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December 2004

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# ENDANGERED *Species* BULLETIN

December 2004

Vol. XXIX No. 2



One of the most frequently asked questions we hear is, "What can I do for endangered species?" This question has many answers, most of which involve minimizing the impacts of our daily activities on the environment. One thing we always advise is to "get your feet wet." Get out and learn more about wildlife and environmental issues. If we are well informed, we can make wiser decisions about how to conserve our natural treasures. The Fish and Wildlife Service is developing educational activities aimed at making people aware of the environment and its associated problems, and giving them the knowledge to help address these problems. This edition of the Bulletin profiles some of these environmental education activities.



Daniel Evans

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## On the Cover

Biology students participate in a workshop sponsored by Cairo High School and the Panama City Fishery Resources Office. The workshop provided classroom training on mussel biology and a field trip to examine water quality, conduct a habitat analysis, and survey aquatic species.

*Jennifer Hand, Cairo High School, Georgia*

## Opposite

Loss of nesting habitat to coastal armoring, such as this rock revetment, is one of the greatest threats to Florida's sea turtles.

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

*We also welcome your comments and ideas. Please e-mail them to us at [esb@fws.gov](mailto:esb@fws.gov).*

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by Teresa M. Jaskiewicz

# The Prairie Wetlands Learning Center



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*T*he Prairie Wetlands Learning Center, located near Fergus Falls, Minnesota, is a 325-acre (130-hectare) outdoor classroom operated by the U.S. Fish and Wildlife Service. It is composed of native and restored prairie, more than two dozen wetlands, and an oak savanna, but it is also a residential environmental education facility. The visitor center has classrooms, an exhibit area, breakout lounges, kitchen, and dining hall. A renovated barn and surrounding lawn area provide additional teaching space. The Center offers a wide variety of educational programs to over 11,000 students each year.

One of the Center's more popular programs is on endangered species. The goals and objectives of the endangered species program are to enable students to distinguish between endangered, threatened, and "special concern" species; the current issues and the measures involved for the protection of these species; information on what roles the Fish and Wildlife Service, National Park Service, Forest Service, and other government agencies serve; the function of partnerships with private non-profit

groups and landowners; and ways individuals can help endangered species.

The first part of the program covers why animals become endangered ("HIPPO: Habitat loss, Introduced species, Pollution, Population growth, and Over-consumption"); what animals are endangered in Minnesota, United States, and the entire world; and who is involved in the recovery of these species. After discussing some endangered species and why animals become endangered, the educator hands out a puzzle piece to each student, and the students put together six separate puzzles. Each of the six puzzles is a logo for an agency or private group involved in the recovery of endangered species. On the back of the logo is a question to be answered by group discussion. The purpose of this activity is to show students that in order for endangered species to survive, many different groups and agencies have to work together.



***Students use reference books to learn about endangered species, then make their own brochures to share with the class.***

USFWS

In the second activity, the class sits in a circle on the floor, and the educator randomly hands out a few pictures of endangered species to students. Students pass a coffee can, covered with pictures of endangered species, around the circle. When the can gets to a student holding a picture, the student places it in the can and identifies the animal to the class. If the can is not dropped as it makes its way around the circle, all animals inside the can are saved. This shows how easy it can be to work together for a common cause. Then, the educator explains that it is not really always that easy, and to demonstrate the potential difficulty, students then have to take off their shoes and pass the can with their feet. If the can is dropped and an animal falls out, that animal is extinct. Students typically begin talking to each other, giving support and advice on how not to drop the can. The group discussion is always very lively, and is a good introduction to the next part of the program.

Next, students are put into small groups or pairs. To learn what individuals can do to help endangered species, each group receives a reference book on endangered species of the world. The students choose a random page number

and research the species on that page. Normally, several students in the class will end up with lesser known species, and this provides an opportunity for the other students and sometimes even the educator to learn something new. The educator provides them with a list of questions to aid in the investigation. The students are then asked, "Why save these species?" After a brief discussion, they are asked to make a brochure that answers this question and then share the information with the rest of the class. The brochures are then placed on a big sheet of paper under the words, "Why Save These Species?" This display is taken back to the school and put up in the hallway outside the classroom, thus allowing everyone in the school to benefit from the students' research.

For more information on this and other programs, see the Prairie Wetlands Learning Center website at <http://midwest.fws.gov/pwlc>.

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*Teresa M. Jaskiewicz, an environmental education specialist at the Prairie Wetlands Learning Center, can be reached at [teresa\\_jaskiewicz@fws.gov](mailto:teresa_jaskiewicz@fws.gov) or by telephone at 218-736-0938.*

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by Megan Seymour

# Reaching Out to “Save our Snakes”

**The Lake Erie watersnake is listed federally as threatened, the state of Ohio and the Canadian province of Ontario consider it endangered. Human persecution is the most significant and well-documented cause for the decline of this snake in both the U.S. and Canada.**

**A common public misconception that the snakes are venomous, coupled with an unfounded fear of snakes in general, led to widespread eradication efforts.**

Upon arriving at any of the scenic and popular islands of western Lake Erie, visitors encounter an unusual message: “Watersnakes welcome here!” More than 200 signs describing a unique creature, the Lake Erie watersnake (*Nerodia sipedon insularum*), are found on most of the U.S. islands of the Put-in-Bay archipelago. These signs are the most visible part of a diverse outreach campaign to inform island residents and millions of yearly visitors of the uniqueness and protected status of the Lake Erie watersnake, or LEWS as it is often called.

This snake is endemic to the islands in the western Lake Erie basin of Ohio and Canada. Because of the snake’s very limited geographic distribution and the effects of intentional extermination, the

U.S. Fish and Wildlife Service concluded that an intensive outreach campaign could help. Service biologists reasoned that focusing on the harmless nature of the snake and its significance to the islands’ natural heritage might curb human fear, and in turn limit snake persecution. So began the campaign to, as one local student described it, “Save Our Snakes!”

Even the most fervent nature lover might recoil when first encountering a LEWS. Although the snakes are harmless and non-aggressive, their size (adult females may be up to 5 feet or 1.5 meters in length) and occasional unwillingness to move out of the way can make them an unappreciated animal. In addition, the shoreline, where the snakes bask in the summer, and the nearshore waters of the lake, where they forage for fish, are the major congregation areas for tourists, boaters, anglers, and swimmers, leading to human-snake encounters. This, coupled with the public’s general fear of snakes, has resulted in high human-induced mortality.

Outreach efforts, so far, have attempted to inform people that the snake is harmless, unique to the Lake Erie islands, part of the natural heritage, and a protected species. The “Watersnakes welcome here” signs are just a small part of the Service’s outreach effort. Even more widely distributed than the signs is *LEWS News*, the biannual Lake Erie Watersnake Newsletter. Mailed to all island residents, partnering agencies, island parks, and other interested parties, *LEWS News* addresses issues such as ongoing research, habitat management, “problem” snakes, recovery progress, habitat conservation plans, and the



**A Lake Erie watersnake basks before a “Water Snakes Welcome Here” sign.**

*Dr. Jeffrey M. Reutter, Director, Ohio Sea Grant*



significance of biodiversity. A variety of photos, games, and reader-submitted items complement the articles.

Reader submissions to the newsletter have included winning entries from the LEWS poster, poetry, and essay contests held at the island schools. Students submitted stories, drawings, and poems describing why the snake is important. Winners and participants received prizes and recognition at an awards ceremony, and the winning picture was featured on LEWS posters and brochures. By instilling a conservation ethic among the young island residents, the Service hopes to encourage an appreciation for the snakes that will last into the next generation and beyond.

As part of the effort to keep local residents informed about current LEWS issues, the Service and Ohio Department of Natural Resources' Division of Wildlife (ODNR) regularly issue press releases and involve the media in emerging topics of interest. Television shows such as "Wild Ohio," radio broadcasts on WOSU and the Great Lakes Radio Consortium, and articles in numerous newspapers, magazines, and newsletters contribute toward public awareness of the LEWS.

The Service and ODNR have also published guidance to aid in planning development and land management activities. The Service's "LEWS management guidelines for construction, development, and land management activities," ODNR's "Shore Structures and the LEWS," and ODNR's "LEWS—Make your boating experience more pleasant" document ways to avoid or minimize impacts to the snake and its habitat.

The most significant outreach accomplishment of the Service/ODNR partnership is the establishment of a permanent snake researcher on the islands. Kristin Stanford, the "Island Snake Lady" as she has come to be known, provides a personal contact for islanders, and helps bridge the gap between residents and agencies. She provides one-on-one, site-specific guidance to islanders with snake

issues, writes a regular "Ask the Island Snake Lady" column for the local paper, operates an e-mail address for snake questions, and presents numerous LEWS presentations for various groups throughout the year. She has been invaluable in promoting tolerance and stewardship of the LEWS and its habitat among island residents.

The joint efforts of the Service, ODNR, and researchers to inform islanders and visitors about the significance of this unique animal are making an impact. Populations fluctuated during the late 1990s and early 2000s, a period that coincides with intensive public outreach efforts and the snake's listing under the Endangered Species Act, but in general the population is increasing. Awareness of the snake's protected status also appears to be increasing, as reports of intentional killing of snakes have decreased. People continue to spread the message: "Watersnakes welcome here!"

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*Megan Seymour, a wildlife biologist in the Service's Reynoldsburg, Ohio, Ecological Services Field Office, can be reached at (614) 469-6923, ext. 16.*

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**Female Lake Erie watersnake sunning on a log near the Lake Erie shoreline.**

*Kristin Stanford, Northern Illinois University*



# Eider Journey

by Neesha Wendling and  
Philip Martin



**Barrow High School student handles a Steller's eider during the annual banding drives at Izembek National Wildlife Refuge.**

Neesha Wendling

*E*ider Journey is a comprehensive education and stewardship program addressing conservation and management issues of the North American breeding population of Steller's eiders (*Polysticta stelleri*). It was developed to help educate the young people of Barrow and Cold Bay, Alaska, about this rare bird. Through classroom activities, fieldwork with biologists, and follow-up activities, students develop an increased understanding of the needs of Steller's eiders and the threats they face. As a result, the students become informed stewards of this precious natural resource. The *Eider Journey* program

builds on a collaboration among the U.S. Fish and Wildlife Service (through the Fairbanks Fish and Wildlife Office and the Izembek National Wildlife Refuge), Alaska North Slope Borough Department of Wildlife Management, Alaska North Slope Borough School District, Barrow Arctic Science Consortium (BASC), National Science Foundation Office of Polar Programs, Arctic Research Consortium of the United States (ARCUS), Alaska Biological Research, Alaska Airlines, Federal Aviation Administration, and Peninsula Airways.

*Eider Journey* highlights the significance of the species through local



**Steller's eider**

Chris Dau

partnerships and an education program that reflects local needs and community issues. It exposes students to research that addresses issues of conservation and management of wildlife populations. The multifaceted and developing project has four long-term goals:

- inform the public about Steller's eiders and involve communities in the decision-making processes related to eider conservation issues,
- provide first-hand experience in the field research that informs agency management decisions,
- promote sciences, particularly wildlife sciences, as a career, and
- provide quality resources and information for educators and students.

Since 1999, 17 students have participated in the *Eider Journey* program (15 from Barrow, one from Cold Bay, and one from Hawaii). In 1999 and 2000, students traveled to Izembek NWR to assist with the annual eider banding drives and other local research. In 2002, a partnership with BASC, a local non-profit organization, allowed program expansion by hiring four student interns to assist the Service with eider surveys in Barrow. In 2003, two alumni returned for a second year of summer work, and three new students were hired as interns. Students were assigned to three- or four-person teams responsible for searching a different area each day. Teams searched large areas on foot, recording and mapping all occurrences of Steller's or spectacled eiders, as well as predators such as gulls, jaegers, and foxes. Students learned to identify birds, orient and map using aerial photos, and classify habitat. Annual surveys provide data about year-to-year changes in Steller's eider breeding and information on the distribution in the Barrow area.

In addition to the annual eider banding drives in Izembek Lagoon, in 2002 and 2003, students assisted Dr. Peter McRoy in gathering data on eelgrass stands. The data will be compared with a baseline from the 1980s to

assess the health of the eelgrass beds, which are critically important to Izembek Lagoon wildlife. Also in 2003, the field studies exchange program expanded to include a student from Cold Bay who assisted with nest surveys in Barrow and brought her new knowledge of the eider's arctic nesting habitat back for use at Cold Bay.

Students have assisted with the outreach effort in their communities by giving numerous presentations at the Iñupiat Heritage and Language Center, in elementary, middle, and high school classes, with science fair projects based on the program, and on local radio.

To complement the students' field experience, ARCUS and the Service are developing a curriculum guide for teachers that incorporates the concepts of endangered and threatened species, stewardship, and ecological principles. The guide will be made available to other schools near the eider's nesting and wintering areas, and can be used in conjunction with field trips or as part of a regular classroom study.

This year, *Eider Journey* will gain national prominence when it becomes a featured program on *Arctic Alive!*, a series of internet-based electronic field trips developed by ARCUS, in which students across the country can be transported virtually to unique and remote locations within the arctic region. Activities for teachers will be posted in the spring, and students across the country can follow along on an eider banding drive and eelgrass studies in the fall of 2004.

