sacramento Field Office (valary_bloom@fws.gov).

Salt marsh harvest mouse

Reversing a Textbook Tragedy

by John Schmerfeld

Jess Jones/USFWS

Tan riffleshell

A recent sunny morning along the Clinch River was the setting for a homecoming years in the making. Local children, media, Fish and Wildlife Service staff, and conservation officials from Virginia Tech University and the Virginia Department of Game and Island Fisheries (VDGIF) donned hip boots and waders as they released artificially propagated freshwater mussels into a crystal-clear section of river at Cedar Bluff, Virginia. Amid supportive smiles from observers on the riverbank, the group was on the latest leg of a journey that began one day seven years earlier.

On August 27, 1998, the Clinch River turned milky white from the release of over 1,600 gallons (6,060 liters) of a chemical used in foam rubber manufacture. A tanker truck had overturned on U.S. Route 460 and spilled its load into the river, ultimately killing an estimated 18,000 freshwater mussels as well as fish, snails, and other aquatic species. Among the dead were 750 individuals of three endangered mussel species: the tan riffleshell (*Epioblasma florentina walkeri*), purple bean (*Villosa perpurpurea*), and rough rabbitsfoot (*Quadrulla cylindrica strigillata*). One of the most significant kills of endangered species since passage of the Endangered Species Act, this incident was so tragic that it is now often referred to in textbooks. One of the three mussel species, the tan riffleshell, is so rare that it is now believed to exist only near the mouth of Indian Creek, a tributary of the Clinch River. The current total population for the species is estimated at about 400 individuals.

Dolores Savignano/USFWS

These tanks hold the host fish needed by the endangered mussels during their parasitic larval stage.

Under the authority of the Comprehensive Response, Compensation, and Liability Act of 1980 (Superfund) and the Clean Water Act, the Service may "assess injury to natural resources resulting from a discharge of a hazardous substance…and may seek to recover those damages." Natural resource damage assessments (NRDA) are separate from the cleanup actions undertaken at a hazardous waste or spill site, and they provide a process whereby the natural resource trustees can determine the

proper compensation to the public for injury to natural resources. The NRDA process seeks to: 1) determine whether injury to, or loss of, trust resources has occurred, 2) ascertain the magnitude of the injury or loss, 3) calculate the appropriate compensation for the injury, including the cost of restoration, and 4) develop a plan that will restore, rehabilitate, replace, and/or acquire equivalent resources for those resources that were injured or lost.

The Service's Gloucester, Virginia, Field Office Cooperative conducted studies of the resource damage between 1999 and 2002 under an informal funding and participation agreement with Certus Trucking, Inc., and with financial support from the Department of Interior. Disagreements that arose during the damage quantification phase forced the Department of Justice to file a complaint against the company in federal court in the fall of 2002. Working with Interior Department lawyers and Service staff, the company eventually agreed to a $3.8 million settlement. The consent decree reached with Certus stipulates that the settlement funds are to be "…managed by the DOI for the joint benefit and use of the Federal and State Trustees to plan, perform, monitor and oversee native, freshwater mussel restoration projects within the Clinch River watershed…." According to the "The Final Restoration Plan and Environmental Assessment for the Certus Chemical Spill Natural Resource Damage Assessment," the settlement will be devoted to a 12-year program to help restore native freshwater mussels in the Clinch River.

The injury assessment and damage determination focused on sediment toxicity testing and analytical chemistry within the spill area. Based on data from these studies, Virginia Field Office staff determined in 2003 that river sediments had sufficiently returned to background levels through natural attenuation and were once again able to support freshwater mussels. These data gave the green light to the mussel release program, which kicked off in the fall of 2005.

Landowners York and LaRhonda Lindsay watched last fall's release as officials credited them and many town residents with supporting the efforts of the DGIF, the Service, Virginia Tech, Cedar Bluff town officials, The Nature Conservancy, the Clinch River Headwaters Association, the Tazewell County Soil and Water Conservation District, and other groups in pressing for the settlement and its use in restoring the Clinch River's natural resources.

Cedar Bluff's Town Manager, Jim McGlothlin, said the DGIF and the Service have worked in a low-key manner to reach a point where repopulating the mussels is possible. "I've been impressed with how well they've worked with property owners," McGlothlin said. "Cedar Bluff's citizens have been very pro-environment. This is a very historic town, and we don't have a lot of large business and industrial development, so our cultural, historic, and environmental heritage is very important to us."

The key to this and other mussel restoration projects in Virginia has been the development of mussel-breeding techniques over the past two decades by Dr. Richard Neves of the U.S. Geological Survey's Cooperative Research Unit at Virginia Tech in Blacksburg, Virginia. His work, and that of several other researchers around the country, has been supported through Endangered Species Act section 6 grants and Service funding from Regions 4 and 5.

John Schmerfeld is a biologist with the Service's Virginia Field Office (804/693-6694 x107). (Mike Still of the **Richlands News-Press** *contributed to this article.)*

Dolores Savignano/USFWS

"They've been great to work with," LaRhonda Lindsey said of the habitat restoration partners at the release event. "We've only been here since April, but we're trying to learn and help keep the habitat as it should be. I thought today was very interesting."

The Public Role in Conserving Species

by Don Hankins

Elena Delacey

California red-legged frog

Conservation biology is a field that requires the melding of biological and social sciences. This is particularly true when considering the conservation of organisms in areas with high human populations. Although laws and policies direct us to seek public input and consider the needs of people when making regulatory decisions, as scientists, we have sometimes neglected the human factor in our conservation designs. But there is a better chance for success when local citizens are included in conservation planning efforts. In one example, the Fish and Wildlife Service's Sacramento Fish and Wildlife Office is working with the public and private sectors to ensure the conservation of San Francisco's namesake snake.

The San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), listed as endangered by the State of California and the federal government, is a subspecies endemic to the San Francisco Peninsula. It has been referred to as one of the most beautiful serpents in North America. Ironically, the San Francisco garter snake relies partly on a threatened species, the California red-legged frog (*Rana aurora draytonii*), for part of its diet. As with many listed species, the snake and frog are threatened primarily by habitat loss, fragmentation, degradation, and inadequate management. The bullfrog (*Rana catesbeiana*), an introduced species, is also known to prey on, and compete with, both species.

San Francisco garter snakes

Ferry Van Stralen

The Service prepared a recovery plan for the San Francisco garter snake in 1985; however, few recovery actions were implemented prior to 2002. In light of the snake's dire conservation status, the Service's Sacramento Recovery Program convened an internal working group in 2002 to address conservation needs. Among other actions, the working group identified Laguna Salada and Mori Point (adjacent areas located to the south in Pacifica) as priority areas for the conservation of the San Francisco garter snake and California red-legged frog within this portion of their ranges.

Laguna Salada is a former tidal lagoon that was diked in the early 1900s by the City of San Francisco to alleviate tidal flooding of an adjacent golf course (and later a residential development). As a tidal lagoon, it functioned with freshwater flow by seasonally breaching the natural sand spit to allow full tidal action. Together, Laguna Salada and Mori Point represent one of the northernmost population centers remaining for the San Francisco garter snake. Numerous studies from previous decades indicate the snake and the California red-legged frog extensively use the wetland complex and surrounding uplands, making the continued

management of those areas critical to the survival and recovery of both species.

In 2000, the Trust for Public Land, in cooperation with other partners, purchased Mori Point and transferred ownership to the National Park Service's Golden Gate National Recreation Area. The Service's Sacramento Recovery Program began working in partnership with the Golden Gate National Recreation Area, Golden Gate National Parks Conservancy, and San Francisco Zoo to address the snake's conservation needs. Several key conservation elements were identified, including the enhancement of wetlands to provide secure foraging and breeding habitat for the garter snake and red-legged frog, respectively; creating a "head-start" program to increase survivorship of newborn snakes; and conducting public outreach and education (such as zoological holdings[1] and interpretive signs).

Due to Laguna Salada-Mori Point's urban setting, heavy recreational use, and the on-going threat of poaching from reptile enthusiasts, the partnership recognized that successful conservation of the San Francisco garter snake would require extensive public participation and ownership. One day in October 2002, the public was invited to Mori Point to share knowledge of the site and discuss the preliminary plans to enhance the wetlands. Many of the participants noted their personal observations of the San Francisco garter snake and California red-legged frog. Following this initial public contact, final plans for the wetland enhancement project were developed. Workshops were held to inform the public, solicit its support, and educate volunteers on the biology, ecology, and identification of the snake.

The enhancement project took place in fall 2004, with key participation by volunteers from the Golden Gate National Parks Association's Site Stewardship Program. California red-legged frogs responded two months later by laying eggs in the newly created ponds. In February 2005, tadpoles were observed emerging from their egg sacs and in January 2006, more red-legged frog eggs were laid in the new ponds. Although it is too early to determine if this effort will substantially benefit the San Francisco garter snake, it is evident from press coverage that the public is quite enthusiastic about the project. People in the area are beginning to take ownership in the recovery of the species, and that bodes well for the future status of both the San Francisco garter snake and the California red-legged frog.

USFWS

After pond construction, biologists began to notice California red-legged frog egg masses (below).

USFWS

Don Hankins, formerly a fish and wildlife biologist with the Service's Sacramento Field Office, is now a professor at California State University, Chico.

1 In 2003, the two remaining captively held individuals in the United States died. In June 2005, ten captive-bred snakes were successfully repatriated from European collections and are now on display for educational purposes at the San Francisco Zoo.

Whooping Crane Population Reaches Record High

by Tom Stehn and Wendy Brown

Whooping Crane Eastern Partnership

A pilot dressed as a crane leads the reintroduced whoopers by ultralight as they learn their new migration route between Wisconsin and Florida.

Whooping Crane Eastern Partnership

The pilot's costume prevents the young cranes from imprinting on people.

For video of the whooping crane, go to http://www.fws.gov/video/ and click on B-Roll.

A record 237 endangered whooping cranes (Grus americana) arrived in their Texas wintering grounds in 2006-2007. This is likely the highest number of whoopers wintering in Texas in the past 100 years, and it exceeds last winter's record by 17. There is definitely cause to celebrate; the wild population has doubled over the past 20 years.

The increase was due to excellent nesting production in 2006. The Canadian Wildlife Service reported that 62 nesting pairs fledged a record 49 chicks on their nesting grounds in Wood Buffalo National Park, Canada. The 45 surviving chicks that arrived in Texas set another recovery record. Seven sets of adult pairs even arrived with two chicks each. This is yet one more record; whooping cranes normally hatch two chicks, but usually only one survives.

Flock updates one year ago had not been as optimistic, with the peak population size determined at 220 for the 2005-2006 winter, only a slight increase. Production was once again very good in Canada, with 30 juveniles making it to Aransas in fall 2005, but higher than average mortality of about 25 birds (11.6 percent of the population) between the spring and fall of 2005 allowed the flock to grow by only a few individuals. Much of the mortality of fledged whooping cranes comes from collisions with power lines during migration stopovers. Shootings, one of the major causes of the historic decline of whooping cranes along with habitat loss, now occur infrequently. The last known shooting of two whooping cranes occurred in Kansas in early November 2004. One died within a week, and the second later died from respiratory problems that developed from its injuries. Veterinarians at Kansas State University had surgically repaired the wing of this crane, with hopes that it could survive to contribute to the captive breeding flock. The Kansas Department of Wildlife and Parks flew the whooper to the USGS Patuxent Wildlife Research Center in Maryland, but the bird died after arrival. Charges filed against a party of sandhill crane (Grus canadensis) hunters involved in the shooting resulted in a guilty plea with fines of $3,000 per hunter, additional restitution paying the medical bills incurred caring for the injured cranes, community service, and loss of hunting privileges for two years.

Whooping cranes are the tallest birds in North America, standing nearly five feet (1.5 meters) tall with a wingspan wider than most cars. The only remaining natural population nests in Wood Buffalo National Park on the border of Alberta and the Northwest Territories in Canada and migrates 2,400 miles (3,860 kilometers) through the prairie states and provinces to the Texas coast. During the 2006 fall migration, however, five whooping cranes were confirmed at Grulla National Wildlife Refuge in New Mexico. (Grulla, appropriately, is the Spanish word for crane.) This sighting adjacent to the border of west Texas was the second confirmed sighting of Aransas-Wood Buffalo population (AWBP) whooping cranes in New Mexico.

Whoopers winter on the Texas Coast on and near the Aransas and Matagorda Island national wildlife refuges about 45

miles (72 km) north of Corpus Christi, Texas. Both their summer and winter range is restricted to a 25-mile (40-km) radius. Whooping cranes use a variety of habitats, including coastal and inland marshes, lakes, ponds, wet meadows, rivers, and agricultural fields. Wintering whooping cranes forage primarily for blue crabs in salt marsh habitat, while in summer they hunt fresh water ponds for minnows, a favorite food. Habitat at Aransas was good in the 2006-2007 winter due to high rainfall on the coast and adequate freshwater inflows into the bays. Inflows boost the blue crab population and lower marsh salinities, allowing cranes to drink directly from the marsh. Unlike most bird species, whooping cranes are territorial in both summer and winter and will defend and chase all other whooping cranes out of their estimated 350-acre (140-hectare) territories.