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*You can learn more about this Arctic Alive program at: <http://www.arcus.org/ArcticAlive/Eider/index.html>.*

*For information on any aspect of Eider Journey or Steller's eider conservation in general, contact Neesha Wendling at 907-456-0297 in the Service's Fairbanks Office or send an email to [Neesha\\_Wendling@fws.gov](mailto:Neesha_Wendling@fws.gov).*



***A Barrow High School student helps a Princeton University student with the Steller's Eider Breeding Pair Survey in Barrow, Alaska.***

*Neesha Wendling*

**The North American population of Steller's eiders is listed as threatened under the national Endangered Species Act. At present, the only known regularly occupied nesting area of Steller's eiders in North America is near Barrow, the largest rural community in northern Alaska. Each fall, Steller's eiders migrate from Barrow southwest to the Alaska Peninsula. Izembek Lagoon, about 40 miles (65 kilometers) from the western end of the Alaska Peninsula, is an important site for molting and wintering Steller's eiders. The lagoon contains one of the largest eelgrass beds in the world, providing habitat for the small invertebrates eaten by the eiders. In Izembek Lagoon, the concern is to protect the shallow and biologically productive waters from oil spills and other pollution from vessels traveling the Bering Sea.**



# Slowing the Flow

by Carrie Wright

*D*ue to human activities, the salt marsh habitat in California's San Francisco Bay area has undergone major changes in the past 150 years. Over 85 percent of these wetlands have been lost to infilling for landfills, urbanization, and the construction of salt ponds. As a result, several species unique to these wetlands are now listed as threatened or endangered, including the salt marsh harvest mouse (*Reithrodontomys raviventris*) and the California clapper rail (*Rallus longirostris obsoletus*).



**California clapper rail**

© B. Moose Peterson/Wildlife Research Photography



The salt marsh harvest mouse is a small nocturnal rodent that makes its home and all of its meals out of pickleweed (*Salicornia virginica*), a native plant growing in the salt marshes. The California clapper rail is a secretive marsh bird with a distinctive call. When the light is low, usually at dusk and at dawn, this shy bird emerges from the cordgrass (*Spartina foliosa*) at the edges of the marsh to feed on invertebrates in the mudflats during low tide. In the 1970s, Congress approved two wildlife refuges in the bay area, the Don Edwards San Francisco Bay National Wildlife Refuge (NWR) and the San Pablo Bay NWR. This was due in no small part to the hard work and perseverance of local groups of concerned citizens to protect wetland habitats in the San Francisco estuary.

At the Don Edwards San Francisco Bay NWR Environmental Education Center in Alviso, California, Fish and Wildlife Service employees, Student Conservation Association interns, and San Francisco Bay Wildlife Society employees work hard to provide educational opportunities and promote awareness about the challenges facing the salt marshes and their inhabitants. One of these opportunities is the "Slow the Flow" environmental education program, which is made possible by a partnership among the city of San Jose, the Service, and the Wildlife Society. In 1999, San Jose provided a grant to the Wildlife Society to hire a program coordinator who is based at the Don Edwards San Francisco Bay NWR. This partnership grew out of the Service's need to reach a wider audience and the city's desire for an environmental education program to help with issues involving water pollution control.

The Slow the Flow program focuses on watersheds, water conservation in relation to the salt marshes at the refuge, and the effects of the nearby San Jose/Santa Clara Water Pollution Control Plant. The plant releases up to 120 million gallons (455 million liters) a day

of clean freshwater effluent into the Artesian Slough that runs through the refuge. This release has altered the salt marsh to freshwater marsh, making it uninhabitable to some species. The Slow the Flow program was created to heighten public awareness of this and other water use issues in an effort to slow the flow of freshwater effluent to the bay's salt marshes and increase viable habitat for endangered species.

The Slow the Flow program incorporates field trips, classroom presentations, weekend interpretive programs, outreach activities, and several annual special events. The San Jose grant includes funding for advertising and materials, making it possible to provide programs to the public free of charge. The field trips include an in-depth hike through refuge habitats, allowing students to see and learn firsthand about native wildlife and develop a greater sense of connection with the salt marshes. Field trips also involve hands-on activities such as mud creature studies, water quality testing, and salinity testing. Classroom presentations such as "Mysteries of Wastewater Treatment" and "Reduce, Reuse, Refuge" were created to increase the program's audience in response to lack of school funding for transportation to the refuge. The coordinator of the Slow the Flow program also plans special events like Shark Day and the International Migratory Bird Day celebrations at the Environmental Education Center. The Slow the Flow program has reached over 3,000 individuals from January to October 2004 and continues to provide meaningful experiences to students of all ages.

On March 11, 2003, the partnership involving the city of San Jose, the San Francisco Bay Wildlife Society, and the Service was honored at a ceremony in San Jose. Mayor Ron Gonzales read a proclamation celebrating the successes of the Slow the Flow program and supporting the future of the partnership. He thanked "the dedicated staff of both the Don Edwards National Wildlife

Refuge and the San Jose Environmental Services Department for their dedicated efforts in support of environmental and watershed education for the youth of San Jose and our neighboring communities in the South Bay." This partnership has been beneficial both to the Wildlife Society and the city of San Jose, and the Service hopes to establish similar programs to build on this success.

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*Carrie Wright was formerly the Slow the Flow Program Coordinator at the Don Edwards San Francisco Bay NWR Environmental Education Center. The new coordinator, Tina Simmons, can be reached at [sfbay\\_slowtheflow@sfbws.org](mailto:sfbay_slowtheflow@sfbws.org), or by telephone at (408) 262-5513, ext. 104.*



**Salt marsh harvest mouse**

© B. Moose Peterson/WRP

by Barbara A. Simon

# Creative Partners, Creative Solutions



**Students arrive for the Sweetwater Safari "Backpack Adventure."**

USFWS

*T*he San Diego National Wildlife Refuge (NWR) Complex in southern California is continually challenged to create programs that have a positive impact on a community whose human population is diverse and growing at an incredible pace. We've developed some nontraditional partnerships and interesting ideas to communicate the Refuge System's message.

The Zoological Society of San Diego's Education Department and our refuge complex collaborate on many programs and events, but the Dr. Zoolittle endangered species and migratory bird shows, "Disappearing Wildlife" and "The Great Migration," are two of the most exciting. These shows are interactive and fun for adults and children alike. The intrepid Zoolittle performed last year at 11 school assemblies that reached over 6,000 students in traditionally underserved areas. The shows were also presented at the Children's Zoo Theater several times daily during peak visitor months. We estimate that, on average, the shows at the Children's Zoo reached 300 to 700 people a day. This year, Zoolittle will be adding a third program, which focused on insects. The first time the show was presented, the audience was invited to eat the crunchy creatures!

In addition to providing schools access to the program, the refuge complex provides age-appropriate materials for teachers to use in their classrooms. The Fish and Wildlife Service and the refuge are acknowledged at each school performance.

"Sweetwater Safari" is another zoo/refuge collaboration and includes our partners at the Chula Vista Nature Center on Sweetwater Marsh NWR. The humor-

ous researcher, HD Hernandez, introduces students and teachers to the wonders of the refuge and endangered species in their own backyards through his fictitious, but accurate, field guide. The science-based field experience for fourth grade students meets California standards for language arts, science, and social studies, and was developed through a grant from Chevron to the San Diego Zoo's Conservation Education Department. The zoo's education and design departments created an exciting, self-guided backpack adventure, including equipment for four rotations: plankton drag and identification, bird identification, evidence of animals, and plant identification. As they participate in each exercise, students draw plants, animals (or their signs), and plankton. Then they take their information and drawings to the classroom for inclusion in a classroom journal and in individual field journals. The students carry backpacks containing binoculars, field scopes, plankton nets, brightly colored field guides, and other equipment from one station to another.

This program, like our other field trips, begins in the classroom with teacher workshops developed and taught by our partners and refuge staff. It's rewarding to have refuge ideas sup-

ported and expanded upon by the creativity and expertise of the San Diego Zoo, Chula Vista Nature Center, and California State Parks. The backpack field curriculum and organization also owe much to the San Francisco Bay education programs that have existed for many years.

At Seal Beach NWR (located within the Seal Beach Naval Weapons Station), when teachers and students cannot come to us because of the security precautions, we bring the refuge to them in the form of the Pelican Van. The van was developed by our Seal Beach Refuge Friends group for use during the refuge system centennial through a challenge cost share grant, with the idea that after the centennial year (2003), we'd have an eye-catching, roving classroom. Last year, the van traveled from the Salton Sea in California to Portland, Oregon, bringing the refuge story to schools, other refuges, and stops along the way. The techniques and messages developed on that trip helped the group create several school programs that now travel around Orange and San Diego counties.

"Habitat Heroes" is another curriculum that, while funded this year by the Service, was developed with a local environmental organization. The Endangered Habitats League is helping us create a long-term exotic plant GIS mapping and restoration program for the elementary, middle, and high schools along the South San Diego Bay. Mentors for this field and classroom experience will come from Southwestern Community College and a local high school.

The Multiple Species Conservation Program Outreach Committee, involving the refuge since its inception, decided to take a habitat restoration program for the endangered Quino checkerspot butterfly (*Euphydryas editha quino*) under its wing. The Quino restoration project is funded through Service recovery funds. Members of the outreach committee from the County of San Diego and private conservation organizations have helped us set up a program that encompasses many of the goals for our educa-

tion programs, and for the butterfly. Dr. Alison Andersen from the Service's Carlsbad Field Office provides information and her considerable expertise for the Steele Canyon Science Club students who participate in the program.

We were granted the use of a greenhouse at a residential facility for mentally challenged adults where we propagate the butterfly's host plant, *Plantago erecta*. Local high school students, refuge personnel, other volunteers, and eventually (we hope) the residents of the home will gather seeds from plants already on the San Diego NWR.

Helping to perpetuate a strong environmental ethic in such a large community is one of our goals, as it is for our community partners. With strong partners, we have an opportunity to create active stewards of our fragile coastal environment. Without such partners, we would, quite simply, be overwhelmed.

---

*Barbara Simon is the information and education specialist for the San Diego NWR Complex, located at Sweetwater Marsh NWR in Chula Vista, California (619/691-1262; Barbara\_Simon@fws.gov).*

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**The "Pelican Van" in the redwoods during the Refuge Centennial.**  
USFWS



**Dr. Zoolittle and the Endangered Species skit.**  
USFWS



by Alan Lieberman

# Teaching the Children: A Hawaiian Tradition

“If you plan for a year, plant kalo.  
If you plan for ten years, plant koa.  
If you plan for 100 years, teach the children.”

*Hawaiian Proverb*

**The children understand that they will play a part in planning the future of their island home, and they learn how each step toward recovery of the islands' health plays a part in our quality of life.**

Such sentiments are found in many cultures, many lands, and many languages, but they all speak to the same hope: if you want to make the world a better place for all, begin by teaching your children well. In Hawai‘i, the incredible natural heritage of this island state has been well documented, both in the recent fossil record and in the observations of the first naturalists to visit the islands. The conservation story in this island paradise is one of unparalleled richness and, unfortunately, a story of endangerment and extinction.



***Students are encouraged to participate in the conservation center's activities. Planting native species of plants helps the kids feel a connection to the forest and a sense of ownership for the recovering Hawaiian ecosystems.***

*Mary Schwartz*

In 1993, a conservation partnership was formed by the U.S. Fish and Wildlife Service, the Hawai'i Division of Forestry and Wildlife, and The Peregrine Fund, later joined by the Zoological Society of San Diego. The goal of this partnership was to establish self-sustaining captive populations of the most endangered of Hawai'i's remaining species of honeycreepers, thrushes, and a crow as a hedge against extinction and as genetic reservoirs for the eventual reintroduction of these species into habitat that is identified for management and protection. The partnership, now called the Hawai'i Endangered Bird Conservation Program (HEBCP), operates the Keauhou and Maui Bird Conservation Centers and has established an excellent record of captive propagation; breeding and rearing several species of endemic honeycreepers, such as the Maui parrotbill (*Pseudonestor xanthophrys*), the Hawai'i 'akepa (*Loxops coccineus coccineus*) and creeper (*Oreomystis mana*), and the palila (*Loxioides bailleui*), as well as the endemic puaiohi or small Kaua'i thrush (*Myadestes palmeri*) and the 'alala or Hawaiian crow (*Corvus hawaiiensis*). Although the success of the breeding program is something to "crow" about, the real success of the program might be found in something more subtle and less splashy than the front page cuteness of a nestling songbird being hand fed by an attentive biologist. We take the Hawaiian proverb seriously and have tried to "plan for 100 years, teach the children."

In 1998, the HEBCP, recognizing that the true value of our efforts might lie in the educational opportunity it afforded the children of Hawai'i, formed a new partnership with the Keakealani Outdoor Education Center (KOEK). The KOEK is a unique environmental education program sponsored by the Hawai'i Department of Education that hosts every sixth grade student on the Big Island of Hawai'i for a three-day/two-night stay in the remote rainforests near the Hawai'i

Volcanoes National Park. Every sixth grader eagerly looks forward to this adventure where they hike the park, learn about Hawaiian natural history, and visit the Keauhou Bird Conservation Center. Here they see first hand what is being done to recover the endangered avifauna of their Hawai'i. The children are amazed to hear how the world is watching their tiny island home and how Hawai'i presents a natural laboratory for all the world to see. They better understand the process of speciation, adaptation, and extinction. Their eyes are opened to the world of conservation.

Since 1998, over 10,000 children have visited the facilities, seeing bird species they may have only heard about from their elders. They see first hand the dedication and effort being applied to saving the last of the last, and they grow to understand the role they play as future citizens of Hawai'i. After a visit to the breeding centers, the children are filled with the pride of knowing that their home is unique and worth saving. It is a cultural experience that is sure to last a lifetime for the students. We are planning for 100 years...or even longer. We are teaching the children well.