Historic population declines resulted from habitat destruction, shooting, and displacement by human activities. The species reached a low of only 21 birds in 1941. It has been listed as endangered in the United States and Canada since the 1970s. Current threats include limited genetic diversity, loss and degradation of migration stopover habitat, collisions with power lines, degradation of coastal habitat, chemical spills, and sea level rise.

Although the whooping crane population remains endangered, the population has been growing at more than four percent annually and first reached 100 birds in 1986 and 200 birds in 2004. Whoopers currently exist in the wild at three locations and in captivity at nine sites. The February 2007 total wild population is estimated at 353. This includes 237 individuals in the only self-sustaining population (Aransas-Wood Buffalo), 53 captive-raised individuals released in an effort to establish a non-migratory population in central Florida, and 63 introduced individuals in the eastern U.S. that migrate between Wisconsin and Florida. The current total breeding

Pedro Ramirez/USFWS

Whooping Crane Eastern Partnership

captive population at the Calgary Zoo, International Crane Foundation, Patuxent Wildlife Research Center, the Species Survival Center in New Orleans, and the San Antonio Zoo is 145 birds. The total population, wild and captive, in February 2007 was 498.

The Whooping Crane Recovery Teams of Canada and the U.S. were combined into the first International Recovery Team in 1995, with five Canadian and five U.S. members. The team decided in 2000 to write a combined international recovery plan. This is the third revision of the U.S. whooping crane recovery plan, which was first completed in 1980. In January 2005, the draft revised recovery plan for the whooping crane was published in the Federal Register for public review and comment. The final plan is under review.

Despite this progress, the wild whooping crane population is characterized by low numbers, slow reproductive potential, and limited genetic diversity. The possibility exists that a single catastrophic event could eliminate the wild, self-sustaining AWBP. Therefore, the principal strategy of the draft revised recovery plan is to augment and increase the wild population by reducing threats and establishing two additional, discrete populations. Offspring from the captive breeding population will be released into the wild in an attempt to establish self-sustaining wild populations. The continued growth of the AWBP population, along with the two additional populations, will also stem the loss of genetic diversity.

Because of the whoopers' low numbers and growth potential, recovery criteria for the current plan have been established only for reclassification (downlisting) of the species. Downlisting can be achieved when 1) there are a minimum of 40 productive pairs in the AWBP and 25 productive pairs in each of two additional self-sustaining populations, or there are 250 productive pairs in the AWBP, and 2) there are at least 21 productive pairs in the captive population.

The whooping crane story is truly a classic in endangered species recovery. The beauty of these long-lived birds and their extreme peril of extinction captured the hearts of many people and ignited the sustained efforts of many individuals and organizations, from international governments to schoolchildren. These efforts have made it possible for the species to not only survive but begin to recover against tremendous odds.

Update: In a tragic loss on February 2, 2007, 17 juvenile whooping cranes were killed in their winter reintroduction pen at the Chassahowitzka NWR. These cranes had successfully completed their first migration, led 1,200 miles (1,930 km) behind ultra-light aircraft between Wisconsin and Florida. A violent line of thunderstorms and tornados that killed 20 people created a storm surge that flooded the release pen and caused the 17 cranes to drown. One of the penned birds escaped and was found two days later with sandhill cranes in an adjacent county. The numbers in the accompanying article reflect these losses.

The storm surge was unprecedented for that time of year and had not been forecast. Project personnel could not have reached the remote release site, which is accessible only by airboat, during the night-time storm. They will conduct a thorough review of the incident and change methodology to prevent such a loss from happening again.

Tom Stehn (tom_stehn@fws.gov), the national whooping crane recovery coordinator, is stationed with the wintering cranes at Aransas NWR in Texas. Wendy Brown (wendy_brown@fws.gov) is the endangered species recovery coordinator for the Southwest Region of the Service in Albuquerque, New Mexico.

Defense and Conservation: Compatible Missions

by L. Peter Boice

The Department of Defense (DoD) manages approximately 29 million acres (12 million hectares) of land throughout the nation. Access limits due to security considerations and the need for safety buffer zones have shielded these lands from development pressures and large-scale habitat losses. About 380 installations have "significant natural resources," as defined by the Sikes Act, and more than 250 have at least one federally-listed threatened or endangered species. In total, 320 listed species may be found on DoD-managed lands.

Management decisions affecting DoD lands are guided by the principle that these lands were set aside to serve military training and testing purposes. The Sikes Act, DoD's enabling legislation for natural resources management, requires that these lands be managed for "no net loss in the capability . . . to support the military mission." Within these guidelines, the DoD has embraced its stewardship responsibilities for the rich variety of natural resources on the lands it manages.

The DoD's challenge is to balance the need to use its air, land, and water resources for military training with its stewardship responsibility to conserve these resources for future generations. It uses principles of multiple use, sustained yield, and biodiversity conservation to manage its biological resources, and the conservation of endangered and threatened species is a priority.

A Sound Legislative Foundation

In 1997, Congress amended the Sikes Act, providing DoD an opportunity to enhance its management of natural resources. It directed all military installations with significant natural resources to develop and implement Integrated Natural Resources Management Plans (INRMPs) in cooperation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency. With this requirement came increased funding for

Below: Marines at the California least tern nesting area, Camp Pendleton.

USMC

Lance Cpl. Matthew K. Hacker

James Bradley, a student at Allegheny College in Pennsylvania, inserts a small light into a red-cockaded woodpecker nest on Camp Lejeune.

Cadet Wendy Cook

Hawaii Army National Guard field ecologist Trae Menard cares for a new population of* Scheidea adamantis*, an endangered plant known to grow only at Diamond Head Crater at Fort Ruger.

many projects relevant to endangered species management, including management plans, inventories, resource monitoring, and habitat restoration and enhancement.

An INRMP is a comprehensive document that provides for the sustainable use of natural resources and the conservation of listed or sensitive species and ecosystems. Its purpose is to balance the management of ecosystem resources with the specific mission requirements of the installation. INRMPs are also comprehensive sources of biological and geographic information and primary sources of information for preparing environmental assessments and impact statements.

An amendment to the Endangered Species Act contained in the FY 2004 Defense Authorization Act further increased the importance of INRMPs to endangered species management. This amendment precludes a critical habitat designation on military lands under DoD management where an approved and implemented INRMP provides a benefit to the species.

INRMP Strategic Action Plans

In 2005, to provide a road map for future INRMP implementation, DoD endorsed a "Cooperative Plan for Using INRMPs at Active Military Installations and Ranges to Sustain Readiness." The plan identified a set of activities, including:

- a Sikes Act Tripartite Memorandum of Understanding that establishes a cooperative relationship involving the DoD, Service, and the relevant state fish and wildlife agency;
- a template that will provide consistency to all new and revised INRMPs;
- a course, tested in November 2005, to assist all tripartite stakeholders in the cooperative development and implementation of INRMPs; and
- a workshop, held in May 2006, to determine how to integrate INRMPs and State Wildlife Action Plans.

Managing for Species at Risk

A partnership initiated in 2001 among DoD, NatureServe, and the network of State Natural Heritage Programs identified more than 500 species at risk. This information has been invaluable in identifying and prioritizing potential conservation actions on or near DoD installations; since the conservation of such species can make it unnecessary to list them as endangered or threatened. A follow-up project developed management guidelines for four key species. A second project used a habitat approach to evaluate and map species at risk on six military installations in Georgia and to prepare management guidelines.

Regional Ecosystem Management Initiatives

Cooperative regional partnerships enhance communication, program efficiency, and understanding among the partners. In 1994, the DoD adopted an ecosystem approach to natural resources management. It has established important initiatives for such regions as the Sonoran Desert, Great Basin, Mojave Desert, Gulf Coastal Plain, Colorado Front Range, Fort Huachuca (Arizona) watershed, and Camp Pendleton (California).

Conservation Easements

The habitats on DoD installations are often the last, best hope for imperiled species. Many surrounding lands are experiencing rapid development and other encroachments. It is important that the DoD cooperates on resource management beyond installation borders to reduce potential restrictions on training and to enhance species recovery. For example, the Army has aided landowners in establishing conservation easements near Fort Bragg, North Carolina, to protect habitat for the endangered red-cockaded woodpecker *(Picoides borealis)*. These efforts were the origin of the Army Compatible Use Buffer program and similar efforts to secure compatible long-term land uses near military installations.

Researching Military Effects

Some military activities have the potential to affect listed and at risk species in unique ways. The DoD Strategic Environmental Research and Development Program (SERDP) has sponsored research on the effects of such activities as military noise, smoke and obscurants, and unexploded ordnance. Almost seven years ago, SERDP also established a long-term ecosystem monitoring program at Fort Benning, Georgia, and it recently initiated a similar effort focusing on estuarine issues at Camp Lejeune, North Carolina.

New Tools for DoD Managers

In addition to the training courses and workshops implemented under the INRMP Strategic Action Plan, DoD is providing its resource managers with a wide range of management tools. The INRMP Handbook, "Resources for INRMP Implementation," was revised in the summer of 2005. An August 2005 study, "Best Practices for INRMP Implementation," identifies management practices and lessons that will improve the effectiveness of INRMPs. A revised handbook, "Conserving Biodiversity on Military Lands," will provide new scientific and policy information and detailed DoD case studies. An outreach toolkit will describe the importance of biodiversity on DoD lands for military commanders, base residents, and other audiences. We also have developed new training oriented towards the needs of military land managers, and have reviewed and endorsed additional courses developed by other federal resource management agencies. These and other actions make today an exciting time for resource conservation on DoD lands.

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Captive-propagated Pronghorn are Released

In November 2006, the Fish and Wildlife Service released the first ever captive-bred endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) into their historic Arizona habitat. Two males born into captivity in 2005 on the Cabeza Prieta National Wildlife Refuge joined other wild pronghorn on the refuge. Two more yearling males were released in January 2007.

The refuge and its partners maintain a fenced semi-captive breeding facility to contain the pronghorn, keep out predators, and provide for drinking water and forage. Nine animals were born in the enclosure in the spring of 2006 and six in 2005. Their contact with humans during captivity has been minimal to ensure they remain as wild as possible.

The U.S. population of Sonoran pronghorn in the wild has grown from an estimated 21 animals in 2002 to an estimated population of 68 today, and 23 are in the breeding facility. The recovery program is a cooperative effort involving the Service, the Air Force and Marine Corps at the adjacent Barry M. Goldwater Range, Mexico, two Arizona hunting clubs, zoo veterinarians, and University of Arizona volunteers.

Master Sgt. Michael Burns/USAF

These pronghorn were photographed several years ago at the Barry M. Goldwater Range on southern Arizona.

Wildlife Conservation and the U.S. Army

by Rosemary Queen

US Army

Camp Shelby burrowing crayfish

Conservation of natural resources on the Army's 15 million acres (6 million hectares) has long been part of its heritage. In the 1870s, the Army sent cavalry troops to what are now Yosemite National Park and other future parks to protect wildlife from poaching and vandalism. In 1886, the cavalry arrived to protect the future Yellowstone National Park, and it remained there until 1916, when the National Park Service was created.

In the 1950s and earlier, the Army managed its property for hunting, timber harvesting, and agricultural use. During this period, the U.S. Fish and Wildlife Service worked with the Army on management programs to develop recreational opportunities. The Service, states, and Department of Defense recognized the importance of conserving fish and wildlife resources on military lands. Congress formalized the DoD's role in 1960 with passage of the Sikes Act.

The Sikes Act provides a framework for cooperation among the DoD, Service, and state wildlife agencies in planning, developing, and maintaining natural resources on military lands while supporting military training. For its part, the Army works to conserve natural resources while creating the most realistic training possible for its soldiers. Amendments to the Sikes Act have expanded its authority to develop ecosystem-based integrated natural resources management plans (INRMPs).

As a component of INRMPs, the Army actively promotes the recovery of 188 listed species found on 102 installations (fiscal year 2005 data), and it has put tremendous effort into preventing the need to list identified species-at-risk. For example, the longleaf pine forests managed on installations in the Southeast such as Fort Bragg, North Carolina, and Fort Stewart and Fort Benning, Georgia, have been essential for increasing the

F Troop of the U.S. Cavalry poses atop a fallen giant sequoia in the 1870s.