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*Alan Lieberman is Program Director of the San Diego Zoo's Hawaii Endangered Bird Conservation Program (alanlieberman@earthlink.net).*



**Educators lead students through the different work areas at the Keauhou Bird Conservation Center, including egg incubation and chick rearing rooms, video monitoring areas, propagation aviaries, and kitchens.**

*Julie Williams*



**Students are given the opportunity to help feed the birds in the propagation program.**

*Julie Williams*

by Jennifer Hand

# All it Takes is a Little Mussel



***The endangered shinyrayed pocketbook, a freshwater mussel known from the Ochlockonee River basin in Georgia and Florida.***

*Phil DeGarmo*

Just as reducing the number of species on the endangered list seems to be an uphill battle for naturalists, closing the achievement gap that exists between various groups of students can be an overwhelming struggle for educators. The marriage of these two undesirable phenomena, however, can yield very positive results.

Last year, biology students at Cairo High School in southwest Georgia were taught using various EIC (Environment as an Integrating Context for learning) strategies. EIC Model™ strategies are summarized in the study, “Closing the Achievement Gap,” first published in 1998 by the State Education and Environment Roundtable, which is composed of 16 states working to improve student learning by integrating the environment into K-12 curricula and school reform efforts. These strategies require students to apply fresh approaches to problem solving, rather than passively listening and taking notes.

The EIC Model™ is not solely devoted to environmental awareness, but uses the school’s community and surroundings as a framework to meet the required curriculum objectives. The results of the 1998 study, based on 40 schools in diverse natural and community settings, were promising: 1) better performance on standardized tests; 2) fewer discipline problems; 3) increased enthusiasm for learning; and 4) greater pride in accomplishments. The results specific to science indicate that EIC students more effectively master scientific knowledge and skills and achieve a deeper understanding of scientific

processes and concepts. They were also better able to discern the connections between what they learn in science and applications in the real world.

So, how was the EIC Model™ implemented at Cairo High School, and what does it have to do with endangered mussels? At the beginning of the school year, students held a bake sale and raised enough money to sponsor a program with Sandy Beck from a Tallahassee, Florida, animal rehabilitation and conservation group, the St. Francis Wildlife Association. Mrs. Beck spent an entire day at the school, using live animals to teach students in each biology class about the threats to, and adaptations of, wildlife. Among these animals were a barn owl that had been blinded by pesticides and a red-tailed hawk that had been hit by a car. Students will probably never forget the hawk spreading his magnificent wings as Mrs. Beck held him above her head. She explained that people attract rodents to the road when they throw litter out their car windows. As raptors like hawks and owls prey on the rodents, they risk being hit by a car.

Okay, so what about the mussels? Another school project focused on water quality. A local newspaper article carried



a story about Tallahassee, Florida, threatening to sue Cairo if a problem with Cairo's wastewater treatment plant was not corrected. The plant was not able to adequately treat the city's water supply, and effluent was running off into Tired Creek, which empties into the Ochlockonee River. The Ochlockonee River flows through Tallahassee and is a wonderful natural resource. Prompted by the article, students undertook a comprehensive approach to learn about the problem and what our city was doing to address it. The students 1) interviewed the mayor and a civil engineer who specializes in wastewater treatment, 2) collected and tested water samples at various locations with an Environmental Protection Agency scientist, 3) invited a river management analyst from Florida State University to speak to the biology classes, 4) met with a representative of the Tall Timbers Research Station in Tallahassee, 5) attended Tallahassee's Apalachee Audubon Society meetings and interviewed Tallahassee's water quality specialist, and 6) met with Holly Blalock-Herod of the U.S. Fish and Wildlife Service. Mrs. Blalock-Herod conducted a workshop covering the main reasons why mussels like the

shinyrayed pocketbook (*Lampsilis subangulata*) are endangered.

The students compiled their findings on posters and placed them in the school halls. On Earth Day, they handed out questionnaires to all the administrators, faculty, staff, and students to complete, using the posters to increase awareness about Cairo's water quality problem and the degradation of the Ochlockonee River. The questionnaires were then entered into a drawing for \$25 or a gourmet dessert. It was an awesome learning/teaching experience. Students realized that their understanding of science was critical regardless of whether or not they were going to become scientists. They learned that Cairo had become the victim of some faulty engineering and was in the process of trying to come up with the millions of dollars necessary to build a new wastewater treatment plant. They also learned that the river that many of them fished and boated on was becoming degraded and that its inhabitants were becoming endangered. The students were amazed at how dependent the mussels were on fish for their reproductive cycle, and they gained insight to the fact that, if water quality

problems were endangering mussel populations, fishing trips might become endangered as well.

The past year was full of adventure and excitement. To top it off, not only did the students' enthusiasm and grades improve, but they also received several awards and recognition for their efforts: 1<sup>st</sup> Place from Keep Georgia Beautiful (with an \$1,800 grant to continue their efforts), 2<sup>nd</sup> Place from the Georgia Conservancy (with another grant for \$1,000), and the most exciting recognition was earning national recognition by winning the President's Environmental Youth Award! Sometime during the spring of 2005, the students will be recognized in Washington, D.C. by the Environmental Protection Agency. President Bush has presented the award in person at the White House for the past three years, and the students are hopeful that the tradition will continue. In addition, the students were recognized in the Apalachee Audubon Society, Georgia Recycles, and Fish and Wildlife Service (Egrits) newsletters, the local newspaper, and at monthly board of education meetings.

All of these efforts took a lot of time, planning, and generous volunteers, but the goals of contributing to the protection of endangered species and increasing student achievement were ultimately met by using "a little mussel!"



**Biology students examining native and non-indigenous mussel species that they located during the field portion of the aquatics workshop.**

Jennifer Hand

*Jennifer Hand is a biology teacher at Cairo High School, Cairo, GA 39828 (229/377-4437). For more information about the State Education and Environment Roundtable and the report "Closing the Achievement Gap: Using the Environment as and Integrating Context for Learning," contact <http://www.seer.org>.*

*The EIC Model™ was developed by, and is the property of, the State Education and Environment Roundtable.*

by Chris Mensing

# Bird Watchers Flock to Michigan



**Kirtland's warbler**  
Ron Austing

**Annual cowbird control and habitat management has allowed the Kirtland's warbler population to increase from a low of 167 singing males in 1987 to a record high 1,341 singing males in 2004. This represents about a 700 percent increase in the warbler population in less than 20 years. Even with the dramatic population increase, habitat management and cowbird control must be maintained on an annual basis to provide the Kirtland's warblers with the protection needed to ensure their survival.**

The endangered Kirtland's warbler (*Dendroica kirtlandii*) is a small, blue-grey and yellow bird that weighs less than half an ounce but has attracted the attention of bird watchers from all over the world to the two small northern Michigan towns of Grayling and Mio.

The Kirtland's warbler was first discovered near Cleveland, Ohio, in 1851. It was not until 1903 that its nesting range was discovered near the Au Sable River in Crawford County, Michigan. Since then, all confirmed reports of nesting Kirtland's warblers have occurred in the Upper Peninsula and northern Lower Peninsula of Michigan.

The Kirtland's warbler's nesting habitat consists of young jack pine (*Pinus banksiana*) ranging in size from 5 to 20 feet (1.5 to 6 meters) in large stands over 200 acres (80 hectares). Historically, these stands would regenerate after periodic wild fires; however, modern fire control has suppressed natural regeneration and limited the amount of young jack pine available to Kirtland's warblers. To compensate for the loss of natural forest regeneration, managers artificially create suitable habitat by direct seeding or planting jack pine seedlings in the appropriate density and distribution. Currently, over 150,000 acres (60,703 ha) of public forest land are set aside as Kirtland's Warbler Management Areas. These lands are regulated for sustained yield of warbler nesting habitat and timber production.

To further protect the warblers, biologists annually trap and remove brown-headed cowbirds (*Molothrus ater*) from the nesting sites. Cowbirds are brood parasites that place their eggs in the nests of a variety of host species, including Kirtland's warbler. The host bird then raises the cowbird chicks at the expense of the host chicks. Cowbirds were not present in the warbler's nesting range prior to the late 19<sup>th</sup> century settlement and subsequent logging of Michigan. As a result, Kirtland's warblers have no known defense against cowbird parasitism. Before the initiation of cowbird control in 1972, 70 percent of warbler nests contained at least one cowbird egg and an average of less than one Kirtland's warbler chick fledged per nest. After cowbird control was initiated, warbler production increased to an average of 2.7 Kirtland's warbler fledglings per nest.

Each year, the U.S. Fish and Wildlife Service and the U.S. Forest Service provide the public an opportunity to see one of the nation's rarest songbirds. The agencies conduct guided tours from mid-May through July 4. A total of 1,204 people from 43 states, the District of Columbia, and 10 foreign countries

participated in guided tours in 2004. Since 1966, more than 36,000 people have traveled to northern Michigan for the chance to see a Kirtland's warbler. These tours are the best opportunity to view this endangered songbird, since Kirtland's warbler nesting areas in northern Michigan are closed and posted against public entry during the nesting season. The tours begin with a short slide presentation on the Kirtland's warbler recovery program. Participants are then led to nesting sites where they have an opportunity to view Kirtland's warblers. While on the tour, the participants receive more information about Kirtland's warbler biology, habitat requirements and management, the cowbird control project, and the flora and fauna of the jack pine ecosystem.

The Kirtland's warbler tours present an opportunity for people from all over the world to experience the beauty of northern Michigan. Out of the 644

survey respondents, 251 were from Michigan and only 21 were from the local Grayling, Michigan, community. In addition, 88 percent of the participants were visiting the Grayling area primarily to attend a Kirtland's warbler tour. Some of these participants traveled hundreds, if not thousands, of miles for the tour.

The continued survival and recovery of endangered species depend in part on outreach programs like the Kirtland's warbler tours. For more information on the tours, contact Chris Mensing with the Fish and Wildlife Service's East Lansing Field Office ([chris\\_mensing@fws.gov](mailto:chris_mensing@fws.gov)) or Joe Gomola with the Forest Service's District Ranger Station in Mio, Michigan ([jgomola@fs.fed.us](mailto:jgomola@fs.fed.us)).

*Chris Mensing is a fish and wildlife biologist with the Service's East Lansing Office ([chris\\_mensing@fws.gov](mailto:chris_mensing@fws.gov); telephone 517/351-8316).*



*Chris Mensing*

**At the conclusion of the 2004 tours, the participants were asked to complete a short survey. The results showed that the participants were overwhelmingly satisfied with the tour. The guide was rated on knowledge of Kirtland's warbler, knowledge of the warbler management program, general bird identification and information, professionalism, friendliness, and overall effectiveness. These qualities received an average rating of 4.920 out of 5. Likewise, the slide presentation was rated on the detail about Kirtland's warbler, detail about the warbler management program, quality of sound, quality of pictures, and overall effectiveness. These aspects rated an average of 4.633 out of 5. Included with the survey was a section where people could provide additional comments. One of the most frequent comments was that programs such as the Kirtland's warbler tours are an invaluable resource to the public and definitely should be continued.**

### U.S. Participation in USFWS Kirtland's Warbler 2004 Tour



### Tour Participant Distribution





# The Year of the Fish

by Emily Bergum, Marissa Curtis, Amy Gelatt, and Lauren Slagel

## Students Help Restore Populations of Ancient Fish

Colorado students are helping to restore populations of ancient fish through a unique education program sponsored by the Colorado Division of Wildlife (CDOW). Since 2000, elementary and high school classes in western Colorado have raised endangered razorback suckers or Colorado pikeminnows in classroom aquariums during the school year and released them into the river.

"This is a fabulous program," says fifth-grade teacher Cary Atwood from Scenic Elementary in Grand Junction, Colorado. "Having razorback suckers in our classroom greatly increased my students' interest in learning about endangered species, the river system, and water quality. They also assumed the responsibility for feeding the fish, testing their water, and monitoring their growth. My students definitely developed a greater understanding of how people have affected the delicate balance of native and nonnative species in the river system."

At the start of the school year, CDOW Education Specialist Stan Johnson brings the aquarium and fish to each classroom and provides instruction to the students. At over 6-feet-tall, he towers above the students as he explains that when they are taking care of the endangered

Our first thought about raising fish was, "We're going to raise *what?*" We were one of 10 lucky classrooms chosen to raise the endangered razorback sucker (*Xyrauchen texanus*) as part of a program to help save native Colorado River species.

On the day the fish arrived, we were all jumping in anticipation, waiting for our new class pets to arrive. "How big are they going to be?" "What do they look like?" "How long are we going to have them?" These were some of the many questions buzzing around our classroom.

At last, the day we had all been waiting for was here. August 30 was the

day Stan Johnson, the education coordinator for the Colorado Division of Wildlife, delivered our 12 tiny fish. We all huddled around the tank as Stan took the fish from a water-filled plastic bag and placed them into our tank, one by one. He stayed and talked with us about the nitrogen cycle and how to take good care of our razorbacks. And so began "the year of the fish."



*Fish and Wildlife Service Biologist Patty Schrader Gelatt (left) and her daughter, Amy, listen attentively as Colorado Division of Wildlife Education Coordinator Stan Johnson explains how to record measurements of the razorback sucker that Amy and her classmates will release to the river.*

Tom Czapla

## Learning about Razorbacks

Once the fish arrived, our class had more to do than we had thought. That same week we started research. We learned that razorbacks live on the bottom of the river where they eat zooplankton, bugs, and river bottom ooze off the rocks and mud. The hump on their back helps them stay on the bottom of the river when the current pushes against it. They usually live in water 3 feet deep, and they mate at the age of 3 or 4. They can live longer than 40 years. These are some cool fish!

To learn more about the fish and the environment they live in, our class went on some field trips. Our first was to a bird-banding station that was close to the Colorado River. We went to the river and took water samples so we could test the pH, ammonia, and nitrite levels. The water wasn't much different from our classroom tank.