US Army

Jonas Jordan

Prescribed burning is an important habitat management tool for red-cockaded woodpeckers and gopher tortoises at Fort Stewart, Georgia.

population of red-cockaded woodpeckers (*Picoides borealis*), an endangered bird. Fort Hood, Texas, has one of the highest populations of the endangered golden-cheeked warbler (*Dendroica chrysoparia*) thanks to habitat management and the control of cowbirds, which parasitize warbler nests. Camp Shelby, Mississippi, has prepared a candidate conservation agreement with the Service to ensure that the Camp Shelby burrowing crayfish (*Fallicambarus gordoni*) will thrive into the future. The Service determined that, with implementation of the agreement, the crayfish no longer required status as a candidate for listing. Personnel at the Yakima Training Center, Washington, have managed their population of the Columbia Basin greater sage-grouse (*Centrocercus urophasianus*) through fire control, habitat management, and population enhancement to ensure this distinct population segment (DPS) does not dwindle. Yakima's efforts over the last few years have contributed to reducing threats to this DPS.

An installation's natural resource management and conservation activities are delineated within its INRMP. These plans are essential for the Army's successful conservation programs. Because of the effectiveness of these INRMPs, Congress amended the Endangered Species Act in 2004 to allow INRMPs to function in lieu of a critical habitat designation if the Service or National Marine Fisheries Service finds that the INRMP provides sufficient benefit to a species. To date, the 11 Army installations have been excluded from critical habitat designation based on their INRMPs.

The conservation of listed species is only a small part of the Army's commitment to ecosystem health and sustainability. In 2005, the Army released its new "Army Strategy for the Environment." One of its cornerstones is a commitment to incorporate environmental considerations in all contingency and combat operations. This includes fostering an ethic within the Army that goes beyond environmental compliance and strengthens the Army's operational capability by using sustainable practices to reduce the environmental footprint.

This evolution in Army thinking has allowed for innovation and improvements in current operations. For example, Army installations such as Fort Riley, Kansas, and McAlester Army Ammunition Plant, Oklahoma, have restored cool-season grazing sites to high functioning warm-season grass prairies, which benefit both military training and conservation of prairie-dependent species.

Army installations also carry out invasive species control programs. Feral hog and cat control and the removal of such harmful plants as yellow star-thistle, purple loosestrife, kudzu, and saltcedar are just some of the invasive species battles taken on by Army installations. The Army is also active in the Partners in Flight program for migratory conservation. Army installations have set up monitoring stations and survey transects to help assess population levels of many migratory birds. Many INRMPs also contain management strategies to benefit, and minimize operational impacts on, migratory birds. Such strategies include changing the timing of field and forest activities to avoid nesting periods; protecting nests during training activities; controlling feral cats, cowbirds, and non-native birds; and educating installation staff and soldiers on wildlife conservation.

With continuing support from the Service and state wildlife agencies, the Army will continue to be a leader in the conservation of the natural resources that are so important to its training and testing missions.

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Desert Tortoises Get Help From the Marines

by Captain Aaron Otte, U.S.M.C.

USMC

A Marine and civilian biologist examine a desert tortoise.

Desert tortoises (*Gopherus agassizii*) have crawled the Mojave Desert since California's southern interior was covered with green ponds and wetlands. Millions of years have altered the landscape dramatically, turning it into an arid expanse dominated by wind, rocks, and sand. The desert tortoise has adapted to major geological and climate change and continues to dig burrows there, waiting out the harshest periods of the year in safety under ground.

In recent decades, a new tenant has arrived on the scene: the Department of Defense. In 1952, the DoD found that the Mojave Desert's wide open spaces provided an ideal backdrop for Marines to practice war fighting. The Marine Corps moved some of its units from Camp Pendleton on the California coast to what is now the Marine Corps Air Ground Combat Center near Twentynine Palms, California. A 596,000-acre (240,200-hectare) spread of rugged landscape directly north of Joshua Tree National Park, the base has evolved into the Corps' showcase for large-scale live-fire training.

The desert tortoise is an amazingly adaptive animal. However, despite the species' remarkable longevity, its survival is now in peril. In the early 1980s, human migration to the Mojave Desert rose and so did the incidence of trash scattered throughout the landscape. Benefiting from increased food (from human trash) and water, populations of the common raven, a prolific omnivore, skyrocketed. Unfortunately, the raven became one of the main predators of young tortoises. For this and other reasons, including disease, the U.S. Fish and Wildlife Service listed the Mojave population of the desert tortoise in 1990 as threatened.

For every 15 clutches of eggs laid (each clutch typically numbers 3 to 10 eggs), only one individual is likely to live to maturity. Once a desert tortoise has reached adulthood, its prospects for a long life are promising. Its shell is hard enough to protect it from all native wild animals except the mountain lion. However, during its first three to seven years of life, the reptile's shell is soft, and it fails against a wide variety of predators, most significantly the raven. Other creatures that take their toll on eggs and immature tortoises are foxes, dogs, bobcats, and badgers.

For tortoises that survive the elements and predators, there is yet another threat: upper respiratory tract disease (URTD). The primary pathway for UTRD bacteria is direct nose-to nose contact. While there is some question to whether URTD-causing bacteria are native or introduced to the Mojave Desert, the release of diseased pet tortoises does appear to exacerbate the condition in the wild. Rather than killing the tortoise directly, URTD depresses the immune system. A tortoise can survive URTD in a year when food and water are plentiful. In a bad year, however, the disease can be the straw that breaks its back, allowing death by malnutrition, predators, or other diseases.

DoD Takes Action

Two military bases within the native range of the Mojave Desert tortoise population have already acted to overcome the effects of the exploding raven population and respiratory disease. Edwards Air Force Base and Fort Irwin, in concert with the University of California at Los Angeles (UCLA), were first to open captive-breeding pens for the tortoise.

Now, the Marine Air Ground Task Force Training Command at Twentynine Palms is kicking off its own effort. The Tortoise Research and Captive Rearing Facility is a 2.25-acre (1-ha) protected enclosure located a few miles from the main base in an area that carries a high tortoise population. Its mission is to protect tortoise nests, hatchlings, and juveniles for the first three to seven years of life. The base environmental staff has been the main proponent for building the captive rearing facility. The Marine Corps recognizes the expertise of UCLA, and it is paying the university to manage the tortoise rearing facility and to provide personnel and equipment.

The much-anticipated program began operating in March 2006. UCLA staff locates female tortoises in the training area surrounding the rearing facility. With a transportable x-ray machine, tortoise handlers check tortoises to determine if they are carrying eggs. If so, staff will take them to one of three large enclosures inside the facility to lay eggs, afterwards returning them to their original location. The eggs will hatch on their own as they would in the wild. (In the wild, adult tortoises do not provide parental care.)

To prevent transfer of the URTD bacteria, personnel keep the tortoises separated in the rearing facility. Biologists wear latex gloves, disinfect equipment between uses, clean their shoes after working in the disease pen, and take other preventative measures.

Hatchlings will live in protection for two to seven years, waiting until their shells have hardened sufficiently to resist predation. New tortoises will be brought into the enclosure in coming years so that a variety of ages are represented. Once released into the wild, the tortoises will be tracked for at least one year to determine their location and overall welfare.

The captive rearing facility also provides a laboratory for scientists to study such topics as tortoise disease transmission, genetics, paternity, and diet. Because rainfall in the Mojave Desert is fickle, the rearing facility will be supplemented with irrigation when necessary to encourage growth of native plants for forage and shelter.

Efforts by Edwards Air Force Base, Fort Irwin, and now the Marine Air Ground Task Force Training Command are coordinated with those of UCLA, the U.S. Fish and Wildlife Service, and tortoise protection groups. All of these agencies and organizations want to see the desert tortoise return to a secure status, making Endangered Species Act protection no longer necessary. These captive-rearing projects will not only contribute directly to recovery by increasing tortoise numbers, but augmented populations will also provide the basis to evaluate other management efforts on the landscape, thus contributing to a comprehensive recovery strategy.

USMC

A tortoise crawls toward the shelter at its burrow at the Twentynine Palms Marine Corps Air Ground Combat Center.

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by Darbie Sizemore

Eggert's Sunflower Prospers at Arnold AFB

For more than seven years, the Eggert's sunflower (*Helianthus eggertii*) was listed as threatened under the Endangered Species Act. In 2005, however, the U.S. Fish and Wildlife Service removed this plant from the list, recognizing that it no longer needs protection under the Act. A cooperative management agreement now in place between the U.S. Air Force's Arnold Engineering Development Center (AEDC) at Arnold Air Force Base, Tennessee, and the Service deserves part of the credit for the species' recovery. The agreement requires continued management and protection for Eggert's sunflower at Arnold AFB, and will help to ensure that this wildflower remains an integral part of the base's ecosystem.

This species of sunflower, which has large yellow flowers and grows up to eight feet (2.4 meters) tall, is known to grow only in Alabama, Kentucky, and Tennessee. Eleven populations occur on base property. "Recovery and delisting of a federally listed species like the Eggert's sunflower is a first for the Air Force," says Richard McWhite, the AEDC natural resources planner. "Eggert's sunflower is an impressive member of the AEDC barrens plant community. Beginning in early August and lasting through mid-September, the bright yellow flowers of the Eggert's sunflower can be seen across the base. Aggregations, or groups, of Eggert's sunflower, while in flower, dominate a site and throw yellow blooms into the air."

When Eggert's sunflower was placed on the threatened species list, biologists knew of 34 population sites within 14 areas: one county in Alabama, five counties in Kentucky, and eight counties in Tennessee. Now, there are 73 known populations (seven that span three counties in Alabama; 18 that span nine counties in Kentucky; and 48 that span 15 counties in Tennessee). Of these, approximately 27 populations occur on public land or on land owned by The Nature Conservancy (TNC). Management plans provide for extended conservation of the species at all sites on federal lands and the TNC site. The number of secure populations exceeds the recovery goal of 20 such populations.

The Eggert's is more adaptable than scientists previously realized. It prefers rolling-to-flat uplands in full sun or partial shade. Often, it is found in open fields or thickets along wooded borders with other tall plants and small trees. It persists in, and may even colonize, roadsides, power line rights-of-way, or fields with suitable open habitat. One manage-

ment tool for this species is the use of prescribed burning to open up densely vegetated habitat. Distinguishing characteristics of Eggert's sunflower include opposite, stalkless, lance-shaped leaves that are rough and waxy on the upper leaf surfaces and white on the undersides. The plant grows in large aggregations that arise from an underground stem that may have many above-ground stems.

The distribution of Eggert's sunflower correlates strongly with the presence of barrens habitat. In eastern Tennessee, the term "barrens" refers to the unique complex of grasslands and wetlands that once characterized the Highland Rim region. The gently rolling uplands, interspersed with wet flats and depressions, appear much like the familiar Midwestern tallgrass prairie-oak savanna landscape. The barrens were historically maintained by fire and grazing, and have declined with the loss of natural ecosystem processes.

"Restoration of barrens habitat at Arnold has provided the needed open areas and barrens for the Eggert's sunflower," says McWhite. "Two thousand acres of barrens habitat have been restored recently, creating additional habitat for Eggert's sunflower."

Genetic research initiated in 1999 enabled biologists to define what constitutes a functioning population of Eggert's sunflower. This research, combined with successful habitat restoration and a cooperative management agreement between AEDC and the Service, led to the species' delisting in 2005.

Now that Eggert's sunflower is secure, the Air Force is no longer required to engage in interagency consultations with the Service for this plant under section 7 of the Endangered Species Act. Species management has become simplified by reducing the number of barrens habitat units under survey, and species monitoring is simplified and incorporated within the base's Barrens Ecological Monitoring Program. Land use restrictions for the benefit of Eggert's sunflower are no longer needed outside barrens restoration areas, and the species' annual management costs can be reduced by 40 percent due to a reduced need for monitoring and the consolidation of prescribed burn units. Recovery of Eggert's sunflower not only has conserved a colorful wildflower species but has produced several operational advantages for the Air Force.

Arnold Engineering Development Center

Darbie Sizemore is a senior public affairs writer for Aerospace Testing Alliance (ATA), the prime contractor for operations, maintenance and support, at Arnold Engineering Development Center. ATA is a joint venture between Jacobs Sverdrup, Computer Sciences Corporation, and General Physics.

In Defense of Coral Reefs

by Lorri Schwartz

Phillip Lobel and Lisa Kerr Lobel

Coral reefs are the world's most biologically diverse marine ecosystems. They consist of a vast assemblage of plants, animals, and microbes, many of which are still scientifically unknown. Reef ecosystems provide habitat and food for fish, substances for new medicines, revenue from tourism and recreation, and protection from coastal storms. However, studies over the past 10 years show that corals are deteriorating at an alarming rate. Human activities such as coastal development, destructive fishing practices, pollution, and sedimentation are causing coral reef degradation worldwide. As a result of these impacts, the National Marine Fisheries Service (NMFS) recently listed the elkhorn coral (*Acropora palmata*) and staghorn coral (*A. cervicornis*) as threatened species under the Endangered Species Act.

In response to growing concern, Executive Order (EO) 13089 (issued June 11, 1998) directed federal agencies to study, restore, and conserve coral reefs in the United States. It also established the U.S. Coral Reef Task Force to coordinated federal protection. The Task Force is co-chaired by the Secretaries of the Departments of Interior and Commerce, and is composed of representatives from participating federal agencies, states, territories, and Freely Associated States. The Department of Defense, a member of the Task Force, is represented by the Assistant Secretary of the Navy (Installations and Environment). The Task Force oversees implementation of the EO, guides coral reef initiatives, and works in cooperation with other agencies and stakeholders. It is also responsible for coordinating a comprehensive program to 1) map and monitor U.S. coral reefs, 2) develop and implement research and mitigation efforts, and 3) assess the U.S. role in international protection.

In 2000, the Navy, with assistance from the other military services, submitted the DoD Coral Reef Protection Implementation Plan. The DoD plan contains a comprehensive overview of Army, Navy, Air Force, and Marine Corps policies and programs related to coral reef protection, describes military activities potentially affecting coral reef ecosystems, and lists funding sources for conservation. It includes a discussion of DoD research, outreach, and stewardship initiatives to protect and enhance coral reef ecosystems. The plan continues to be a useful source of environmental information and requirements for military personnel, and it is an excellent communications vehicle for disseminating information to other federal agencies and the public.

The DoD uses a variety of programs to identify and avoid impacts to coral reefs, but the most important of these is environmental planning. The Navy evaluates major operations and training exercises for potential environmental impacts under the National Environmental Policy Act and the Coastal Zone Management Act. Although EO 13089 applies only to U.S. coral reef ecosystems, actions conducted internationally are reviewed under EO 12114, Environmental Effects Abroad of Major Federal Actions. Environmental plans for training and combat exercises provide for the proper management of ship and vehicular operations to avoid damage to coastlines, reefs, and beaches. The DoD also uses information from baseline ecological surveys, and innovative maneuvering techniques to ensure that coral reefs are protected during testing and training operations. The Navy

is using a marine-based Geographic Information System (GIS) system that will contain coral reef monitoring data, reef locations, habitat conditions, and related marine fisheries information. Installations near coral reef ecosystems also include ecological information on reefs and conservation measures in their Integrated Natural Resources Management Plan.

Part of the DoD Coral Reef Protection Implementation Plan addresses marine pollution. In accordance with the Act to Prevent Pollution from Ships, DoD complies with strict shipboard pollution prevention standards. Shipboard equipment has significantly reduced the amount of pollutants and waste products used on military vessels. DoD continues to develop innovative technology such as "compressed melt units," which compress all plastic waste for storage on board. This technology has allowed DoD to implement a "zero plastics discharge" policy. Now, all plastic waste is brought back to shore for disposal or recycling. Biodegradable materials such as cardboard are processed by on-board "pulpers" into a non-floating slurry that is non-toxic to marine organisms and authorized for discharge.

In addition to protecting the marine environment during normal operations, DoD assists in special circumstances, with cleaning up disasters at sea, such as catastrophic oil spills. These spills are devastating to marine wildlife and can be very detrimental to corals. The Navy possesses one of the world's largest inventories of oil pollution response equipment, and it is available from a global network of installations. In fact, Navy fleet skimmers collected half of the oil recovered from the *Exxon Valdez* spill in Alaska. Additionally, upon a formal request by the government of Yap (one of the Federated States of Micronesia), the Navy successfully off-loaded nearly 2 million gallons of oil from a sunken World War II oil tanker, the *USS Mississinewa,* which began leaking oil near Ulithi Atoll (another island of the Federated States). The DoD also has well-established compliance programs on the installation level to prevent oil spills and to provide a rapid response and clean-up.

The DoD plan also addresses the proliferation of non-native and invasive species which can damage both terrestrial and aquatic ecosystems. These intruders upset the natural balance of marine ecosystems, competing with or displacing corals and reef fish communities. The transfer of ballast water carried by large commercial ships is the greatest source of aquatic invasive species worldwide. To prevent such accidental introductions from military vessels, DoD has a "double exchange" policy. It requires that all tanks containing ballast water taken on within 3 nautical miles of shore or in polluted areas be purged twice with clean seawater while the ship is farther than 12 nautical miles from shore.

NOAA Fisheries

The elkhorn coral was listed recently as a threatened species.

Activities conducted on land and near shore are an important part of coral reef protection for DoD. Such activities as agricultural operations and dredging, can affect the health of coral reef ecosystems if responsible conservation practices are not used. Runoff from landscaping and farmland generally contains pesticides, herbicides, and fertilizers that, over time, can degrade the health of nearby waters. To prevent the introduction of these harmful substances into the marine environment, military installations use best management practices to control this non-point source pollution. The DoD also minimizes sedimentation through erosion control measures and restorative projects when appropriate, all of which is detailed in our installation Integrated Natural Resources Management Plans.

In addition to producing the Coral Reef Protection Implementation Plan, DoD developed the Coral Reef Conservation Guide, a general outreach brochure to heighten awareness within the Department. The guide provides basic information on coral reef ecosystems and discusses why their protection is important. It also gives an overview of DoD activities that could affect coral reef ecosystems and outlines laws and policies regarding coral reef protection. A DoD training course is offered periodically for natural resource managers and other DoD personnel to promote these coral reef protective measures.

It is DoD's mission to be good stewards of the lands and waters in which it operates. As evidence of this commitment, DoD continues to be an active member of the Coral Reef Task Force and work in cooperation with partners to research, restore, and protect coral reefs.

The DoD Coral Reef Protection Implementation Plan is available for download via the Defense Environmental Network Information Exchange (DENIX) at: *www.denix.osd.mil.*

Lorri A. Schwartz, with the Naval Facilities Engineering Command in Washington, D.C., can be reached at (202)685-9332.

Army National Guard Discovers a Tough Little Shrimp

by Dana Quinney

A female raptor fairy shrimp.

Biologists break through the ice to survey for raptor fairy shrimp.

Idaho National Guard photos

Idaho National Guard biologists Jay Weaver and Dana Quinney recently made a memorable discovery: a new species of giant predatory fairy shrimp. This crustacean lives in the waters of two desert playas (temporary lakes) on the Orchard Training Area in Idaho. They published the species description, co-authored by shrimp taxonomist Christopher Rogers and professor Jorgen Olesen of the University of Copenhagen, Denmark, in the January 2006 *Journal of Crustacean Biology*. There are only two other giant predatory fairy shrimp known to science; one is found in Europe and the Middle East, and one occurs in the Oregon-California desert. Many species of fairy shrimp are similar, but this new species is easily distinguished from any other kind.

The new species belongs to the genus *Branchinecta*. We gave it the species name, *raptor,* for several reasons. First, it is a ferocious predator, preying upon smaller fairy shrimp and other small creatures. Also, the known locations for the species are inside a sanctuary for raptorial birds, the Snake River Birds of Prey National Conservation Area.

Orchard Training Area

Orchard Training Area (OTA) is 138,000 acres (55,850 hectares) of desert landscape where soldiers can train on many weapon systems: Bradley fighting vehicles, M1 Abrams series tanks, Paladins (a self-propelled howitzer), attack helicopters, artillery, and individual weapons. Used by the Idaho Army National Guard since the early 1950s, OTA provides excellent training for desert warfare. In 2005, many Idaho Army National Guard soldiers were deployed to Iraq.

Managing military training on OTA presents a unique challenge. It is on Bureau of Land Management property, part of the Snake River Birds of Prey National Conservation Area. The 1993 federal law that established this special area requires that all land uses remain compatible with birds of prey, their prey, and prey habitat. Thus, the OTA has a mandate for ecosystem management not required of other military installations.

Why Author a New Species?

Why should the military identify and describe a new species? The Idaho Army National Guard environmental staff found that it is more effective to know what

exists on training lands, and then to develop and implement good management plans, than to have outside entities eventually make the discoveries and develop plans without consideration of military training needs.

By co-authoring the species, the Idaho Army National Guard will be included in scientific bodies determining requirements for the species, as well as being a member of decision-making groups responsible for conservation of rare species and the management of their habitats. This enables them to represent both the interests of the species and the interests of the military during development of management guidelines or conservation measures for the species.

What Raptor Does for a Living

Raptor (the species' common name) is a very uncommon shrimp. Adults can be almost 3.5 inches (8.9 centimeters) long, with bright turquoise blue reproductive organs. They are armed with a bristling array of hooks, combs, spines, and projections that help them detect, capture, and hold their prey.

Typically, fairy shrimp hatch rapidly after a significant rain, and they complete their life cycle within a few days or weeks. When the temporary water dries up, the shrimp die, and only their desiccation-resistant cysts remain on the dry playa bottoms. Playa lakes may remain dry for years. The shrimp cysts persist, alive but dormant, in the baking sun and winter cold until the rains once again fill the playas and the cysts hatch, producing a new population of shrimp.

The waters where raptor occurs are as brown as chocolate milk, so the species has reduced eyes. It continually swims on its back, grasping with its large, hooked front legs at other creatures it encounters. Raptor can hold as many as four killed or disabled prey shrimp as it continues to hunt.

Raptor occurs only in winter and early spring, often living under inches-deep ice. Often, when we sample for raptor, we take an ax to chop down to the water where we drag our nets—a strange variation of ice fishing! By April, it's too warm for raptor. It dies and sinks to the bottom until winter rains fall again to fill the playa.

Though many playas have been searched, raptor has been found in only two, one inside the OTA and one outside (but near its boundary). The OTA location is a cultural site where military use has not occurred for many years, and the surrounding habitat is stable. Long-term data (17 years) demonstrate the stability of the surrounding habitat.

Since raptor's cysts are not distinctive enough to search for in dry playa bottom soil, we are now associating raptor larvae with adults, so that the presence or absence of the species in a playa can be determined even during years when the water evaporates before adults have time to appear. We are also investigating conditions necessary for the species to occur and reproduce so that we can implement good management practices.

Announcing the New Species

The Idaho Army National Guard's leadership wanted to share the excitement about the newly discovered species. In March 2005, the Guard announced the new species at a military press conference. Surprisingly, the story was picked up by news agencies around the world and appeared in almost 200 newspapers, dozens of television stations (including CNN), National Public Radio, and thousands of web sites (including National Geographic). As one reporter told me, "It's good to have a significant military environmental story that is positive."

Dana Quinney is with the State of Idaho Military Division.

Scientists use nets to capture the tiny shrimp.

Compatible Land Use Partnerships

by John Housein

The Taylor's checkerspot is one of the species that benefit from the buffer at Fort Lewis, Washington.

There was a time when many military installations were considered remote. They had few neighbors, generated few complaints, experienced few environmental restrictions, and conducted their business relatively unimpeded. However, that era is clearly over. As a result, the Army is redefining its relationship with its neighbors, wildlife included.

Installations that often were strategically placed in relatively unpopulated areas now support communities that have developed because of the installations. The environmental awakening of 1960s and 1970s brought about an age of new legislation and requirements. The Army manages more than 15 million acres (6 million hectares) that are home to more than 175 threatened or endangered plant and animal species and many more at-risk species. Simultaneously, technologies employed by the armed forces allow soldiers to engage the enemy over ever increasing distances. Skills required for war must be taught and practiced in order to be used in battle. These seemingly competing demands on the land base are increasingly stressing Army training.

Numerous installations across the country are experiencing training restrictions due to development, incompatible land uses around their borders, and the presence of threatened or endangered species. Collectively, incompatible land uses or restrictions that affect military training are referred to as encroachment.

Over the past 15 years, the Army has fine tuned methods of securing compatible land uses in the vicinity of Army installations to protect the Army training mission, the natural resources that sustain it, and the quality of life of the local community. The most recent initiative is the Army Compatible Use Buffer (ACUB) program, which was established to resolve installation encroachment issues. This program began when Fort Bragg received a biological opinion from the U.S. Fish and Wildlife Service that planned training activities would likely jeopardize the endangered red-cockaded woodpecker (*Picoides borealis*), or RCW. The resulting training restrictions essentially shut down several training areas on Fort Bragg. The heart of the problem was a lack of land available for habitat management. Located in the North Carolina Sandhills, Fort Bragg could not be responsible for recovering the entire Sandhills population of the RCW while conducting its military readiness mission. In order to be able to train soldiers, the Army needed to increase the habitat available to the RCW, both on and off the installation.

Fort Bragg looked outside its fences to deal with its conservation challenges. In doing so, it entered into a community

Red-cockaded woodpecker at Fort Bragg.

Photos courtesy of DoD

of diverse stakeholders. In the beginning, some of the working relationships were polarized, but over time these diverse groups managed to develop a strategy: the Army would work with its partners to conserve and restore habitat on lands near Fort Bragg by purchasing interests in land from willing sellers. The Army would contribute funds to its partners, who in turn would work to enroll private landowners in the program. This effort, called the Fort Bragg Private Lands Initiative, led to an increase in land available for RCW management.