Another trip was to the fish hatchery. Stan and a U.S. Fish and Wildlife Service employee gave us a tour. Not only did we see razorbacks, but we also saw

Colorado pikeminnow (*Ptychocheilus lucius*). That day we saw more than 60,000 fish! Wow!

## Care and Feeding

Each week, a new "tank team" took care of the fish. The tank team had various jobs to do and each was just as important as the others. Everyone really liked testing the pH and recording the data for the class on the overhead projector. When we tested ammonia and nitrites, we went through the same process as the pH test, except we had to wait 20 minutes before the color of the vial told the truth about the water quality.

Sometimes the ammonia, nitrites, or pH levels were too high or too low and we had to do special things about that. The tank team also had to replace evaporated water and change the tank filters. Even though we changed the filters weekly, they were often very grimy. When we showed the filters to the class, everyone said "Eeewww!"

**fish, "they are no longer students — they are young scientists."**

**With that said, these young scientists understand that what they are doing is serious business.**

**"There are very few of these fish left," Stan tells the students. "You have an important job to do. You need to take care of these fish so they'll grow large enough to survive in the river when we release them in the spring."**

**Cary believes the hands-on experience of raising endangered fish instills her students with a greater sense of how their decisions can affect the world they live in. "It's more than just learning to test water quality and to take care of a living being," she says. "My students learn that the decisions they make about their environment can have consequences. I think they have gained knowledge from their year with the razorbacks that will remain with them for the rest of their lives."**

**Editor's note: The Recovery Program appreciates CDOW's efforts to raise awareness of our efforts to recover the endangered fishes. The Recovery Program supports this program by providing fish from its hatchery near Grand Junction. Starting this fall, the Recovery Program will cost-share aquarium expenses. For more information, contact Stan Johnson at 970-255-6191, (stan.johnson@state.co.us).**



**Colorado students are participating in a unique education program that enables them to learn about endangered species. Fifth-graders from Scenic Elementary in Grand Junction, Colorado, take care of young razorback suckers in their classroom throughout the school year. Each spring, they release fish into the river.**

Cary Atwood



**Kellen Keisling shows off an endangered bonytail he helped raise.**

*Quent Bradwisch, Utah Division of Wildlife Resources*

## Science Class Leads to Career Path

**Kellen Keisling met his first razorback sucker (*Xyrauchen texanus*) during a science class at Page High School.**

**Students worked with biologists from the Utah Division of Wildlife Resources' (UDWR) Wahweap Fish Hatchery to raise the fish in public golf course ponds. They fed, weighed, and measured the razorback suckers and recorded research data. They also tagged the fish and released them into the Colorado River as part of an effort to restore populations that can reproduce in the wild. Now in its eighth year, this unique, award-winning science course is a partnership involving the school, the UDWR, the City of Page (Utah), and the Upper Colorado River Endangered Fish Recovery Program.**

**The experience led Kellen to pursue his dream of becoming a biologist. He recently completed his fourth summer working for the UDWR. His duties have included working at the Wahweap Fish Hatchery, where he helped raise sportfish to stock in Utah lakes.**

**Kellen, 20, is now a senior at Mesa State College in Grand Junction, Colorado, where his major is biology.**

When the tank team fed the fish, they also measured the water temperature and counted the fish. We raised 12 fish all year. Sadly, the week before we released them, one of the smallest died.

## Releasing the Fish

As the day came for us to say farewell to the fish, we were filled with anxiety and sadness. On May 5, our class walked down to the Colorado River State Park at Connected Lakes, located very near our school.

Stan gathered us around, made an opening speech, and asked us what we learned throughout the year. "These fish are fragile" and "We learned to be more responsible" were two of the many responses of our classmates.

Soon Stan organized us into teams and showed us the jobs we needed to do to release our razorbacks. The first job was scanning the PIT (passive integrated transponder) tag that would make it possible to track the fish. Once the scanner came up with the number, the recorder logged the nine-digit number. The scanner then handed the tiny tag to the disinfectant, who inserted it into a needle and cleaned it.

Once Stan got a good grip on a fish, he would take the needle and inject the PIT tag into the fish's belly. When this was done, he would hand the fish to a person wearing white gloves who, while handling the fish carefully, would measure it for the recorder.

Each tagged fish was placed into a clear bucket of river water, carried down to the riverbank, and released. Many "good-byes," and "have a great life," and "live long and prosper" were said that day to our departing fish.

On the bus ride home, there was talk of who had measured the biggest fish and what it looked like. Raising these razorbacks was something that really changed our fifth-grade year and made it a great memory.

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*Emily Bergum, Marissa Curtis, Amy Gelatt, and Lauren Slagel were students in Mrs. Atwood's Fifth-Grade Class at Scenic Elementary in Grand Junction, Colorado.*

*Editor's note: Amy is the daughter of Service biologist Patty Schrader Gelatt. Patty has been involved with recovery of the endangered fishes for 20 years.*



**Fifth-grade classmates released 11 young razorback suckers into the Colorado River. The students raised the endangered fish in their classroom throughout the school year.**

*Tom Czapla*



# The Sonoran Desert Conservation Plan for Kids

by Maeveen Behan



For several decades, Pima County in southern Arizona has experienced rapid population growth. At the same time, the Sonoran Desert is identified by the Nature Conservancy as one of the world's most important ecological regions. Due to the correlation between growth and the consumption of natural resources, the Pima County Board of Supervisors decided in 1998 to launch a Sonoran Desert Conservation Plan.

The area to be covered in the plan, nearly 6 million acres (2.4 million hectares), includes the Tucson metropolitan area, two major eco-regions (the "Sky Islands" and the Sonoran Desert), the second largest Native American nation, and 850,000 residents from diverse ethnic and cultural backgrounds. Because of the numerous endangered, threatened, and vulnerable plant and animal species in this area, the effort is being designed to incorporate a multi-species habitat conservation plan and incidental take permit under section 10 of the Endangered Species Act.

More than 400 experts in various disciplines, 80 members of a steering committee, and 14 government agencies collaborated to gather scientific data that led to the adoption of the Sonoran Desert Conservation Plan as part of Pima County's land use plan in 2001. In 2004, we completed the draft Pima County Multi-Species Conservation Plan.

But that's only half of the story. Since 2001, more than 10,000 kids have

participated in a companion project, the Sonoran Desert Conservation Plan for Kids. The Kids Plan is the result of a broad cooperative effort on the part of schools, non-profit organizations, volunteers, and, primarily, the kids themselves.

Kids have been in the lead as the organizers of the annual Teen Summit, a student-led fair involving area high schools that encourages and facilitates community services, continuing education, and career opportunities in natural resource conservation.

There is a Sonoran Desert Kids Club for the younger participants, who create art and work with coloring books, fact sheets, and games based on information from the Sonoran Desert Conservation Plan, translated for this audience.

The Kids Plan includes workshops and field trips, which are organized and conducted by the head of the Sonoran Desert Conservation Plan for Kids, Wendy Burroughs. Ms. Burroughs launched and developed the Kids Plan, and it owes its success to her energy and ideas, combined with the efforts of her many collaborators.

Kids are in charge of the graphic designs and images of the Sonoran Desert Conservation Plan for Kids. The web-based art gallery includes habitat maps and species illustrations by the participants. The lead artist is Austin Fetter, a high school student who has worked as part of Pima County's Summer Youth Program for a number of years. He has created over 100 images and cartoons that capture the spirit and fun of the Sonoran Desert Conservation Plan for Kids, including the ones accompanying this article. To see his images and a lot more, visit the Sonoran

Desert Kids web page at <http://www.co.pima.az.us/cmo/sdcp/kids.html>.

In terms of public process, the Kids Plan has been a wonderful model. During a recent Teen Summit, when bus loads of students who did not speak English showed up at the last minute, the kids figured out how to overcome communication problems: everyone was paired with a bilingual teen from Tucson. No NEPA guidelines are needed to instruct these innovators how to be inclusive and open. Enthusiasm and their love of the subject carry the project.

From lessons learned through the Kids' Plan, the Sonoran Desert Conservation Plan process has learned more about how the community can become knowledgeable and empowered in natural and cultural resource protection issues. We recommend inviting kids into the planning process as participants and advisors as early as possible.

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*Maeveen Behan, Assistant to the Pima County Administrator, is the Project Director for the Sonoran Desert Conservation Plan. She can be reached at [mbehan@exchange.co.pima.az.us](mailto:mbehan@exchange.co.pima.az.us) or by calling 520/740-8015.*



# The Sewee Earth Stewards

by Karen Beshears



**During the initial trip to I'on Swamp, students define their "Kingdom" and record everything they see in it to refine their observation skills.**

*SEWEE Association*



**After finding many species in I'on Swamp, this student from Boulder Bluff Elementary uses a microscope to identify one of the creatures.**

*SEWEE Association*

We've all seen children enthralled when someone brings out an educational animal or when they have the chance to explore on our public lands. They get that wide-eyed look of discovery and you sense that this experience will stay with them for a long time. The Sewee Earth Stewards program is reaching out to students along the coast of South Carolina to give them "discovery moments" and, we hope, an understanding and respect for the mission of the national wildlife refuges (NWRs) found in their own backyards.

Cape Romain NWR joined the U.S. Fish and Wildlife Service's Earth Stewards program in 1998, and over the past six years the refuge has made Sewee Earth Stewards a vibrant, growing environmental education project in conjunction with the Sewee Visitor & Environmental Education Center in Awendaw (a joint venture of Cape Romain and Francis Marion National Forest) and the SEWEE (South Eastern Wildlife and Environment Education) Association, the cooperating association for Cape Romain, Waccamaw, and ACE Basin NWR's. The Ashepoo, Combahee, and Edisto rivers, which give the ACE Basin its name, combine to create one of the largest undeveloped estuaries on the Atlantic Coast.

Our initial project focus was on fifth-grade students in a local rural school. After looking at the state educational standards for that age, we decided to focus on the freshwater wetland habitats abundant in the coastal plain. These areas are important for many migratory birds and our endangered red wolves

(*Canis rufus*). The SEWEE Association hired a teacher to put together the curriculum for this program and guide us through the initial classes with our students. Two years later, after many days of fun and pitfalls, we were able to create a solid set of cross-curriculum lesson plans and figure out how to take up to 50 students into a swamp for hands-on learning activities. Since 2000, the program has grown from the initial school with about 50 students to 8 elementary schools with about 650 students and one middle school with 60 students for this school year.

So, what do our Sewee Earth Stewards do? Throughout the eight-week curriculum, they read books on animals and their habitats; write stories and poems; learn mathematical concepts through measuring mounted alligators and calculating water absorption rates in wetlands experiments; discover animal adaptations and behaviors; and identify interdependent wetland flora and fauna. Since Cape Romain is comprised of salt marsh and barrier islands and must be

reached by boat, we have partnered with the Francis Marion National Forest (where the Sewee Center is located) and use a swamp trail on the mainland as our study site. Students have an initial visit to I'on Swamp and use multiple activities to heighten their observation skills. This visit also gives them the context for the activities over the following weeks on the animals and plants they found there. At mid-term, the students and teachers spend a day at the Sewee Center, where they study several of the habitats found in the coastal plain. They learn about the Red Wolf Recovery Project and the role that Cape Romain plays in that by visiting our Red Wolf enclosure. They experience the raptors of our area by participating in a program by the South Carolina Center for Birds of Prey. At the end of their studies, they revisit I'on Swamp for their "research" trip, where they find and identify macroinvertebrate aquatic species. By the end of the term, our students know more about alligators, turtles, snakes, red wolves, migratory birds, birds of prey, invertebrate species, and freshwater wetland habitats.

Two years ago, we were able to expand this program to seventh-graders

and create a new curriculum focusing on salt marsh and barrier island habitats. These students are able to use the concessionaire's ferry to study on Bulls Island within Cape Romain and experience one of the few undeveloped islands along our coast. In 2003, Waccamaw NWR asked the SEWEE Association to expand the elementary program into its region, and we are now hosting the first students to this relatively new refuge with few modifications.

Since 1999, nearly 1,700 students have become Sewee Earth Stewards, and more than 700 others will be in the program this year. That's a lot of students, teachers, and parents who have had an incredible learning experience with Cape Romain and Waccamaw NWR's and have a better understanding of the role of the refuge system as it relates to South Carolina.

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*Karen Besbears is the Executive Director of the SEWEE Association, the cooperating association for the National Wildlife Refuges of Coastal South Carolina. She can be reached at [sewee.association@earthlink.net](mailto:sewee.association@earthlink.net).*

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***Students from Belle Hall simulated tracking red wolves by using a tracking receiver to look for a radio collar placed in the brush at the Sewee Center. Students then walked back to the wolf enclosure to see the red wolves that live at the Center.***

SEWEE Association



# This Bird is No Chicken

by Mary Hake



**The piping plover's main defense is camouflage. While this strategy for evading predators worked well for millennia, it didn't work well with the increasing numbers of humans. Most beachgoers would be hard pressed to pick out an adult plover on the beach, much less their sandy-colored eggs that blend perfectly with the open sand, or the chicks, which are flightless for a month. As a result, eggs and chicks were being accidentally stepped on or run over. Moreover, the wrack line, a mixture of plant detritus and invertebrates the plovers feed on, historically washed up freely along the shoreline. Now it was increasingly being removed to "tidy" up the beach. The wild nature of the beach was disappearing and so were piping plovers.**

**“P**iping Plover: Tastes Like Chicken” reads a bumper sticker affixed to a four-wheel drive vehicle in my home town of Eastham, Massachusetts. Here on Cape Cod, the piping plover (*Charadrius melodus*) is loved by most, but to some people this small shorebird symbolizes an unwelcome change in beach management.