Over the past 15 years, the Fort Bragg Private Lands Initiative has seen a significant increase in woodpecker breeding pairs, including birds on Fort Bragg. Through years of observation, research, and land management, military training and RCW conservation have become compatible on Fort Bragg and other military installations.

In 2003, citing the Fort Bragg initiative as a model, Congress expanded the authority of the armed services to enter into cooperative agreements for conservation and encroachment purposes. This was a milestone in the transition from the Private Lands Initiative at Fort Bragg to the nation wide ACUB program. To date, 14 Army installations have joined the ACUB program and six more are in the developmental stage. The program has helped to protect approximately 45,000 acres (18,210 ha) of wildlife habitat outside of military installations. Nearly $20 million in Department of Defense funds leveraged partner contributions estimated at $91 million.

The RCW will turn out to be a major beneficiary. Five Army installations (Camp Blanding, Florida; Camp Shelby, Mississippi; Fort Bragg, North Carolina; Fort Benning, Georgia; and Fort Stewart, Georgia) are protecting woodpecker habitat around the bases through this program. Fort Bragg has already achieved its recovery objective within its boundaries, and it continues to work with partners and willing neighbors to expand habitat beyond the fence-line.

Fort Lewis prairie habitat.

By working with their neighbors, defense installations are becoming more active members of their surrounding communities. Camp Blanding's ACUB happens to be a small part of the much larger Florida Forever program administered by the state. Florida Forever is a statewide land acquisition effort that protects vital ecosystem functions and services.

In the state of Washington, Fort Lewis's developing ACUB is a partnership among The Nature Conservancy, the state, and the installation. The program in this case intends to protect habitat for four candidate species so that they will not need to be listed. These species occupy a prairie ecosystem and include the mardon skipper and Taylor's checkerspot butterflies, the streaked horned lark, and the Mazama pocket gopher.

Such stories are multiplying around Army bases across the nation. Through the ACUB program, installations are working to preserve their mission, the natural resources on and off the installation, and the quality of life in surrounding communities. In so doing, the Army is sustaining the environment for a secure future.

John Housein is a wildlife biologist for the U.S. Army Environmental Center.

States Working Together for Wildlife

by Dave Chadwick

USFWS

Northern goshawk

Species such as the Northern goshawk, black-tailed prairie dog, striped bass, *Hesperomannia arbuscula*, timber rattlesnake, and a crayfish *(Barbicambarus cornutus)* are among those considered species at-risk in State Wildlife Action Plans.

American wildlife conservation has reached a historic milestone: the completion of statewide wildlife action plans in every state and territory. Continuing the long tradition of state-federal partnerships, the wildlife action plans complement existing programs aimed at the conservation of game species on the one hand and endangered species on the other. Taken as a whole, the wildlife action plans provide a national agenda for preventing wildlife from becoming endangered, with a focus on those that have not benefited from conservation attention due to a lack of dedicated funding.

Teaming with Wildlife

The impetus for wildlife action plans comes from the Teaming with Wildlife initiative, a national grassroots campaign launched in the early 1990s to expand the funding base for wildlife conservation. The goal of Teaming with Wildlife was to provide additional resources to support a more comprehensive approach to wildlife conservation and mirror the success our nation has had with the Pittman-Robertson Wildlife Restoration Act and Dingell-Johnson/Wallop-Breaux Sportfish Restoration Act. Over time, the Teaming with Wildlife coalition has grown to include more than 4,000 organizations and agencies, including hunters and anglers, environmentalists,

Curtis Carley/USFWS

Black-tailed prairie dogs

professional biologists, wildlife managers, and nature-related businesses.

During the late 1990s, the efforts of the Teaming with Wildlife coalition helped advance the Conservation and Reinvestment Act, a broad proposal to dramatically increase federal funding for a variety of land, water, and wildlife conservation programs. Despite strong bipartisan support, the Conservation and Reinvestment Act did not pass. However, Congress did enact two new programs in 2000 to support state-level efforts to prevent wildlife from becoming endangered: the Wildlife Conservation and Restoration Program and State Wildlife Grants.

The Wildlife Conservation and Restoration Program and State Wildlife Grants provide funding to state wildlife agencies for wildlife conservation planning and projects. Both programs are administered by the U.S. Fish and Wildlife Service's Division of Federal Assistance. Funds are distributed according to a formula based on each state's population and land area, and they require matching funds from state or other non-federal sources. The Wildlife Conservation and Restoration Program was created as a subaccount of the Pittman-Robertson Wildlife Restoration Act and requires a 25 percent non-federal match for all activities. State Wildlife Grants operates as a stand alone program, requiring a 50 percent non-federal match for implementation projects and a 25 percent match for development of the action plans.

Although the Wildlife Conservation and Restoration Program was authorized as a permanent program under Pittman-Robertson, funding was only provided for the first year. However, federal funding has continued to flow to State Wildlife Grants through the annual appropriations process. Over the past five years, the two programs have provided a total of more than $400 million in new money for wildlife conservation. In a relatively short time, these programs have become the federal government's core programs for keeping wildlife from becoming endangered. This dramatic growth in a very tough budget climate has been the result of the strong bipartisan support built by the Teaming with Wildlife coalition.

Timothy Knepp

Striped bass

As a condition of both the Wildlife Conservation and Restoration Program and State Wildlife Grants, each state wildlife agency committed to developing a wildlife action plan, known technically as a "comprehensive wildlife conservation strategy." These statewide action plans draw together all available information on the condition of each state's wildlife species and habitats, outline the conservation issues that need to be addressed, and make recommendations to address those issues. Each of the plans was submitted to the Service for review and approval in 2005.

In the legislation defining the wildlife action plans, Congress outlined eight core planning requirements (sidebar on next page). Beyond those requirements, the states have considerable flexibility to develop approaches that fit their own unique wildlife resources, management structure, and local issues. Wildlife agencies worked together to share information and priorities across jurisdictions. The states also gathered ideas from federal agencies and conservation groups, drawing on many different models and experiences to develop innovative planning approaches.

Required Elements for Wildlife Action Plans

Congress outlined eight core requirements that are contained in every wildlife action plan:

1) **information on the distribution and abundance of wildlife, including low and declining populations that are indicative of the diversity and health of the state's wildlife;**
2) **descriptions of locations and relative condition of habitats essential to species in need of conservation;**
3) **descriptions of problems that may adversely affect species or their habitats, and priority research and survey efforts;**
4) **descriptions of conservation actions proposed to conserve the identified species and habitats;**
5) **plans for monitoring species and habitat, and plans for monitoring the effectiveness of the conservation actions and for adaptive management;**
6) **descriptions of procedures to review the plan at intervals not to exceed 10 years;**
7) **coordination with federal, state, and local agencies and Indian tribes in developing and implementing the wildlife action plan; and**
8) **broad public participation in developing and implementing the wildlife action plan.**

John Obata

Hesperomannia arbuscula, *a rare Hawaiian plant*

Species in Greatest Need

Congress asked states to assess the health of a "full array" of wildlife, with particular attention to the wildlife species that have low or declining populations and are "indicative of the diversity and health of wildlife" of each state. Most of the wildlife action plans refer to these targeted species as "species of greatest conservation need." In identifying these species, the intent was not to define a new official status on top of existing threatened, endangered, or other designations. Instead, the goal was to identify the wildlife species that need attention in order to avoid the need for formal regulatory protection.

States used various sources to identify the species that needed to be targeted in each wildlife action plan, including natural heritage programs and other wildlife occurrence databases, data from other planning efforts and assessments, and input from agency biologists, academics, and other scientific experts. While the identification of species of greatest conservation need included species that had been designated under state-level programs and the federal Endangered Species Act, the wildlife action plans placed more emphasis on identifying at-risk species not yet identified by other conservation efforts.

Getting the Biggest Bang for the Buck

Many of our great wildlife restoration stories tell of the return of one species at a time, from the wild turkey to the American alligator. However, a species-by-species approach is not practical when dealing with the breadth of each state's wildlife. In even the smallest states, the native fauna can encompass several thousand species, while in Texas, California, and Florida, the number of species can reach into the tens of thousands. On top of the sheer complexity of addressing this many species individually, conservation planning efforts are challenged by serious information gaps about the habitat needs and life history of many species.

To efficiently address the needs of each state's full array of wildlife, the action plans are broadly built around a "coarse-filter/fine-filter" approach. Broad, habitat-focused conservation

actions (the coarse filter) are combined with specific interventions for individual species whose needs are not completely addressed by habitat-focused actions (the fine filter).

In outlining habitat conservation needs, the states took a variety of approaches. Some states assessed species richness, habitat quality, and threat magnitude to identify specific geographic areas that encompass a range of conservation targets. Others focused on identifying and prioritizing those habitat types or communities that are most important to species in need of conservation. Still other states took a more comprehensive ecosystem approach to outlining the steps needed in all of the state's wildlife habitats.

Suzanne L. Collins/Center for North American Herpetology

Timber rattlesnake

A New National Agenda

The strong commitment of the state wildlife agencies and the Service resulted in the completion of all 56 state and territorial wildlife action plans in 2005. At an event recognizing the completion of the plans, former Interior Secretary Gale Norton hailed the historic place of the action plans in the conservation of North America's wildlife. "These plans represent a future for conservation in America that is rooted in cooperation and a partnership between the federal government and states, tribes, local governments, conservation groups, private landowners and others with a commitment to the health of our land and water, fish and wildlife," she said. "Working together, we are tapping into the expertise of those who live and work on the land so that we can conserve our fish and wildlife before they become threatened or endangered."

Working Together to Take Action

The wildlife action plans are already being implemented both by state wildlife agencies and their partners, including federal, state, and local governments, conservation groups, private landowners, and a variety of other individuals and organizations with an interest in wildlife. The agencies committed to developing the wildlife action plans to serve as plans for *wildlife,* not plans for wildlife *agencies.* States are working cooperatively to develop shared priorities and to adjust the plans to local and regional scales. Implementation actions address problems or threats to habitats and species by creating partnerships, restoring habitats, monitoring species, and filling in data gaps.

Additional information, including copies of each state's action plan, links to useful resources, and contact information, is available on a special clearinghouse website hosted by the Association of Fish and Wildlife Agencies at www.wildlifeactionplans.org.

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Guenter Schuster

Barbicambarus cornutus

Saving Saipan's White-eye

by Gayle Martin and
Shelly Kremer

Curt Kessler

Sarigan Island, near the center of the Mariana archipelago (see opposite page).

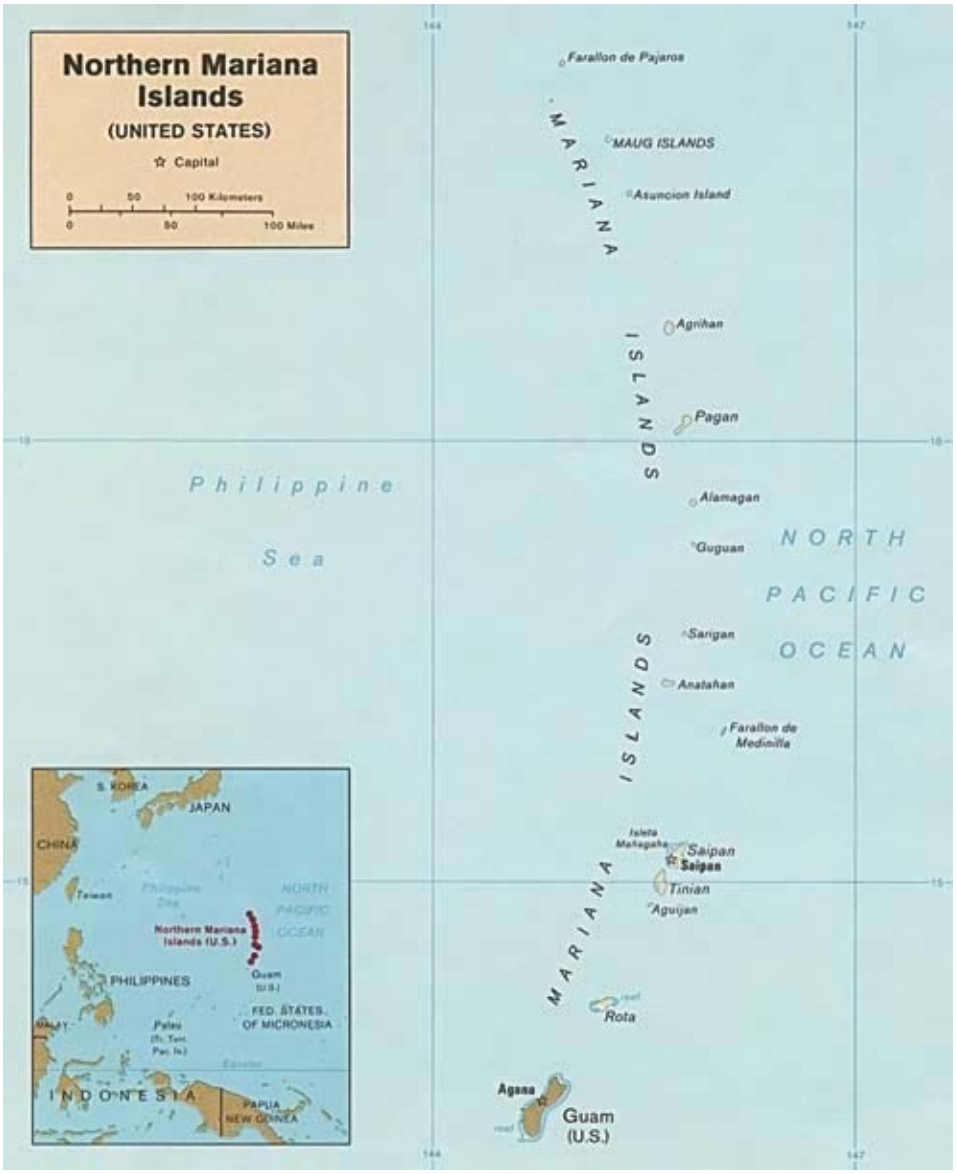
The little known Commonwealth of the Northern Mariana Islands (CNMI) is an archipelago of 14 tiny islands in the mid-Pacific region of Micronesia. Nestled just north of Guam and south of Japan, the entire Mariana archipelago spans 420 miles (675 kilometers). This story is about Sarigan, a volcanic island in the CNMI only 1.9 square miles (5 square kilometers) in size.

You could hike across Sarigan in a day if you didn't mind scrambling over boulders, hacking your way through dense vegetation with a machete, hunching down through thick hibiscus vines, trying to keep your balance walking over moss-covered coconuts, climbing precariously steep slopes, and getting really sweaty. Although Sarigan's northern and western slopes are blanketed with tall coconut trees, its plateau and ravines support pockets of native forest. Only grasses and ferns cover its precipitously steep eastern and southern slopes.

The Chamorros, Carolinians, Germans, and Japanese who inhabited Sarigan in

Saipan bridled white-eye

Shelley Kremer



the early 20th century planted coconuts by the thousands and brought goats and pigs to the island for food. Once humans abandoned the island, the pigs and goats they left behind became numerous and began eating all vegetation within reach. With no natural defenses against these non-native ungulates, Sarigan's native forests began to disappear. But through the cooperative efforts of the U.S. Navy, the U.S. Fish and Wildlife Service, and the CNMI Division of Fish and Wildlife (DFW), feral goats and pigs were eradicated from the island by 1998. Vegetation surveys before and after eradication demonstrated that the forest began to recover more quickly than anyone had ever imagined.

The CNMI's Comprehensive Wildlife Conservation Strategy (CWCS) identified 24 species as species of special conservation need. Of these, 18 are endemic, occurring nowhere else in the world. Endemic wildlife species are not evenly distributed throughout all the islands in the archipelago. For example, nine of the 11 endemic forest bird species occur on only four or fewer islands. Being small places removed from other land masses, islands tend to support comparatively few numbers of species and small population sizes, making wildlife species susceptible to extinction, and the Mariana Islands are no exception. The non-native brown treesnake (*Boiga irregularis*) devastated Guam's endemic forest

Shelley Kremer

Robby Kohley takes a blood sample from a Sarigan Island bird, the Micronesian honeyeater.

bird species, and it is slithering its way northward aboard cargo ships and planes to the other populated islands of the archipelago—Rota, Tinian, and Saipan.

The accidental introduction of the brown treesnake was identified as one of the biggest threats to wildlife in the CWCS. This nocturnal predator has the potential to drive all of the Marianas' terrestrial wildlife species to extinction, including all 14 species of endemic forest birds, one endemic freshwater bird (Mariana common moorhen), two endemic mammals (Mariana fruit bat and sheath-tailed bat), two native geckos (Micronesian gecko and rock gecko), and one endemic skink (tide-pool skink). Conservation actions identified in the CWCS to combat this threat include interdiction of the snake on the populated southern islands through installment of snake barriers and traps at ports, teams of detector dogs, a rapid response program, public education, establishment of a captive breeding program for native bird species, and translocation of native birds to uninhabited northern islands in the archipelago.

This brings us to the Saipan bridled white-eye (*Zosterops conspicillatus saypani*), the first candidate chosen by the DFW for translocation. The diminutive insectivore is the most abundant endemic bird in the southern islands of the CNMI. Although not yet endangered, its distribution is limited to only three islands. White-eyes were the first avian species to become extinct on Guam as a result of brown treesnake infestation. Successful translocation of the white-eye will promote translocation plans for other species in the future.

Sarigan was the first island chosen to receive translocated birds because its feral animals have been eradicated, its native forests are recovering, and transportation costs and time to Sarigan are less than for the more remote northern islands. In April 2006, the DFW and its partners embarked on an expedition to Sarigan with a field crew of 22 to assess the recovery of Sarigan's ecosystem and to determine if its habitat was suitable for the white-eye.

The Sarigan expedition was a huge undertaking. Biologists surveyed the island's birds, vegetation, reptiles, small mammals, and invertebrates. They also sampled for avian disease, examined the stomach contents of monitor lizards, and conducted a census of fruit bats. All of this work was done over a two-week period. Although the quantitative data have not yet been analyzed, we have already learned much from our qualitative observations. We confirmed that the native forest is returning with gusto on Sarigan's plateau and in ravines following the removal of goats and pigs. Other changes are not as encouraging; monospecific coconut plantations are being perpetuated by young coconuts and the invasive wood rose vine (*Operculina ventricosum*) has blanketed the native forest, although tree seedlings are beginning to emerge through the vine mat. The steep grassy slopes of Sarigan are still devoid of birds, but abundance of birds in newly vegetated areas appears to be increasing. Native tree snails were

Shelley Kremer

Gayle Martin

present in higher densities than ever seen before. The size of the resident Mariana fruit bat (*Pteropus mariannus*) colony was reassuringly stable, and a new survey protocol for coconut crabs (*Birgus latro*) was tested in the field.

The most encouraging news is that Sarigan is a potential refuge for Saipan bridled white-eyes. To test for presence of avian disease on Sarigan, biologists captured Micronesian honeyeaters (*Myzomela rubrata*) and collared kingfishers (*Halcyon chloris*) by mist-net and took blood samples, with a subsample of birds subjected to necropsies. (We are anxiously awaiting analysis of these data.) The invertebrate abundance survey indicated that there is enough prey on Sarigan to support a population of approximately 6,000 Saipan bridled white-eyes. In May 2006, we began to develop trapping and holding procedures with a group of zoological experts by capturing 40 white-eyes for captive breeding. We are looking forward to translocating white-eyes to Sarigan in 2007 with our partners from the American Zoo and Aquarium Association.

Funds from the DFW's State Wildlife Grant paid for two round-trip vessel charters and supplies. This expedition would not have been possible, however, without the generous support of personnel, expertise, supplies, helicopter time, and additional vessel charters from our partners: the Fish and Wildlife Service, Navy, Workforce Investment Agency, University of Guam, volunteers, residents of Alamagan Island, Institute of Wildlife Studies, Brown Treesnake Program, and University of California at Davis.

Gayle Martin (gayle.dfw@gmail.com; phone 670-664-6025, fax 670-664-6060) is a natural resources planner with the CNMI Division of Fish and Wildlife (Caller Box 10007, Saipan, MP 9695). Shelly Kremer (shelly_kremer@fws.gov; phone 808-792-9408, fax 808-792-9582) worked until recently as an ornithologist with the CNMI but is now with the Fish and Wildlife Service's Pacific Islands Office in Honolulu, Hawaii.

Above left: Native tree species have thrived since the removal of feral animals eight years ago.

Above: The humped tree snail, a species endemic to the Mariana Islands, is a candidate for listing under the Endangered Species Act.

Planning for Wildlife in the Lone Star State

by Steven Bender

In September of 2005, the Texas Parks and Wildlife Department (TPWD), along with myriad conservation partners, completed its first comprehensive strategy for the recovery of nongame species and their associated habitats. The strategy focuses on the 10 ecoregions, 15 major river basins, and approximately 1,000 of the more than 30,000 nongame species known in Texas. The final result of this hard work is now known as the Texas Wildlife Action Plan.

The Action Plan allows Texas to participate in the State Wildlife Grant (SWG) program, which provides federal funding for conserving nongame species in danger of becoming threatened or endangered so they will not need Endangered Species Act protection. While threatened and endangered species were considered in the development of the Texas Action Plan, a lot of work went into determining which additional species needed to be addressed. Texas refers to these animals as "species of concern." Special emphasis will be put on these species to stabilize them and, we hope, restore them to healthy levels.

With the strategy complete, Texas has moved into the implementation phase. This means working with species such as the Louisiana black bear (*Ursus americanus luteolus*), which is listed as threatened, and other species such as the lesser prairie-chicken (*Tympanuchus pallidicinctus*), box turtles (*Terrapene* spp.), and Townsend's big-eared bat (*Corynorhinus townsendii*) that need assistance. Not only does it mean working with individual species, it means working with habitats and monitoring key areas such as our bays and estuaries in order to better understand pressure placed on the species.

In order to accomplish the goals of the Action Plan, the Texas Parks and Wildlife Department is working with our partners to identify areas across the state where conservation can be focused for the greatest return on the money spent. Although this is difficult, we have a great deal of information on species dispersal and habitat needs. We can take that information and use the latest mapping technology to target our efforts. Another part of this process is employing that same technology to better understand the habitats in which we are already working. This includes new vegetation data mapping that allows biologists to create better habitat or recover lost habitat.

In addition to updating our resources and focusing our conservation efforts, it is critical to work with private landown-

Lesser prairie-chicken

Tom Harvey

ers. This means gaining permission for access to private lands to develop our vegetation information as well as collect species data. One way to motivate private cooperation is the Landowner Incentive Program (LIP). This program began in Texas 10 years ago as a state effort to create incentives for private landowners to conserve endangered animal and plant species and their habitats. It became a nationwide federally funded program under the current administration, with the U.S. Fish and Wildlife Service overseeing the implementation. In Texas, the TPWD intends to run this program parallel to the State Wildlife Grants program to assist with implementation of the Action Plan. Since the Texas program's inception, the state has developed contracts with more than 120 landowners for approximately 190,000 acres (77,000 hectares) under management. The TPWD considers these landowners to be partners in the overall conservation of native Texas species, and it will continue to seek their involvement and support.

Over the next 5 to 10 years, the TPWD also will continue to work with conservation organizations throughout Texas to implement the Action Plan. Projects will focus on learning more about Texas flora and fauna, digitizing that new knowledge, and using the information to create more specific goals and revise the Action Plan. Concurrently, on-the-ground projects will create better habitat through the use of LIP monies and other funding sources. This dual approach should allow Texas biologists to accomplish a great deal of conservation in a relatively short period of time.

Texas is a wonderful state with a great deal of natural beauty and diversity. All Texans should feel responsible for maintaining that beauty. It is important that we all work together to support the habitat and the species that make it wonderful to be a Texan. With the help of these programs and some motivated individuals, we can do just that. Texas conservation organizations are well aware of the need to become partners and be strategic with limited resources. We will use that knowledge to make good use of those resourses and move conservation forward in Texas.

USFWS

Louisiana black bears

Steven Bender (Steven.Bender@tpwd.state.tx.us; telephone 512-581-0657) is the LIP/SWG Administrator with the Texas Parks and Wildlife Department, P.O. Box 1980, Bastrop, Texas 78602.

Building on a Conservation Legacy

by Rich Bechtel and Aislinn Maestas

Fracé/NWF Poster Stamp

This eastern painted turtle is one of a collection of paintings commissioned by the National Wildlife Federation for its wildlife poster stamp program, which began in 1938 to support wildlife conservation.

It can take years, sometimes decades of perspective to gain appreciation for some of history's greatest moments. So it was with passage of the 1938 Pittman-Robertson Aid in Wildlife Restoration Act. While the name may not suggest greatness to people unfamiliar with its purpose, the Act has funded many of America's most successful wildlife conservation efforts through a unique federal-state partnership. To date, it has directed over $4.8 billion in excise taxes sportsmen pay on their hunting equipment to state wildlife agencies for the restoration of wildlife and its habitat.

Even more remarkable than the success of the Act is the story of its creation. It started in 1936 when President Franklin Roosevelt convened sportsmen, gardeners, Jaycees, and other civic leaders to assess the plight of the nation's wildlife and to recommend how to restore its health. Within two years, they formed local and statewide wildlife federations across the country and persuaded Congress to take action.

This story serves as the inspiration for the National Wildlife Federation's State Wildlife Action Plan Initiative. With the help of the Doris Duke Charitable Foundation, the NWF and five of its affiliates launched the Initiative in 2006 to help states implement their State Wildlife Action Plans. These plans, which were completed by all 56 states and territories last year, present a state-based nationwide biological survey and provide the most up-to-date scientific assessment of the status of wildlife and habitat as well as current threats. They also outline the conservation actions needed to keep wildlife and habitats healthy. The NWF believes these Action Plans can stimulate another renaissance in wildlife conservation.