It's not the first time piping plovers have been in hot water. They were nearly driven to extinction in the 19<sup>th</sup> century due to excessive hunting, mainly for the millinery trade. The Migratory Bird Treaty Act of 1918 afforded their populations an opportunity to recover, but after World War II the decline resumed. With increased development and recreational use in coastal habitats, people began building, driving, and playing on the wild beaches that piping plovers once pretty much had to themselves. Not only did the piping plover have to contend with natural predators, high tides, and storms, it now also had to deal with shrinking habitat and increasing numbers of people competing for the beaches that plovers needed to survive. The plover had its hands (make that wings) full.

By 1986, the piping plover population along the Atlantic coast had fallen to fewer than 800 pairs, making it necessary to list the population as threatened. Many areas along the coast began intensively managing the piping plover. Sections of upper beach were fenced to protect nests, and regulations limiting some recreational activities were posted and enforced. State and federal agencies

began regulating or even closing vehicular use of nesting beaches. These new restrictions created tension with some user groups, and the plover bashing began.

That's where I stepped in. In the course of my 20 years with the National Park Service, most of it spent working with piping plovers, I came to realize that protecting nesting birds and their young was not enough. Gaining public support is important to their recovery. Since the plovers couldn't speak out, I had to do so on their behalf. This could mean taking the time to show a visitor how vulnerable a plover chick is to an unleashed dog, or just how well concealed a plover nest really is. One by one, you could see visitor attitudes change. They now realize the battles the plover face are real.

In the early 1990's, Barbara Beers from the U.S. Fish and Wildlife Service developed a wonderful piping plover lesson plan. It included slides and a script outlining the habitat, life history, and threats to piping plovers, along with classroom activities. The lesson plan inspired me to take it on the road. Each year since 2000, I've been starting my season at Cape Cod National Seashore

by visiting local schools, preaching the gospel of plovers. I created my own slide presentation, incorporating some of the slides and ideas from the Fish and Wildlife Service plan, and off I went.

I speak mainly to 5<sup>th</sup> graders. It's a perfect age; they are open minded and enthusiastic. My favorite part comes after viewing the slide presentations. We move all the desks to the sides of the classroom and the room becomes a beach, with the students as piping plovers. The students enact three scenarios; the first, a wild undisturbed beach, the second, a beach with human disturbance, and third, a beach with a predator trying to eat plover chicks. In each scenario, the plovers are trying to run down their designated lane to the intertidal zone where they can feed on marine invertebrates (represented by dry beans). If there is a threat in their designated lane, the plovers (students) must run back to a safe zone.

As you can imagine, it's easy for the first group of plovers, but increasingly difficult for the latter two groups. Many are out of breath, sprawled out on the floor. They love the game. The hands-on activity allows the kids to feel what it might be like to be a plover, leading to a better understanding of the issues. Not only is it their minds, the plight of the piping plover is now in their hearts. In past years, I handed out "I'm a Plover Protector" buttons to the kids. They all wore them like a medal of honor. I get hand drawn pictures and letters from kids thanking me for what I do and reassuring me that they will now help protect the plover on their beaches. One girl wrote "I learned a lot from the plovers-they have a hard life to live."

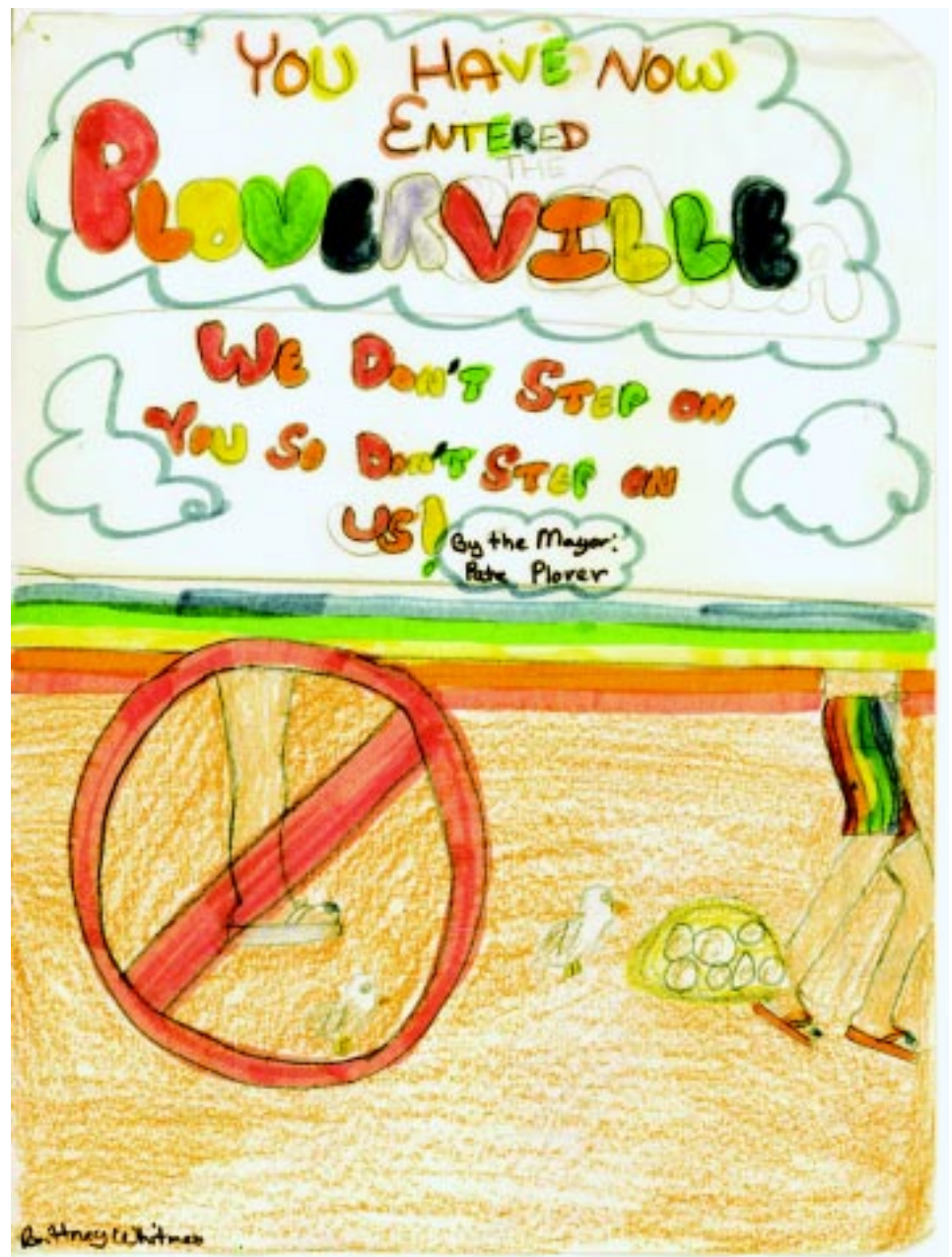
I know not everyone will love plovers. I am reminded of this every time I see that bumper sticker. But I hope the more than 3,500 students and teachers that I have spoken to over the past few years have a better understanding of the challenges faced by piping plovers and a greater willingness to share the beach

with these amazing birds. While endangered species management must be based in science, education is also a critical component of effective recovery. Through this program we are sowing the seeds of concern for the piping plover, which we hope will bear fruit as support for plover management in the next generation.

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*Mary Hake, a biological technician with Cape Cod National Seashore, can be contacted at [mary@hake\\_nps.gov](mailto:mary@hake_nps.gov) or 508/255-2112, ext. 14.*

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*Brittney Whitman*

# In Our Dreams...

by Ann Carlson



**Pygmy rabbit**

courtesy Washington Department of Fish and Wildlife

*I*f one were to dream up a list of the attributes of an outstanding environmental education partner, it might include:

- an ability to reach a large audience;
- experts in species life history, habitat, and conservation;
- a professional public relations staff;
- hands-on programs for children;
- a wide range of established partnerships;
- a proven history of fund raising;
- leadership in establishing conservation education consortiums;
- facilities and programs dedicated to conservation of species; and
- a mission of inspiring the community to create a better future for wildlife.

In the Pacific Northwest, the U.S. Fish and Wildlife Service has such a partner: the Oregon Zoo! Yes, our zoo has lions and tigers and bears on display. It also has a snake house, a polar bear swim-

ming pool, and many of the other wonderful things we love to look at from the safety of a glass window or a viewing platform. But the Oregon Zoo has much more than that.

Our zoo has a mission for wildlife that includes captive propagation for endangered and threatened species. It is helping us save a grand bird, a tiny rabbit, and two butterfly species and their host plants, all of which were once abundant in the Pacific Northwest.

The endangered California condor (*Gymnogyps californianus*), seen soaring above Oregon's Columbia River by Lewis and Clark in 1805, is now part of a captive-rearing program at one of the Oregon Zoo's off-site breeding facilities. It opened in November 2003 and houses 6 breeding pairs, or 12 of the 219 California condors that exist today. Within four months of taking up residence in Oregon, Tama and Mandan, an established breeding pair, produced an egg. When this egg was removed for artificial incubation, Tama laid a second egg. Both eggs hatched; the proud parents are raising hatchling number one, while number two is being reared at the Los Angeles Zoo. This early success of the Oregon Zoo's Condor Creek Conservation Facility has brought tremendous support for completing the flight aviary where young condors can learn survival skills. Even though the remote facility is designed to minimize the exposure of condors to people, a practice that facilitates release to the wild, the Oregon Zoo ensures that people hear the news, see the pictures, and thereby participate in condor conservation activities.



**Adult California condor in flight**

Noel Snyder



The Columbia Basin distinct population segment of Washington's pygmy rabbit (*Brachylagus idahoensis*) was emergency listed in 2001 as endangered. Only 30 individuals were known to remain in the wild. These rabbits are the smallest in North America, weighing less than half a kilogram or about one pound. Unlike cottontails and jackrabbits, pygmy rabbits dig burrows, the only American rabbit that does so. The Oregon Zoo developed husbandry techniques to breed pygmy rabbits in captivity. One of the species' few known needs is big sagebrush (*Artemisia tridentata*), a shrub used for both food and cover. With large swaths of sagebrush country being developed or converted to agriculture, the pygmy rabbit is losing ground throughout its Great Basin historic range. The Oregon Zoo is growing its own sagebrush for rabbit feed – five seedlings a day per rabbit. Two litters of pygmy rabbits were born at the breeding facility in May of this year. A video feed of the rabbits' secluded, hand-built habitat can be quite dull until suddenly a brown blur hops up into the air – *boing!* The first releases to protected habitat in central Washington should occur next year.

In addition to building habitats for big birds and little rabbits, the Oregon Zoo created a scientifically-planned butterfly conservation lab where they hatch eggs into larvae, and then grow the larvae into pupae to be released into the wild. The Oregon silverspot butterfly (*Speyeria zerene hippolyta*), a threatened species, was the first to be raised at the lab. Once found in coastal grasslands from northern California to southern Washington, this species is now reduced in range to a few spots on the Oregon coast. Last year, the Oregon Zoo released 293 butterfly pupae at the Cascade Head Preserve, a site managed by The Nature Conservancy and the one remaining stronghold for the species. The zoo brings in fifth graders from a local school to plant western blue violets (*Viola adunca*), the

silverspot's rare host plant. The kids then get to view the rearing process, from eggs in petri dishes to larvae that look like tiny caterpillars under a microscope. The Oregon Zoo is also contributing to the conservation of the endangered Fender's blue butterfly (*Icaricia icarioides fenderi*) by raising its host plant, the Kincaid's lupine (*Lupinus sulphureus* spp. *kincaidii*), itself a threatened species.

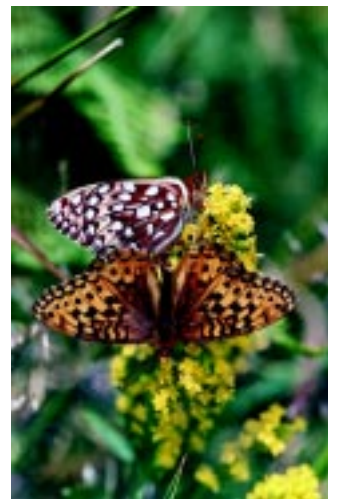
"This conservation effort is serving as a model for rebuilding an ecosystem," says Tony Vecchio, Oregon Zoo Director. "We want to involve children in the protection of endangered butterflies so they care about the future of all plants and animals."

The captive breeding programs developed by the Oregon Zoo have led to plenty of environmental education opportunities, from videos of animal releases to science projects for school classrooms. In March of this year, the Oregon Zoo hosted the first Northwest Zoo Conservation Education Consortium. Eight zoos and aquariums sent representatives to compare conservation and education programs and develop partnerships.

"Everyone knows the animals in the tropical rainforest are in trouble," says Vecchio. "Unfortunately, most people don't realize there are many endangered species right here in the Pacific Northwest. Our goal is to gather zoo and aquarium educators and scientists to develop strategies for informing our combined nearly five million annual visitors about the plight of animals in our own backyards."

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**Oregon silverspot larvae and adult butterflies.**

*photos by Rich Szlemp*

by Daniel R. Evans

# Raising Awareness of Sea Turtle Habitat



**The educational material developed by STSL includes “Do Not Disturb” door-hang tags, three-sided “table top tents,” and double-sided placemat coloring sheets. Each cooperating group has received 3,000 to 5,000 of each item for local distribution. In addition to a colorful photo, the door-hang tags have county-specific information about sea turtles and the coastal ecosystem, suggestions on how to reduce the impact of visitor activities, and contact information for the local group(s) taking part in the Campaign. The table top tents contain similar information. The coloring sheets provide additional sea turtle information and graphics, such as a sea turtle size chart, puzzles, and games.**

Florida’s natural coastal environments are being put under increasing pressure as the population in coastal communities grows and development encroaches on wildlife habitats. Florida’s Atlantic and Gulf coasts provide vital nesting habitat for the threatened loggerhead sea turtle (*Caretta caretta*), while Florida’s Atlantic coast provides vital nesting habitat for endangered green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. Coastal areas also contain some of the most fragile ecosystems in Florida.