Ivory-billed woodpecker

Ripper/NWF Poster Stamp

While the Pittman-Robertson Act continues to conserve wildlife, new problems require new solutions. Unlike the previous threats of drought, depression, market-hunting, and the feather trade, wildlife today must cope with habitat fragmentation, declines in water quality, invasive species, and global warming. Because these threats occur on a much broader scale, they are outstripping the financial resources and responsibility of sportsmen and women.

The NWF's State Wildlife Action Plan Initiative is focused on educating the public and decision-makers about the opportunities to conserve America's wildlife heritage for future generations. The NWF and its affiliates are dedicated to translating the Action Plans into on-the-ground conservation activities and to securing long-term, dedicated funding at the state and federal levels. Here are a

few examples of how NWF affiliates are engaged in the State Wildlife Action Plan Initiative:

The Montana Wildlife Federation is working with the Montana Department of Fish, Wildlife and Parks (MFWP) and other members of the Teaming With Wildlife steering committee to increase awareness of, and garner support for, Montana's Wildlife Action Plan. To do so, they are giving presentations to organizations and businesses, organizing congressional field trips to visit Action Plan projects, and briefing local, state and federal decision makers. They are also working to organize tours of habitat and state wildlife grants projects for reporters to generate media coverage. Through a public process, the MFWP has identified opportunities to partner with others most effectively and leverage the most resources. The partnership is now working on a prototype outreach strategy that will engage citizens in "community conversations."

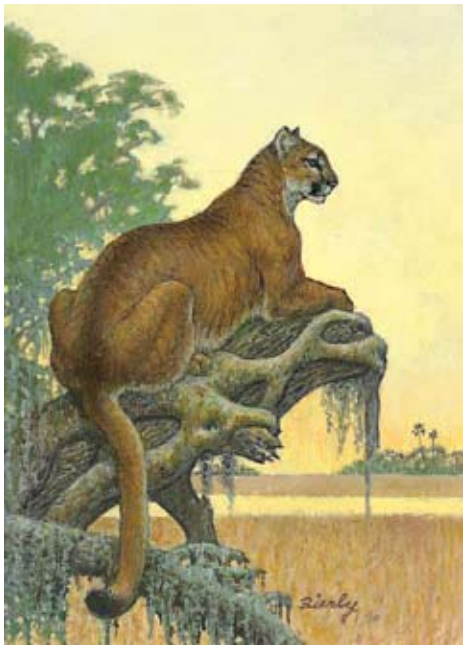
The North Carolina (NC) Wildlife Federation is reinvigorating the state's Teaming with Wildlife Coalition to implement and promote the state's Wildlife Action Plan. They have developed a leadership team that includes a co-chair from the NC Wildlife Federation and the NC Wildlife Resources Commission. With 127 members, the NC Teaming With Wildlife Coalition is working on education and communication tools, and is identifying opportunities for members to participate. The NC Wildlife Federation has also been coordinating with several land trusts across the state to deliver the NC Wildlife Action Plan as a tool for habitat acquisition opportunities.

The Environmental League of Massachusetts and Gun Owners Action League have joined forces with MassWildlife to develop a common goal and implement that state's Wildlife Action Plan. They have also created a strategy for broadening support for increased funding and implementation.

The Georgia Wildlife Federation and Georgia Wildlife Resources Division believe the State Wildlife Action Plans are the greatest opportunity since passage of the Pittman-Robertson Act for bringing everyone together for comprehensive conservation. They plan to use Georgia's Action Plan to communicate the justification for providing landowners the incentives and information they need to conserve wildlife on private lands. This is especially important in states like Georgia where 92 percent of the lands are in private ownership. Grown to over 230 organizations, the Georgia Teaming With Wildlife Coalition involves its leaders in "hands-in-the-dirt" wildlife conservation projects and teaches volunteers that even simple actions like building a fence are building blocks in sophisticated wildlife conservation.

The Wisconsin Wildlife Federation (WWF) and the Wisconsin Department of Natural Resources have formed a unique partnership in which they share an employee who works half-time as the State Birding Trail Coordinator and half-time as the Teaming With Wildlife Coordinator. The WWF's first task was broadening the coalition to include not only WWF affiliates and other rod and gun clubs, but such organizations as The Nature Conservancy, the Council of Churches, labor unions, bed and breakfast owners, garden clubs, local land trusts, bird watching centers, convention and visitor bureaus, and the Department of Tourism. With over 200 members on board and a final goal of between 300 and 500 groups, the coalition has now turned to implementing the Wisconsin Action Plan by becoming actively involved in setting priorities, educating, showcasing, and undertaking grant projects, as well as providing support for the agency and its wildlife program.

The authors are with the National Wildlife Federation and can be reached at bechtel@nwf.org and maestas@nwf.org.



Bierly/NWF Poster Stamp

Florida panther

by Peg Boulay

Tree Farmers Help Grow the Oregon Conservation Strategy

Ken and Karin Faulk have a vision for their land, one that allows them to meet a variety of management objectives while making a real difference for wildlife. It is a vision shared by the Oregon Conservation Strategy.

The Faulks are successfully weaving conservation into their land management to meet both conservation and economic goals. As Ken explains, "In some areas, our primary objective is Douglas-fir production. But in areas with unique habitat values, our objective is to provide quality habitat for a wider range of wildlife species. Without losing very much value in timber production, we can add a lot of value in wildlife habitat by picking areas that are special and where a little bit of work can make a big difference."

The Fender's blue butterfly (shown here on a blue camas plant) is one species benefitting from the Oregon Conservation Strategy.

Bruce Newhouse

These habitats are identified as a priority target in the Oregon Conservation Strategy. The Faulks have completed restoration on 5 acres (2 hectares) of oak woodlands and are hard at work on a 3-acre (1.2-ha) upland prairie enhancement. They are taking conservation actions such as removing competing conifers, controlling an invasive non-native grass, and seeding native grasses and wildflowers. Their work will benefit declining species like the western gray squirrel, slender-billed nuthatch, Lewis' woodpecker, western bluebird, wayside aster, and many others.

The Faulks were selected as Benton County's 2006 Tree Farmer of the Year for the sustainable management of their timber operation and for the work they have done restoring habitats. Tree Farmers of the Year are chosen in all counties through the American Tree Farm system, a long-standing voluntary conservation tradition. The Faulks recently shared with other landowners their knowledge about forest management and restoration through a field tour organized by Benton County Oregon State University Extension.

The Faulk's restoration work is also exciting because their property is part of the larger Cardwell Hill Regional Conservation Planning project area. The Cardwell Hill project is a cooperative, voluntary, landscape-scale planning and restoration effort. It involves over 30 landowners and 2,000 acres (810 ha). Much of the area is contiguous, allowing participating landowners to work for

conservation across property lines. The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program, Mary's River Watershed Council, Institute for Applied Ecology, Oregon Watershed Enhancement Board, and many other partners have provided technical and financial assistance to landowners in the project area.

"The idea of neighbors working with neighbors across property lines is great," says Ken. "One person might have a pond where western pond turtles live, and his neighbor might have some nesting habitat. By working together, you can make a difference for the turtle. This kind of work is going to catch on, and it can do what state conservation strategies hope to do. It can happen even with small properties if landowners compare notes and get a little help from biologists."

The Faulk's property is also located in one of the Oregon Conservation Strategy's "Conservation Opportunity Areas," which are prioritized landscapes where broad fish and wildlife conservation goals can best be achieved. Conservation Opportunity Areas can help focus investments on priority landscapes, increase the likelihood of long-term success over larger areas, improve funding efficiency, and promote cooperation across land ownership boundaries. The Strategy profiles each area, describing the special features, key habitats and species, and some recommended actions. The Faulk's restoration efforts are implementing many of the actions identified for their area.

Ken and Karin's vision can be felt in the Oregon Conservation Strategy, since Ken served on the stakeholder advisory committee that helped develop Oregon's conservation approach. The committee was a diverse coalition including scientists, conservation groups, landowners, extension services, anglers, hunters, and representatives from agriculture, forestry, and rangelands.

As Ken sums it up, "This tree farmer is proud to have worked with other landowners and conservationists on Oregon's Strategy. Until the past 10 years, there was very little guidance or assistance for tree farmers working towards conservation goals. But now with the Tree Farm System, the Service's USFWS Partners for Fish and Wildlife, and ODFW's Conservation Strategy providing guidance and financial help, a lot of projects will be accomplished. As more projects happen, the word will get out, and more people will come to the table. Hopefully, it will snowball."

Photo by Robert E. Petit

Tree farmer Ken Faulk admires a large oak on his land.

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by Kim Winter

The Conservation of Pollinating Species

Eric VanderWerf

'Akohekohe, a Hawaiian bird.

A lesser long-nosed bat pollinates a saguaro flower.

Pollinating animals are critically important to the maintenance of virtually all terrestrial ecosystems, yet the population status of most pollinating species often goes unnoticed. Butterflies, moths, bats, birds, bees, beetles, flies, ants, and wasps assist almost all flowering plants in their reproduction, helping them to develop the seeds, foliage, nuts, and fruits that ensure the survival of innumerable wildlife and human populations worldwide. Sadly, many pollinator populations are declining precipitously around the world.

© Merlin D. Tuttle, Bat Conservation International

In 1999, scientists and natural resource managers concerned with pollinator conservation founded the North American Pollinator Protection Campaign (NAPPC), administered by the Coevolution Institute to promote the health of resident and migratory pollinating animals. NAPPC has grown to become a partnership of more than 100 organizations, ranging from universities and environmental groups to utility companies, zoos, and government agencies throughout the United States, Canada, and Mexico (http://www.nappc.org/partners2005.html). The U.S. Fish and Wildlife Service recently signed a Memorandum of Understanding with the Coevolution Institute, giving the Endangered Species Program access to NAPPC's tri-national network of experts in pollination biology.

Prompted by a NAPPC initiative, the National Academy of Sciences (http://www.nationalacademies.org) is undertaking a study of the status of pollinating species in North America, the results of which should illuminate some of the most important species of concern.

It is unknown exactly how many federally listed animal species are pollinators, or how many federally listed plant species depend on rare pollinators for reproduction. What we do know is provided in the table. In addition to the federally listed species, there are others that may be of concern. For example, the Xerces Society maintains a Red List of Pollinators (http://www.xerces.org/Pollinator_Red_List /index.htm) that describes the pollinating butterflies, moths, and bees in need of conserva-

tion attention in the U.S., Canada, and Mexico. The society identifies 35 additional butterflies, and 58 bees, nearly half of which are *Hylaeus* species in Hawaii that either need additional study or may need additional conservation measures.

Endangered species biologists can become involved with NAPPC pollinator conservation by:

- Considering plant-pollinator relationships. Management efforts to restore healthy populations of an endangered flowering plant must also consider the animal pollinators that may assist in its reproduction. Likewise, endangered and threatened species of pollinators may have coevolved with a distinct species of flowering host plant.
- Working with NAPPC scientists to plan pollinator conservation projects throughout the United States, Canada, and Mexico.
- Creating pollinator habitats using "Pollinator Friendly Practices" guidelines, a joint project of NAPPC and the Wildlife Habitat Council. The guidelines are available online at: http://www.nappc.org. They focus attention on foraging, nesting, and reproductive requirements of pollinating species.
- Learning more about NAPPC activities at www.coevolution.org and www.nappc.org. To receive links to news articles and publications or to ask collaborating scientists about pollinators or management practices, join the pollinator listserv at: http://lists.sonic.net/mailman/listinfo/pollinator.
- Offering feedback to the National Academy of Sciences Study on the Status of North American Pollinators at: http://www8.nationalacademies.org/cp/projectview.aspx?key=BLSX-K-02-06-A.
- Contributing to or using the NAPPC conservation database about plant-pollinator relationships, by contacting info@nappc.org.

Theresa S. Talley

Valley elderberry longhorn beetle

Examples of pollinator guilds currently listed under the Endangered Species Act

Birds	Some bird species listed as endangered are known to be pollinators. Some Hawaiian honeycreepers have a highly coevolved relationship with the plants and moth pollinators upon which they feed. For example, Hawaii's endangered palila (*Loxioides bailleui*) depends upon forests of an endemic legume, the mamane (*Sophora chrysophylla*), for nesting, shelter, and food. *Cydia* (Tortricidae) moth caterpillars also feed upon mamane and are an important food resource for palilas, demonstrating the intricate interrelationships between a pollinating bird, pollinating moth, and flowering plant.
Bats	At least three species of pollinating bats are federally listed as endangered, including the lesser long-nosed bat (*Leptonycteris curasoae*), Mexican long-nosed bat (*Leptåonycteris nivalis*), and Mariana fruit bat (*Pteropus mariannus mariannus*). Both long-nosed bats migrate north from Mexico to feed on nectar and pollen of several species of *Agave.* These bats leave the U.S. for Mexico in late summer or early fall, after the blooming period of agaves has passed.
Butterflies	There are 23 federally listed species of butterflies and skippers identified as pollinators on the Xerces Red List, with 17 recovery plans completed or in draft form. Many butterflies are listed because of their coevolved relationships with diminishing host plant populations, such as the case with the Fender's blue butterfly (*Icaricia icarioides fenderi*) and Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) in the Pacific Northwest.
Moths	Two species of sphinx moth are listed, including the Kern primrose sphinx moth (*Euprserpinus euterpe*), which uses evening primrose plants (*Camissonia* sp.) as host plants. When this endangered moth lays its eggs on the introduced plant, filaree (*Erodium* spp.), its larvae cannot develop and soon perish, prompting its populations to decline.
Beetles	At least one of the 17 species of beetles listed as endangered may be a pollinator, the valley elderberry longhorn (*Desmocerus californicus dimorphus*). Its emergence coincides with the flowering of its host plant, the elderberry (*Sambucus* spp.), which is visited by other pollinators. Elderberries provide an important source of fruit for at least 50 species of songbirds and other wildlife.

Dr. Winter, a wildlife ecologist and International Coordinator for NAPPC, can be reached at kw@nappc.org or 301-405-2666.

Polar Bear Proposed for Listing as Threatened

On December 27, 2006, the U.S. Department of the Interior announced its intent to propose listing the polar bear (*Ursus maritimus*) as a threatened species under the Endangered Species Act. At the same time, it initiated a comprehensive scientific review to assess the current status and future of the species.

The listing proposal, published in the January 9, 2007, *Federal Register*, cites the threat to polar bear populations caused by receding sea ice, which bears use as a platform to hunt for prey. In recommending a proposed listing, the Fish and Wildlife Service used scientific models that predict the impact of the loss of ice on bear populations over the next few decades.

The Service will use the next 12 months to gather more information, undertake additional analyses, and assess the reliability of relevant scientific models before making a final decision whether or not to list the species.

"Polar bears are one of nature's ultimate survivors, able to live and thrive in one of the world's harshest environments," said Interior Secretary Dirk

Kempthorne. "But we are concerned the polar bears' habitat may literally be melting."

Although some females will use snow dens on land for birthing cubs, polar bears are almost completely dependent upon Arctic sea ice for survival. They use sea ice as a platform from which to hunt and feed upon seals, to seek mates and breed, to move to maternity denning areas on land, and to travel long distances. Any significant changes in the abundance, distribution, or existence of sea ice would have profound effects on all stages of the animal's life cycle.

"Based on current analysis, there are concerns about the effect of receding sea ice on polar bear populations," he said. "I am directing the U.S. Fish and Wildlife Service and the U.S. Geological Survey to aggressively work with the public and the scientific community over the next year to broaden our understanding of what is happening with the species. This information will be vital to the ultimate decision on whether the species should be listed."

Scientific observations have revealed a decline in late summer Arctic sea ice to the extent of 7.7 percent per decade and in the perennial sea ice area of 9.8 percent per decade since 1978. Observations have likewise shown a thinning of the Arctic sea ice of 32 percent from the 1960s and 1970s to the 1990s in some areas.

There are 19 polar bear populations in the circumpolar Arctic containing an estimated total of 20,000 to 25,000 bears. The western Hudson Bay population of polar bears in Canada has suffered a 22 percent decline. Alaska populations have not experienced a statistically significant decline, but Service biologists are concerned that they may face such a decline in the future.

Recent scientific studies of adult polar bears in Canada and in Alaska's Southern Beaufort Sea have shown weight loss and reduced cub survival. While data are lacking about many populations, the Service suspects that polar bears elsewhere are being similarly affected by the reduction of sea ice.

While the proposal to list the species as threatened cites the threat of receding sea ice, it does not include a scientific analysis of the causes of climate change. That analysis is beyond the scope of the Endangered Species Act review process, which focuses on information about the polar bear and its habitat conditions, including reduced sea ice.

Polar bears are considered marine mammals since they are highly adapted to life on sea ice. Accordingly, they already receive some protection under the Marine Mammal Protection Act of 1972. That law generally prohibits the take or import of marine mammals and their parts or products.

The species is also protected by international treaties involving countries in the bear's range. In early December, Congress passed the United States-Russia Polar Bear Conservation and Management Act of 2006, implementing a treaty with Russia designed to conserve polar bears shared between the two countries.

The Service analyzed the impact of both onshore and offshore oil and gas development on polar bears and determined that it does not pose a threat to the species.

The Service likewise examined the impact of subsistence hunting of polar bears by Alaska Natives. Such hunting is specifically allowed under the Marine Mammal Protection Act and would also be allowed if the polar bear is listed under the Endangered Species Act, unless the Service finds it is jeopardizing polar bear survival. Hunting polar bears is of social and cultural importance to Native peoples throughout much of the Arctic. Some Native communities in Arctic Canada also obtain significant financial

©B. Moose Peterson/WRP

benefits from allocating a portion of their overall subsistence quota to trophy hunters from the U.S. and other nations, and from providing guiding services to such hunters. Under standards set by the Marine Mammal Protection Act, the Service currently allows the import of sport-hunted trophies only from those Canadian populations that have a sustainable harvest. If the species is listed as threatened, the Service will work with the Marine Mammal Commission, Congress, and all interested parties to evaluate options for allowing continued import of trophies from healthy populations.

A copy of the proposed listing rule and other information about the proposal is available on the Service's Marine Mammal website located at: http://alaska.fws.gov/fisheries/mmm/polarbear/issues.htm. The Service invites the public to submit data, information, and comments on the proposed rule. Comments will be accepted through April 9, 2007.

by Leopoldo Miranda-Castro

Forging Partnerships for Habitat Restoration

The majority of our Nation's fish and wildlife resources are found on privately owned lands. Because the habitat needs of most endangered and threatened species cannot be met solely on public lands, voluntary partnerships with private landowners are essential. Fortunately, we have an effective tool to provide landowners incentives for cooperative conservation—the Partners for Fish and Wildlife Program.

The mission of the Partners Program is to "efficiently achieve voluntary habitat restoration on private lands, through financial and technical assistance for the benefit of Federal Trust Species." Whether implementing projects ourselves or providing assistance to others, we have helped thousands of private landowners to restore and conserve important fish and wildlife habitats on their lands. Cumulatively, these lands contribute significantly to the conservation of listed and candidate species as well as keeping common species common.

The Partners Program has developed more than 1,200 agreements directly with private landowners to restore over 23,000 acres (9,308 hectares) of wetlands, 1,200 miles (1,930 kilometers) of rivers and streams, and over 100,000 acres (405,000 ha) of upland habitats for the direct benefit of listed and candidate species. Field biologists in all 50 states and U.S. Territories work one-on-one with private landowners and other partners to plan, implement, and monitor their projects.

Partners Program biologists help landowners find sources of funding and guide them through the permitting process, as necessary. This personal attention and follow-through is

Topeka shiner

© Michael Redmer

a significant strength of the Program. The biologists provide expert technical assistance directly to private landowners on the best and most cost-efficient practices to restore and manage fish and wildlife habitat on their lands. In many instances, they also provide cost-share financial assistance through a cooperative agreement. Any privately-owned land is potentially eligible for restoration.

Here are a few of the successful habitat improvement projects benefiting endangered and threatened species in partnership with private landowners:

In 2004 and 2005, Partners staff at the Service's Rock Island (Illinois) Field Office worked with the Iowa Natural Heritage Foundation and two private landowners on a habitat restoration project for the Topeka shiner (*Notropis topeka*) along Cedar Creek in Greene County, Iowa. Endangered species recovery funds paid for the design and construction. The project restored the hydrology of an oxbow in the Cedar Creek floodplain and provided permanent off-stream refugia and potential spawning habitat for Topeka shiners. It also reconnected the downstream end of the oxbow to Cedar Creek to allow Topeka shiners to disperse into the watershed.

In the late 1990s, the Fish and Wildlife Service and its conservation partners identified a privately-owned remnant of native tallgrass prairie. It had survived despite a history of overgrazing, introductions of non-native forage grass species, and natural invasions of non-prairie plants. Surveys lead researchers to discover a small population of a threatened plant, the prairie bush clover (*Lespedeza leptostachya*). The landowner agreed to modify his land use practices to promote the species' recovery. These modifications include a voluntary cessation of grazing, the mechanical removal of invasive woody species, the use of prescribed fire to maintain open habitat and the control of invasive herbaceous species. Partial funding for the revised management was provided by the Service. As a result of the project, the prairie bush clover population has expanded three-fold. In addition, populations of state species of concern have also expanded. The landowner continues to gain economic benefits from the tract by harvesting and marketing local seed from the portions of the prairie that do not contain the Federal or State species of concern.

A partnership effort with the Service's Nevada Fish and Wildlife Office, Nevada Department of Wildlife, and private landowners created a refugium

Kraig McPeek

Kraig McPeek

Two views of Cedar Creek, before (top) and after (bottom) the restoration project. Among the beneficiaries of this project is an endangered fish, the Topeka shiner.

Craig Neudecker

Two Creeks Ranch

Gary Scoppettone, USGS/BRD

The Preston White River springfish is found at only four locations, all within a four-square-mile area in Nevada. It benefits from a cooperative habitat conservation project for another fish, the White River spinedace.

Right: Landowner Mike Cripps releases endangered White River spinedace at Indian Spring, Nevada.

for the endangered White River spinedace (*Lepidomeda albivallis*). Partners worked together to restore spawning and feeding habitat, improve water temperature, prevent non-native fish invasion and restore adult fish passage at Indian Spring in the White River Valley of White Pine County. In addition, the partners restored 45 acres (18 ha) of alkali desert riparian habitat for migratory birds and enhanced habitat for waterfowl and wading birds. The restoration efforts also resulted in a 300 percent increase in the endemic Preston White River springfish (*Crenichthys baileyi albivallis*) and provided the private landowner with enough water to maintain farming operations.

In Montana, the streams that bisect the Two Creeks Ranch provide important habitat for bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Salmo clarki lewisi*), grizzly bears (*Ursus arctos*), and many other creatures. Poor grazing management in the past affected the riparian vegetation as well as the width, depth and condition of the streams. The Partners Program has been working with the ranch managers since 1994 on a variety of best management practices that both benefit the ranch and its wildlife. In 2005, we constructed 1.7 miles (2.7 km) of fence along both Monture Creek and McCabe Creek and developed off-site water for livestock use. This project will significantly improve riparian conditions and water quality while improving livestock distribution and water availability.

A project to benefit Utah prairie dogs (*Cynomys parvidens*) entailed fencing 180 acres (73 ha) and treating 74 acres (30 ha) to provide optimum habitat for the reintroduction of this threatened species. The treatment included the removal of shrub vegetation and replanting with native plants. A Safe Harbor Agreement, prepared in a cooperative effort involving a conservation group, Environmental Defense, and the Service's Salt Lake City Field Office, will give the property owner assurances regarding future Endangered Species Act requirements.

For more information about the Partners for Fish and Wildlife Program, we invite you to visit http://www.fws.gov/partners.

Leopoldo Miranda-Castro is a biologist with the Service's Partners for Fish and Wildlife Program (leopoldo-miranda@fws.gov).

Bridget Nielson

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BOX SCORE

Listings and Recovery Plans as of March 19, 2007

GROUP	ENDANGERED U.S.	ENDANGERED FOREIGN	THREATENED U.S.	THREATENED FOREIGN	TOTAL LISTINGS	U.S. SPECIES W/ PLANS
MAMMALS	69	255	12	20	356	54
BIRDS	76	175	15	6	272	80
REPTILES	14	65	23	16	118	35
AMPHIBIANS	13	8	10	1	32	16
FISHES	74	11	63	1	149	98
SNAILS	25	1	11	0	37	30
CLAMS	62	2	8	0	72	69
CRUSTACEANS	19	0	3	0	22	18
INSECTS	47	4	10	0	61	33
ARACHNIDS	12	0	0	0	12	6
ANIMAL SUBTOTAL	412	521	155	44	1,132	436
FLOWERING PLANTS	570	1	143	0	714	605
CONIFERS	2	0	1	2	5	3
FERNS AND OTHERS	26	0	2	0	28	28
PLANT SUBTOTAL	598	1	146	2	747	636
GRAND TOTAL	1,009	522	301	46	1,878*	1,075

TOTAL U.S. ENDANGERED: 1,009 (411 animals, 598 plants)
TOTAL U.S. THREATENED: 301 (155 animals, 146 plants)
TOTAL U.S. LISTED: 1,310 (566 animals**, 744 plants)

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

** Eleven U.S. animal species and five foreign species have dual status.

ENDANGERED Species BULLETIN

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

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