Certain forms of development on nesting beaches discourage female sea turtles from nesting and increase turtle hatchling mortality. To minimize these impacts, it is essential that citizens and tourists become more informed about how their activities affect sea turtles and how people can support sea turtle conservation.

In 2002, the Sea Turtle Survival League (STSL), a program of the non-profit Caribbean Conservation Corporation, initiated the Sea Turtle Nesting Habitat Awareness Campaign to promote a greater understanding of the impacts that coastal residents, businesses, and visitors can have on sea turtle nesting habitat. The campaign was an expansion of STSL’s 1999 Coastal Awareness Pilot Campaign and its ongoing Sea Turtle Migration-Tracking and Coastal Habitat Education Program, which began operation in 1996.

The Campaign has focused on Florida’s counties with sea turtle nesting

beaches that have a local sea turtle conservation group available, and willing, to participate. It is divided into three parts: 1) providing local sea turtle groups with printed educational materials for distribution to coastal businesses; 2) acknowledging businesses that are “sea turtle friendly” through an awards program; and 3) providing online educational resources for the public.

The STSL provided local sea turtle conservation groups with educational material for distribution to beachfront hotels, restaurants, condominiums, retail stores, and realtors. It also coordinated the recognition of those businesses working to benefit sea turtle nesting habitat through the “sea turtle friendly” awards. To date, the Campaign has been conducted in Brevard, Collier, Indian River, Lee, Manatee, Martin, Palm Beach, Pinellas, Sarasota, St. Johns, Volusia, and Walton counties.

The “sea turtle friendly” awards program provides a great opportunity to

recognize coastal businesses for going the extra mile to protect Florida's sea turtles and their nesting beaches. The public is encouraged to support these businesses, thereby giving others an incentive to join the effort.

Since the Campaign began, nearly 800 coastal businesses have been approached to receive the educational materials with nearly 89 percent of these businesses accepting one of the materials. "Sea turtle friendly" awards have been given to nearly 60 coastal businesses in 11 of the 12 counties.

The online component of the Campaign expanded the STSL section of the Caribbean Conservation Corporation (CCC) website at [www.cccturtle.org](http://www.cccturtle.org) to include additional coastal habitat information, and coverage of issues related to the State's coastal management policies. During 2003, the CCC website

welcomed more than 220,000 new visitors, for an average of more than 610 new visitors per day. (*Note: these are new, distinct visitors, not "hits."*)

The CCC was founded in 1959. Based in Gainesville, Florida, it is the oldest organization in the world dedicated solely to the research and conservation of marine turtles and their habitats. In 1993, the CCC established the Sea Turtle Survival League program to address issues affecting sea turtles and their vital nesting beaches in Florida.

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*Daniel R. Evans is the Education Coordinator for the Caribbean Conservation Corporation, 4424 NW 13<sup>th</sup> St, Suite A-1, Gainesville, FL 32609, (352) 373-6441, (352) 375-2449, [drevans@cccturtle.org](mailto:drevans@cccturtle.org).*

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## **Marine Turtle Conservation Act of 2004**

**The Marine Turtle Conservation Act of 2004 was signed into law on July 2. This bill was created to assist in the conservation of marine turtles and the nesting habitats of marine turtles in foreign countries. The bill would accomplish this by creating a Multinational Species Conservation Fund to support conservation of imperiled marine turtle species, such as loggerhead, green, hawksbill, Kemp's ridley, olive ridley, and leatherback. As of September 2004, no funds have been appropriated for the implementation of this Act.**



**Daniel Evans, STSL Education Coordinator, presents a "Sea Turtle Friendly" award to Tiara by the Sea beachfront motel owner Joyce Gerlak.**

*Janet Hochella*



# Sea Turtle Trails

by Marisa Adler



**Loggerhead sea turtle**

Patrick D. Hagan

**Like other sea turtle species, loggerheads face a number of threats. Lights along nesting beaches can cause turtle hatchlings to become disoriented, attracting them to roads or buildings instead of the ocean. Tire ruts on the beach also capture hatchlings or direct them away from the water. Litter on the beach can entangle turtles and attract turtle egg predators, and plastic bags or other trash in the water often appear to sea turtles as food, resulting in great harm to their digestive tracts. The public can assist turtle conservation by:**

- **respecting closed beach areas,**
- **turning off lights on beachfront houses,**
- **avoiding nighttime activities on the beach,**
- **picking up trash, and**
- **refraining from driving on the beach during nesting seasons.**

The barrier islands of North Carolina's Outer Banks provide important nesting habitat for the loggerhead sea turtle (*Caretta caretta*). Each year, Pea Island National Wildlife Refuge (NWR) offers sanctuary to many of these threatened turtles. The staff and volunteers of Pea Island take great interest in the reproductive success of loggerheads.

Since sea turtles spend all their lives in the water, except when nesting, the refuge's involvement in their life cycle is limited but important: providing undisturbed nesting beaches and protecting nesting turtles, eggs in the nests, and hatchlings as they find their way to the ocean. The refuge also monitors the beach for live stranded turtles, or those that are stunned and immobilized by a quick drop in water temperature, and collects information from dead strandings. When a live stranded turtle is found, it is often brought to a rehabilitation center for recovery and eventual release. The North Carolina Aquarium at Roanoke Island runs one such rehabilitation center, working with the refuge to handle turtles found on local beaches.

Researchers at the North Carolina Aquarium have designed a tracking system to both monitor the success rates of their recovery and release efforts and to help determine what causes the turtles to become stunned by the cold. Funded by a grant from the Institute of Museum and Library Services, and operated in conjunction with the Network for Endangered Sea Turtles (NEST), the program, called "Turtle Trails," aims to monitor released loggerhead sea turtles through the use of satellite transmitters.

The transmitters record water temperature and location, then relay the information back to receivers when the turtle surfaces for air. Since the start of this project in 2003, four loggerheads have been tagged, fitted with transmitters, and released. Ten more are expected to be released soon.

Staff and volunteers at Pea Island NWR are eager to follow information from Turtle Trails and learn of rescue and release success rates as they continue their own conservation and public outreach activities. Refuge efforts include Turtle Patrols to locate and monitor nests, Turtle Watches to help hatchlings reach the water safely, and Turtle Talks to educate the public about sea turtles.

More information on Turtle Trails and the North Carolina Aquarium can be found at [www.ncaquariums.com/turtletrails](http://www.ncaquariums.com/turtletrails) or by calling Joanne Harcke, Conservation and Research Coordinator, at 252-473-3494. Information on Pea Island NWR recovery efforts and outreach can be found at <http://peaisland.fws.gov/> or by calling Ann Marie Salewski, wildlife interpretive specialist, at 252-987-1118.

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*Marisa Adler is an intern at Pea Island NWR in North Carolina.*

# “Habitat Trunks” Delight Teachers

by Ken Torkelson

What does it take to put a smile on the face of a fourth-grade teacher? Well, there are more than 350 smiling fourth-grade teachers in classrooms around North Dakota, thanks to a project spearheaded by the Education Committee of the U.S. Fish and Wildlife Service's North Dakota Outreach Team.

Committee members and other Service staff distributed free “wildlife habitat trunks” to every North Dakota school with a fourth-grade classroom, completing the first phase of a plan to help the state's young people explore the habitats and wildlife that surround them. The trunks are stuffed with mammal skulls and skins, hide samples of big game animals, track and plant replicas, a wing, a turtle shell, wildlife and habitat photos, plant identification cards, several posters featuring species found in the state, wildlife activities, craft projects, maps, and, most importantly, the North Dakota Wildlife Habitat Educator's Guide.

“The trunk items are used to reinforce concepts taught from the educator's guide,” explains committee member Jackie Jacobson, Outdoor Recreation Planner at Audubon National Wildlife Refuge. “They provide students with hands-on materials, which is always a benefit in the learning process.”

But the trunks didn't just magically appear; they are the result of a three-year effort begun during a brainstorming session by Jacobson and committee members Karen Kreil, a biologist with the Service's Ecological Services program; Kristine Askerooth, a biologist at Tewaukon National Wildlife Refuge; and Lynda Knutsen, an Outdoor Recreation Planner stationed at the Valley City

Wetland Management District Office. The committee wanted to provide teachers and students with information on the values of habitat for wildlife and people.

A series of meetings with teachers told committee members they were on the right track, and that it wouldn't be cheap. “The bottom line was \$153,000, so we started writing grants and looking for partners,” recalls Kreil. “We were fortunate to enlist support from the North Dakota Natural Resources Trust, three state agencies – Game and Fish Department, Department of Public Instruction, and the Health Department. Other partners were the Rocky Mountain Elk Foundation, NoDak Sportsmen's Club, the state chapter of The Wildlife Society, and Prairie Pothole Partners. Without them, this project wouldn't have happened.”

These efforts were worthwhile, judging from teacher reactions during trunk distribution and training sessions at 35 locations. “The teachers were thrilled and were really looking forward to having their students explore the items in the trunks,” says Knutsen.

The project is not yet complete. Once the students critique the trunks, committee members will compile and assess their comments, along with those from the teachers, to help determine possible updates.

Then, maybe the committee members will have a chance to sit back and do a little smiling of their own.

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*Ken Torkelson, a writer/editor with the Service's North Dakota Wetland Habitat Office in Bismarck, can be contacted at 701/355-8528*



**Teachers at Naughton School leave the U.S. Fish and Wildlife offices with smiles and Wildlife Trunks. The Service is distributing 375 of the Wildlife Trunks to all the state's fourth grade teachers.**

*Bismarck Tribune*

by Stephanie Eskins

# Welcome to Wildlife University



*H*ow do salmon find their way back to the streams where they were born? Why are endangered species called “nature’s fire alarms”? Does the Houston toad actually live in Houston? How is the Karner blue butterfly connected to the wild lupine? Now you don’t need a degree in wildlife biology to find out. The answers to these and many more questions about wildlife and wild places can be found at Wildlife University, an online learning program developed by the National Wildlife Federation. Wildlife University offers interactive courses, downloadable study guides, presentations from wildlife experts, and information exchange “study lounges.” Best of all, this university is tuition free.

Currently, there are two series of courses: “Creating Places for Wildlife” and “Endangered Species.” The Creating Places courses teach the basic guidelines for making landscapes more hospitable to wildlife, whether these places are in backyards, schoolyards, or throughout communities. The Endangered Species series, developed with support from the Surdna Foundation, contains courses that provide in-depth looks at the issues facing endangered and threatened species including the gray wolf, Kemp’s ridley sea turtle, whooping crane, Florida panther, chinook salmon, and Houston toad. Other courses now available or under development investigate the causes of species loss and decline, the reasons for protecting imperiled species, and the Endangered Species Act.

One of the newest additions to the Endangered Species series is “The Karner

Blue Butterfly and Other Imperiled Pollinators.” This 30-minute course explores the role of pollinators in the natural world and describes the plight of one endangered pollinator, the Karner blue. Course participants learn about this species’ natural history, threats to its survival, and efforts to save it from extinction. Participants also learn how they can contribute to the species’ recovery.

All of the courses at Wildlife University are designed for people who have a basic understanding of conservation and at least a 10th grade reading level. Check it out at [www.nwf.org/wildlifeuniversity](http://www.nwf.org/wildlifeuniversity).

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*For more information, contact  
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703-438-6343.*



# Butterfly Conservation and Management Course

by Shelly Grow

**T**wenty-two butterfly species are federally listed as endangered or threatened in the United States. There are also candidates for federal listing and others that have been identified as species of state concern in their native ranges. Most of the habitat upon which these species depend is severely fragmented and/or degraded, and the need for active conservation efforts is great. "Techniques for Butterfly Conservation and Management" is a three-day workshop designed to increase the number of skilled professionals and volunteers available to support butterfly recovery. The American Zoo and Aquarium Association (AZA) approved course is appropriate for government wildlife biologists; zoo, aquarium, and nature center personnel; environmental educators; volunteers; and others interested in butterfly conservation.

In order to address the needs of people both new and experienced in butterfly conservation, course topics include: Butterfly Diversity and Evolution; Ecology and Behavior; Captive Propagation Basics; Host Plant Care; Genetic Management; Case Studies in Butterfly Conservation; Field and Lab Techniques; Introduction to Recovery Planning; Permitting 101; Habitat Restoration; Exhibitory; Establishing Population Monitoring Networks; Butterfly Conservation Networks; and Integrating Butterflies into Educational and Conservation Programs.

The course will be offered April 28-30, 2005, at the McGuire Center for Lepidoptera and Biodiversity in Gainesville, Florida. Information on the course can be found at <http://www.aza.org/prodev/>.

Members and partners of the Butterfly Conservation Initiative (BFCI) developed this course in response to concerns that many people with a strong interest in butterfly conservation need specialized training in order to be truly effective partners in recovery efforts. The BFCI is a coalition of 49 AZA-accredited zoos and aquariums and six partners: the AZA, U.S. Fish and Wildlife Service, Environmental Defense, McGuire Center for Lepidoptera and Biodiversity, National Wildlife Federation (NWF), and Xerces Society. The BFCI is dedicated to the conservation of threatened, endangered, and vulnerable North American butterflies and their habitats, with a focus on recovery, research, and public education.

BFCI partners and members have developed other educational material as well. The AZA and NWF developed a Butterfly Activity Guide, which can be downloaded from the BFCI web site (<http://www.aza.org/ConScience/bfci>). This guide includes activities appropriate for children in grades K-8. The Xerces Society and BFCI produced summaries of the life histories and recovery needs of all endangered and threatened butterflies in the U.S. These species profiles can be accessed at [http://www.aza.org/ConScience/BFCI\\_SpeciesProfiles/](http://www.aza.org/ConScience/BFCI_SpeciesProfiles/).

If you have questions about the BFCI, Techniques for Butterfly Conservation and Management course, Butterfly Activity Guide, or species profiles, please contact Shelly Grow, BFCI Program Coordinator, at [sgrow@aza.org](mailto:sgrow@aza.org) or 301-562-0777 x263.



**Lange's metalmark butterfly**

*Dr. Edward S. Ross*

by Theresa Jacobson

# Celebrating Groundwater and Cave Critters



**Fourth graders learn about Hungry Cave Critters.**

USFWS



**Students search for "food cards" during a role playing activity.**

USFWS



**The Alabama cave shrimp is a small, colorless crustacean.**

USFWS

What do endangered cave critters, drinking water, and fourth graders have in common? They are all linked by a two-day festival held each spring in Madison County, Alabama. For the past six years, the U.S. Fish and Wildlife Service has teamed up with the Huntsville Grotto and U.S. Army's Redstone Arsenal to present "Hungry Cave Critters," an activity involving endangered cave species, to excited fourth graders attending the festival. Students play the roles of various cave critters, including cave crayfish, cave shrimp, and cave salamander. Crawling on the carpet floor of a darkened room, the students search for food cards. Competition for food is fierce; their critter won't survive if the students can't find enough food.

Bats play a key role in a cave's food chain due to their droppings, called guano. Bat guano is an important food source in caves and is eaten by microscopic invertebrates, cave insects, cave crayfish, and cave fish. During the second round of the Hungry Critters activity, our imaginary cave has been vandalized, causing the endangered bats to abandon the cave and thereby upsetting the amount of available food. Many more cave critters die in the game because of the missing guano in the food chain.

After two quick rounds of food gathering, the students learn about the variety of animal species that live underground and glean insight into their fragile cave habitat. Water festival educators emphasize the four endangered cave animals that live in northern Alabama: the gray bat (*Myotis grisecens*), Indiana bat (*Myotis sodalis*), Alabama cave shrimp (*Palaemonias alabamiae*),

and Alabama cave fish (*Speoplatyrhynchus poulsoni*).

Students also learn that groundwater is an important source of drinking water for people in Alabama as well as other areas of our country. Clean groundwater supports a diversity of aquatic cave animals. Cave fish and cave shrimp living in groundwater streams and pools are indicators of water quality. If aquatic cave species suddenly disappear from their environment, that's a warning of possible groundwater contamination.

Before the students leave, they watch a video clip taken from inside a cave on the Redstone Arsenal. Tiny, translucent Alabama cave shrimp swim in a pool along with ghostly-white cave crayfish and pink-tinged cave fish in their underground world. In about 25 minutes, the fourth graders have learned about endangered cave critters and how their drinking water and the groundwater below their feet are all interconnected in the fragile karstlands of north Alabama.

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*Theresa Jacobson, a wildlife biologist and outreach specialist in the Service's Jackson, Mississippi, Field Office, can be reached at [terri\\_jacobson@fws.gov](mailto:terri_jacobson@fws.gov) or (601) 321-1129.*

*For more information about the Madison County Drinking Water Festival, visit the web site at <http://www.bsutil.org/drinkingwaterfestival/index.htm>.*

*The activity "Hungry Cave Critters" is published in Project Underground, a natural resource education guide. (<http://www.dcr.state.va.us/underground.htm>).*

# The Nature of Learning

“*T*he Nature of Learning” is an education partnership involving the National Wildlife Refuge System, the National Conservation Training Center, the National Fish and Wildlife Foundation, the National Wildlife Refuge Association, and the Keystone Center. It supports community-based environmental education programs, using national wildlife refuges as outdoor classrooms, and seeks to promote a greater understanding of conservation issues while enhancing student academic achievement.

Central to each Nature of Learning site is a partnership among a neighborhood school, natural resource professionals, and community members. These members use Nature of Learning methodology to create site-specific goals and an action plan. Using the standards-based curriculum from collaborating schools, teams of teachers and resource specialists blend the resources from the classroom with existing activities and programs used on public lands. The framework guides educators in a standards-based instructional process that encourages an interdisciplinary approach.

Community projects are planned and implemented as a culminating activity of



this initiative. After building an understanding of conservation issues, students are encouraged to identify tasks that put their awareness into action and enhance their community.

The Nature of Learning framework assists teams with local site workshops to meet professional development needs. Partnerships with organizations that have similar missions are highly recommended. In addition, the National Conservation Training Center and The Keystone Center offer many courses that can be directly applied to the Nature of Learning initiative.

For more information, visit <http://refuges.fws.gov/education/natureOfLearning/index.html>.



by Randi Thompson

# What a Difference Good Outreach Makes



**Lahontan cutthroat trout**  
Pete Rissler

“You are going to destroy a very lucrative recreational fishery,” said Tom Smith, president of the Truckee River Fly Fishermen. “You consider the fish that are in the river now as invasive species; well, we consider you federal employees invasive species, invading our state fishery.” That sentiment was shared by most of the people attending a public meeting held several years ago to discuss the Fish and Wildlife Service’s plan to restore the native stock of the Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) to the Truckee River system in Nevada and California.

By the fall of 2003, however, Tom’s concern had changed a bit. “So when can we have cutthroat trout eggs for our streamside incubation boxes?”

Why the change? Communication. Tom and hundreds like him participated in the process to help scientists on the Lahontan Cutthroat Trout Recovery Implementation Team develop the action plans for restoring this fish. Their participation gave them the opportunity to be part of the process, and that inclusion helped them understand our goals and objectives. We, in turn, heard their concerns and developed actions to address them.

How we got here is a story of persistence and consistency. We were persistent in communicating with the public, and our message stayed consistent. This approach was vital for facing resistance and reluctance. Many anglers were extremely resistant to changing their fishery, and the states were reluctant to take on such a huge task. A little history explains why.

The Lahontan cutthroat trout is the only trout native to the Truckee River system of Nevada and California. A

migratory fish, it would swim upstream from Pyramid Lake via the Truckee River to Lake Tahoe, a 120-mile (190-kilometer) trip. Lahontan cutthroat trout were popular with early settlers, who considered them quite tasty, and anglers sometimes caught fish weighing up to 40 pounds (18 kilograms). By 1940, however, the fish was gone from the Truckee, primarily due to overfishing and the completion of Derby Dam, which blocked fish passage. In 1970, the Service listed the fish as threatened. Although the states of California and Nevada did some recovery work for this fish, there was little interest in tackling restoration in the Truckee River due to multiple conflicts. The river is not only a popular recreational fishery for both states, due to decades of stocking nonnative rainbow (*Oncorhynchus mykiss*) and brown (*Salmo trutta*) trout, but it is the water source for Reno. It’s also used by kayakers and rafters, is a water source for irrigation, and has over 40 different dams and diversions that block fish passage.

We understood the states’ reluctance and the public’s resistance to the restoration effort. The plan was perceived as adversely impacting a popular and lucrative recreational fishery. People weren’t afraid that we would halt fishing, but that we would change it. It was the unknown that concerned them.

We knew we had two big obstacles to overcome. One, some people did not trust us. Two, they did not understand our intentions. To overcome these barriers would take communication on both a broad and personal level.

We needed to involve anyone who was interested or would be impacted by the actions — anglers, environmentalists,

kayakers, landowners, and governmental agencies. We developed a mailing list and sent out meeting notices and letters, each time requesting other names to add to the list. A quarterly newsletter we created provided notice of future meetings, minutes from past meetings, proposed action items, websites with more information, and a list of contact persons. We also explained different elements of the Endangered Species Act and reproduced newspaper articles from the late 1800s and early 1900s. These stories told how thousands of pounds of fish were brought to market in one day, but they also covered the impacts that old papers mills had on the river and its fish. Such historical information provided a long-term perspective, reminding us all of what we once had and lost.

To reach the general public, we engaged the media. We worked with reporters to not only inform people of upcoming meetings, but to talk about the planning process, its goals, and its impacts. Simple events, such as stocking Lahontan cutthroat trout for recreational fishing, became media events that illustrated how fish are reared, tagged,

released, and monitored. We also showed crumbling river banks and explained that repairing these areas would benefit water quality, water quantity, water users, birds, mammals, and, yes, fish. We were doing more than restoring a fish; we were improving a river system that would directly benefit people, too.

To keep people engaged in the planning process, we provided them opportunities to be involved in ways that worked for them. For those who could not attend meetings, we developed a website giving meeting minutes, maps, proposed action items, emails, and phone numbers and mailing addresses for comments.

Our early public meetings were workshops facilitated by a contractor. Sessions on Saturdays and mid-week evenings accommodated various schedules. Large maps displayed around the meeting room allowed local citizens to help us identify streams that needed restoration or that would be good for stocking and monitoring Lahontan cutthroat trout. They also showed us areas that were trophy fishing areas for

brown and rainbow trout that they would like to see remain that way.

While the meetings met our goals of obtaining useful information, we soon learned that people were not going to feel they were a part of the process unless they got to interact directly with decision makers. They had to get to know us as individuals if they were to trust us. After several meetings, we were no longer “federal employees”; we were Lisa, Bob, and Randi.

I’m proud to have been part of this process, but I’m more proud of Lisa Heki, the Project Leader for the Fishery Program, and Bob Williams, Field Supervisor for the Nevada Fish and Wildlife Office. They took criticism, looked folks in the eye, and explained our intentions. In doing so, they gained support, friends, and partners for conservation.

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*Randi Thompson was a public affairs specialist with the Service’s Nevada Fish and Wildlife Office until leaving recently to pursue other interests.*



***Will Cowan, a fisheries biologist with the Service’s Reno office, interviews an angler fishing the Truckee River to determine response to the stocking of Lahontan cutthroat trout.***

USFWS

From January through April of 2004, the Fish and Wildlife Service published the following proposed and final rules in accordance with the Endangered Species Act (ESA). The full text of each action can be found on the internet at: <http://endangered.fws.gov/federalregister/2004/index.html>.

## Proposed Listing

### Northern Sea Otter (*Enhydra lutris kenyoni*)

On February 11, sea otters occurring in southwestern Alaska were proposed by the Service for listing as threatened. These animals comprise the Southwestern Alaska Distinct Population Segment (DPS) of northern sea otters. Survey data indicate that this population, which once contained more than half of the world's sea otters, has declined at least 56 to 68 percent since the mid-1980s, and there is no indication that the decline has ceased.

The proposed rule describes the Southwestern Alaska DPS of northern sea otters as those occurring in nearshore waters from the Aleutian Islands to Cook Inlet, including waters adjacent to the Aleutians, the Alaska Peninsula, and the Kodiak archipelago. This corresponds to the range of the southwest stock of sea otters recognized in 2002 by the Service in accordance with provisions of the Marine Mammal Protection Act. Two other stocks of sea otters in Alaska that also were recog-

nized in 2002, the southcentral and southeast stocks, are believed to be stable or increasing and are not included in the proposed listing rule.

Between the mid 1700s and the early 1900s, commercial hunting of sea otters brought the entire species to the brink of extinction. When they became protected from commercial harvest in 1911 under the International Fur Seal Treaty, only 13 small remnant populations were known to exist, including six in southwest Alaska. Following this protection, otters from 11 populations gradually recovered and recolonized their former range in southwest Alaska and some other portions of their historic range.

In the Aleutians, there were approximately 55,000 to 74,000 sea otters in the mid-1980s. Aerial surveys since that time, however, indicate a progressive decline in the Aleutians to less than 9,000 animals. Survey results also show substantial declines have occurred in the Alaska Peninsula, where the counts of otters have declined by more than 65 percent since the mid 1980s. In the Kodiak archipelago, surveys indicate the number of otters has declined more than 55 percent since the late 1980s.

The cause of the population decline is not clear. Production of young does not appear to be reduced, nor is there evidence that starvation, dis-

ease, or contaminants are involved. There also is no evidence that entanglement in commercial fishing gear or competition with fishermen for prey species is playing a significant role in the decline, and annual subsistence harvest by Alaska Natives is believed to be too low to contribute significantly to the decline. Some evidence points to increased predation on sea otters by killer whales, which in turn may be the result of changes in the ecosystem. However, additional research will be needed before the cause of the decline can be determined.

## Final Listings

**Beluga Sturgeon (*Huso huso*)** On April 21, the Service listed the beluga sturgeon as a threatened species. Female beluga sturgeon are considered the world's most valuable commercially harvested fish because they supply beluga caviar, one of the most highly prized delicacies in the world.

Unregulated overfishing, loss of spawning habitat, and poaching to supply the black market beluga caviar trade have contributed to a notable decrease in the wild beluga sturgeon population. Listing beluga sturgeon as threatened under the Endangered Species Act brings this country's conservation requirements in line with existing international measures for the species under the Convention on International Trade in Endangered Species (CITES). The Service will soon consider the development of a proposed special rule for beluga sturgeon to address measures it deems necessary to ensure the conservation of the species consistent with the provisions of CITES.

Beluga sturgeon are long-lived and slow to mature. On average, male fish mature between 10 and 16 years of age and spawn once every 4 to 7 years. Females mature between 14 and 20 years of age and reproduce only once every 4 to 8 years.

Historically, beluga sturgeon inhabited a wide range throughout eastern Europe and central Asia. Now, remaining wild beluga sturgeon populations are found only in the Black and Caspian Sea basins. In 1998, beluga and all other previously unlisted sturgeons and paddlefish were included in CITES Appendix II. An Appendix II listing al-



**Northern sea otter**

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lows sustainable and controlled international trade for commercial and noncommercial purposes through a system of permits. All sturgeon and paddlefish and their byproducts must be accompanied by valid CITES documentation to be legally imported into, or exported from, the U.S.



**Beluga sturgeon**

© Tennessee Aquarium

**Two Mariana Island Plants** Two plant species, *Nesogenes rotensis* and *Osmoxylon mariannense*, found only on the island of Rota in the Commonwealth of the Northern Mariana Islands, were listed April 8 as endangered. A third species, *Tabernaemontana rotensis*, was withdrawn from consideration for listing. This species occurs on Rota and in the Territory of Guam

Only 34 *N. rotensis* plants and eight *O. mariannense* plants remain on Rota. Perhaps because they are so rare, neither plant has a common name. *N. rotensis* is an herbaceous plant in the verbena family (Verbenaceae) with small, coarsely toothed leaves and small white flowers. *O. mariannense* is a spindly, soft-wooded tree in the ginseng family (Araliaceae).

Both species are threatened by habitat degradation and loss caused by development in forested areas. They also are imperiled because of encroachment of nonnative plants that compete for space and nutrients. Grazing and trampling by feral pigs and deer, road construction and maintenance activities, recreational activities, alleged vandalism, reduced reproductive vigor due to extremely small population sizes, and probable seed predation by insects, mice, or rats are also threats. The small geographic areas the plants occupy make them vulnerable to extinction from naturally occurring events such as typhoons.

Although *T. rotensis* is recognized as endemic on Guam and Rota, published work has identified it as part of the widespread species *T. pandacacui*. The Service originally proposed listing *T. rotensis*

with the other two species, but in developing the final rule has reconsidered its status. Because there is no indication that *T. pandacacui* is endangered or threatened throughout all or a significant portion of its range, and because *T. rotensis* does not appear to be a separate species, the Service does not believe there is a basis for listing at this time.

**California Island Foxes** Four subspecies of a tiny, docile fox inhabiting four of the Channel Islands off the southern California coast were listed on March 5 as endangered. The Santa Cruz Island fox (*Urocyon littoralis santacruzae*), Santa Rosa Island fox (*Urocyon l. santarosae*), San Miguel Island fox (*Urocyon l. littoralis*), and Santa Catalina Island fox (*Urocyon l. catalinae*) occupy separate islands. Populations of the island foxes have dropped dramatically since 1994.

The primary cause for the decline of foxes on San Miguel, Santa Rosa, and Santa Cruz islands is predation by golden eagles, which were initially drawn to the islands due to the presence of nonnative pigs. The main cause for the decline of foxes on Santa Catalina Island is the rapid spread of canine distemper, which is transmitted by dogs.

While eagle predation and disease are direct threats to these foxes, habitat degradation from

nonnative mammals such as sheep, goats, rabbits, deer, elk, cattle, and horses adds to fox mortality. The Service is participating in a long-term study of bald eagles that are being reintroduced to the islands. Bald eagles, which historically nested on the islands, are territorial and, if reestablished, could keep golden eagles away from the islands. Bald eagles feed primarily on marine mammals and fish, and would not be a threat to the foxes. The bald eagle population on the islands became extinct by 1960 because of the egg-shell-thinning effects of the pesticide DDT. Programs to breed foxes in captivity for eventual reintroduction also are underway.

## **Rota Bridled White-eye (*Zosterops rotensis*)**

This small forest bird, distinguished by a ring of white feathers around its eyes, was designated on January 22 as an endangered species. Found in the Mariana archipelago of the western Pacific, the Rota bridled white-eye exists only on the island of Rota in the Commonwealth of the Northern Mariana Islands. Once numerous, the estimated population has declined dramatically since the early 1980s, when there were nearly 11,000 birds. Today, fewer than 1,100 birds are thought to remain on Rota.

Exact causes for the sharp decline in Rota bridled white-eye populations are unknown. Possible factors include degradation or loss of habitat due to



**California island fox**

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development, agricultural activities, and naturally occurring events such as typhoons; predation by rats and black drongos (an introduced bird species from Taiwan); and use of pesticides.

## Final Delisting Rules

**Two Mariana Island Birds** Two bird species endemic to the Mariana Islands were removed from Endangered Species Act protection on February 23 on the grounds that they are extinct:

The Mariana mallard (*Anas platyrhynchos*) once inhabited the islands of Guam, Tinian, Saipan, and Rota. It was listed as endangered by the Trust Territory of the Pacific Islands in 1976 and by the U.S. Fish and Wildlife Service in 1977. The species was probably never abundant, since the Mariana Islands have few freshwater marshes and lakes. There have been no confirmed sightings of the Mariana mallard since it was last observed on Saipan in 1979, despite extensive surveys conducted by the Division of Fish and Wildlife of the Commonwealth of the Northern Mariana Islands, the Division of Aquatic and Wildlife Resources of Guam, and the Service. The exact causes for the extinction of the Mariana mallard are unknown. Possible factors contributing to its decline include the massive loss of suitable wetland habitat and years of unregulated hunting.

The Guam broadbill (*Myiagra freycineti*), a small flycatcher that occurred only on the island of Guam, was listed as endangered in 1984. At the time, fewer than 100 individuals remained. There have been no confirmed sightings of the Guam broadbill since 1984, despite surveys conducted by Guam biologists. Predation by the nonnative brown tree snake (*Boiga irregularis*) is likely the major factor contributing to its extinction.

## Withdrawn Listing Proposal

**Slickspot Peppergrass** (*Lepidium papilliferum*) On January 22, the Service withdrew its 2002 proposal to list this Idaho species, an herbaceous annual or biennial plant in the mustard family (Brassicaceae), as endangered. After reanalyzing information and evaluating recently formalized conservation plans, the Service

made two determinations: 1) there is not strong evidence of a negative population trend for the species, and 2) conservation efforts will reduce risk to the species to a level that would not meet the need for Endangered Species Act protection.

The slickspot peppergrass, which resembles the garden flower sweet alyssum, is conserved by three different conservation measures:

- a Candidate Conservation Agreement (CCA) developed by the Bureau of Land Management, State of Idaho, Idaho Army National Guard, and several private property owners who hold BLM grazing permits. Agreements have been established between the State of Idaho and several private landowners to conserve the species on private land.
- Integrated Natural Resource Management Plans of the U.S. Air Force, which were updated to address the protection and conservation of slickspot peppergrass.
- conservation activities being implemented by the Idaho Air National Guard.

The slickspot peppergrass grows in sagebrush steppe habitats in southwestern Idaho, including the Snake River Plain, Owyhee Plateau, and adjacent foothills in Ada, Canyon, Elmore, Gem, Owyhee, and Payette counties. It has many tiny, white flowers that resemble the garden flower sweet alyssum. Slickspot peppergrass typically grows in "slickspots," which are small areas of sparse vegetation within sagebrush habitats.

Among the conservation measures to be undertaken for the slickspot peppergrass are increased wildfire protection and minimum impact fire suppression and rehabilitation practices, treatment of noxious weeds, adjustments to grazing practices, and measures to reduce ground disturbance in and around slickspots.

## Withdrawn Reclassification Proposal

**Pahrump Poolfish** (*Empetrichthys latos*) On April 2, the Service withdrew a proposal to reclass-

sify the status of the Pahrump poolfish (*Empetrichthys latos*) from endangered to threatened. The species will remain listed as endangered, as it has since 1967.

In 1993, it appeared that the species' status had improved enough for it to be reclassified as threatened, so the Service proposed the reclassification. But soon, the Service learned about new developments that were adversely affecting the species.

The Pahrump poolfish is historically found at only one location, a warm alkaline spring on private land at the Manse Ranch in southern Nye County, Nevada. In anticipation that ground water pumping would cause the natural spring to dry up, biologists transplanted poolfish in the early 1970s to three federal and state managed locations in Nevada. By 1975, the spring went dry and poolfish living in the native spring died off, leaving only the transplanted populations.

By 1993, the three transplanted populations were stable and recovery objectives were being met, which led the Service to propose reclassifying the species as threatened. However, soon after publication of the proposed rule, the Service learned that habitat modifications at the state-managed site would adversely impact the species. Thus, the proposal to change the status of the poolfish was halted while actions were taken to secure that population's survival.

By the late 1990s, the population was secure at the state-managed site, but the poolfish at the federal site were decimated by the illegal introduction of crayfish, a nonnative aquatic predator. An isolated pool was recently built at this federal site and a small number of poolfish were reintroduced in the summer of 2003. Surveys at the other federal site in 2003 indicate that there has been a significant decrease in the poolfish population at this transplanted location. The cause for the decline is unknown and is being investigated.

## Critical Habitat

Critical habitat, as defined in the ESA, is a regulatory term for a specific area that contains physical and biological factors that are essential for

the conservation of a listed species. Critical habitat designations do not establish a wildlife refuge, wilderness area, or any other type of conservation reserve, nor do they affect actions of a purely private nature. They are intended to delineate areas in which federal agencies must consult with the Service to ensure that actions these agencies authorize, fund, or carry out do not destroy or adversely modify the designated critical habitat. Within designated critical habitat boundaries, federal agencies are required to consult except in areas that are specifically excluded, such as developed areas within the boundaries that no longer contain suitable habitat. Maps and more specific information on critical habitats actions listed below are contained in the specific *Federal Register* notice designating each area.

## Final Critical Habitat Rules

### La Graciosa Thistle (*Cirsium loncholepis*)

On March 17, the Service designated approximately 41,090 acres (16,630 hectares) in coastal areas of San Luis Obispo and Santa Barbara counties as critical habitat for La Graciosa thistle, an endangered native California plant.

### Desert Yellow head (*Erma xanthocephalus*)

On March 16, the Service designated about 360 acres (145 ha) in Fremont County, Wyoming, as critical habitat for a threatened plant, the desert yellowhead.

## Proposed Critical Habitat Rules

**Arroyo Toad (*Bufo californicus*)** On April 28, the Service proposed to designate approximately 138,715 acres (56,135 ha) in Monterey, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego counties, California, as critical habitat for the endangered arroyo toad.

**Riverside Fairy Shrimp (*Streptocephalus woottoni*)** On April 27, the Service proposed to designate about 5,795 acres (2,345 ha) of land in Ventura, Los Angeles, Orange, Riverside, and San Diego counties as critical habitat for the endangered Riverside fairy shrimp, a small, freshwater aquatic crustacean that inhabits vernal pools.

**California Red-legged Frog (*Rana aurora draytonii*)** On April 13, the Service proposed to designate 4.1 million acres (1.67 million ha) in 28 California counties as critical habitat for the threatened California red-legged frog, the species that is believed to have inspired Mark Twain's short story, "The Celebrated Jumping Frog of Calaveras County."

**Lane Mountain Milk-vetch (*Astragalus jaegerianus*)** On April 6, the Service proposed to designate 29,520 acres (11,945 ha) of critical habitat for the endangered Lane Mountain milk-vetch in the Mojave Desert in San Bernardino County, California.

### Santa Ana sucker (*Catostomus santaanae*)

To meet a court order, the Service simultaneously published on February 26 a temporary emergency critical habitat designation for a fish, the Santa Ana sucker, and a separate proposal for long-term critical habitat protection. The designation covers approximately 21,130 acres (8,550 ha) of streams in Los Angeles and San Bernardino counties, California.

### California tiger salamander (*Ambystoma californiense*)

On January 22, the Service proposed to designate approximately 13,920 acres (5,630 ha) as critical habitat for the endangered Santa Barbara County population of the California tiger salamander.



**Arroyo toad**

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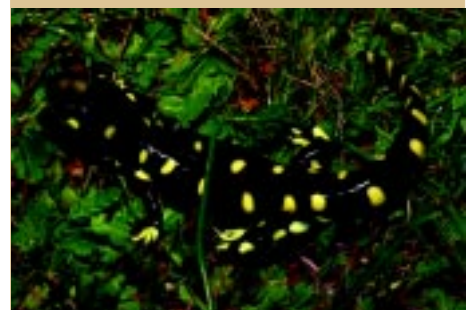
**Riverside fairy shrimp**

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**California red-legged frog**

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**California tiger salamander**

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# BOX SCORE

Listings and Recovery Plans as of November 1, 2004

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	U.S. SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	69	251	9	17	346	55
 BIRDS	77	175	13	6	271	76
 REPTILES	14	64	22	15	115	33
 AMPHIBIANS	11	8	10	1	30	15
 FISHES	71	11	43	1	126	95
 SNAILS	21	1	11	0	33	23
 CLAMS	62	2	8	0	72	69
 CRUSTACEANS	18	0	3	0	21	13
 INSECTS	35	4	9	0	48	31
 ARACHNIDS	12	0	0	0	12	5
ANIMAL SUBTOTAL	390	516	128	39	1,074	415
 FLOWERING PLANTS	571	1	144	0	716	579
 CONIFERS	2	0	1	2	5	2
 FERNS AND OTHERS	26	0	2	0	28	28
PLANT SUBTOTAL	599	1	147	2	749	609
GRAND TOTAL	989	517	275	42	1,823*	1,024

**TOTAL U.S. ENDANGERED:** 989 (390 animals, 599 plants)

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

**TOTAL U.S. LISTED:** 1,264 (518 animals\*\*, 746 plants)

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

tern, green sea turtle, saltwater crocodile, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

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

**ENDANGERED**  
*Species*  
**BULLETIN**

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

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