U.S. Fish & Wildlife Service
National Wildlife Refuge System

RefugeUpdate

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The fight against the Old World climbing fern at the Arthur R. Marshall Loxahatchee Refuge is in high gear.

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Twin seal pups are thriving at Midway Atoll National Wildlife Refuge, thanks to a NOAA collaborative effort.

Reading Rachel Carson

The Rachel Carson Book Club is a "fabulous way to engage people to focus on the life and legacy of Rachel Carson," says Anne Post Roy, NCTC conservation librarian. Writers, scientists, historians and journalists moderate the online discussion. A different book is featured each month. The June selection is *Always, Rachel*, letters from Carson to her Maine neighbor Dorothy Freeman. To participate, go to http://rcbookclub.blogspot.com. *(USFWS)*

Ride a Jet Plane — Plant a Native Tree

U.S. Fish and Wildlife Service Director H. Dale Hall and The Conservation Fund President Larry Selzer shake hands on a new partnership that engages companies, communities and individuals in the effort to offset their own carbon dioxide emissions and combat climate change. Donations to the Go Zero℠ program will be used to plant native trees on national wildlife refuges throughout the country. (USFWS)

A new partnership between The Conservation Fund and the U.S. Fish and Wildlife Service will help restore wildlife habitat on national wildlife refuges while it helps offset carbon emissions that contribute to global warming. The partnership was announced in April at Santee National Wildlife Refuge in South Carolina, where approximately 25 acres of native forest habitat will be restored under The Conservation Fund's Go Zero℠ program.

Go Zero℠ is a carbon sequestration program that is intended to engage companies, communities and individuals in the effort to combat climate change. Go Zero℠ measures the specific carbon dioxide emissions generated by different human activities — from airplane travel to energy use in office buildings to community events and individual lifestyles. Customers of participating companies are able to "zero out," or offset, their carbon emissions through a donation to The Conservation Fund that is used to plant trees that absorb carbon dioxide.

Many trees have already been planted on national wildlife refuges in Louisiana, Mississippi, Tennessee, New Jersey and Virginia. Earlier this year, 50 acres of oak and bald cypress were planted at Bogue Chitto National Wildlife Refuge in Louisiana. Another 100 acres of slash pine were planted at Big Branch Marsh

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H. Dale Hall

From the Director

Personal Connection with Nature

Chuck and Betty Mulcahy of Aurora, Colorado, can't hide their enthusiasm when they describe their experience as volunteers last year at Imperial National Wildlife Refuge in Arizona:

"We felt invigorated. We felt stimulated. And we were awed by the knowledge we had gained and the magnitude of the knowledge yet to be learned," the couple said.

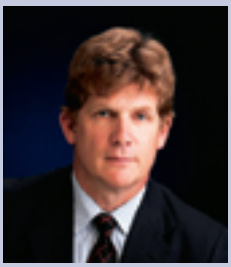
Like so many others across the country, the Mulcahys will be volunteering again this year. They are among the thousands of folks each year who combine their time, talent and love of nature to help national wildlife refuges. In 2006, about 34,000 volunteers donated more than 1.4 million hours to the U.S. Fish and Wildlife Service — doing work that would have required about 700 full-time employees. But these remarkable numbers are only part of the story.

Each year our volunteers play a vital role in connecting millions of people with nature — sometimes in ways you may not expect. For example, the Mulcahys helped create and deliver interpretive programs to local schools. They led tours and winter hikes through the Sonoran Desert. They worked with the refuge volunteer coordinator to design an interpretive trail through a wash and along burro trails. They met five other volunteer couples who occupied RV pads at the refuge. And they met the desert.

"We learned feral burros compete for the little vegetation with native desert bighorn sheep," the Mulcahys said. "We learned about the Colorado River's change in ecology after several dams redirected its flow. And we learned that while we were completely free to roam among the refuge's natural inhabitants, this was their home and their needs take precedence."

These are lessons that only can be learned when people make a personal and up close connection with nature. The Mulcahys will take their newfound knowledge back to their local community, to their neighbors, to their children and grandchildren. Indeed, the couple's family members or friends might even become volunteers next year, or the year after that. Maybe they won't volunteer, but will visit a national wildlife refuge. Either way, they, too, could forge their own personal connection with wildlife and conservation.

Volunteers provide an invaluable boost to our work. But just as important, they gain an appreciation of refuges and are eager to spread the word about conservation. We welcome them and always love to hear about how our public lands — their public lands — have transformed their lives. ◆



Geoff Haskett

Chief's Corner

The Next Conservation Generation

America's anglers and hunters, among the earliest conservationists, understand what the loss of habitat means not only for recreational species, but also for the well-being of the environment, the very foundation of America's preeminence. They're among the nation's staunchest Refuge System supporters.

So, some of the preliminary data of the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation are insightful. About 42 percent of our kids have gone fishing. About a third of first time hunters and anglers are 21 or older, which means that people who may have missed out on these sports in their youth are finding them in adulthood.

Regardless of this good news, we have a lot of work ahead of us. Retention rates continue to go down. In 1990, 65 percent of anglers had gone fishing in the previous three years. By 2005, that number had fallen to 57 percent.

National wildlife refuges are already doing their part by offering a host of hunting and fishing programs. We are reaching out to populations that are not the sports' traditional audiences. So

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Refuge Update

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Protecting Birds from Jets at Pocosin Lakes Refuge

U.S. Fish and Wildlife Director H. Dale Hall brought the prestige of his office when he voiced clear and strong support for national wildlife refuges in testimony about the hotly disputed proposal by the Navy to build a landing strip within a few miles of Pocosin Lakes National Wildlife Refuge in North Carolina. A growing coalition of the nation's leading sports and conservation groups is speaking out in opposition to the project, as did the governor of North Carolina.

Director Hall appeared in March at the first of six public hearings the Navy held to gather citizen assessments of the planned strip. Pocosin Lakes Refuge's wetlands are a highly valued sanctuary for migrating waterfowl. In light of that, the Director decided to put his viewpoints into the public record.

Navy jet pilots would use the strip — technically an Outlying Landing Field (OLF) — to practice aircraft-carrier landings. Although the Service fully supports the Navy's efforts "to meet its national defense mission," Hall emphasized that locating the OLF near a wildlife refuge could be highly disruptive to wildlife.

"Our concerns center on the loss of foraging habitat for wintering waterfowl, the effects of aircraft noise on waterfowl, and the cumulative impacts of these and other effects on historic waterfowl use patterns," Hall testified. "We also have concerns about the effects of the facility on our ability to manage and monitor wildlife resources on and around the refuge, the effects of the facility on the endangered red wolf population, and, lastly, the effects of aircraft noise on the integrity of the refuge and the experience of visitors."

In fact, record numbers of snow geese and tundra swans were recorded at Pocosin Lakes Refuge just this year. The American Bird Conservancy says the Pungo Unit of Pocosin Lakes Refuge is exceptionally important, even essential for bird conservation. More than 100,000 waterfowl, including 20,000 to 30,000 tundra swans and 75,000 to 80,000 snow geese winter here. That is 27 percent of the entire Atlantic Flyway population of tundra swans.

Record numbers of snow geese and tundra swans were recorded at Pocosin Lakes Refuge this year, not far from the site of a jet landing field proposed by the Navy. U.S. Fish and Wildlife Service Director Dale Hall has testified that locating the landing field on this site could compromise the integrity of the refuge. (USFWS)

The nonprofit Defenders of Wildlife, opposed to the landing field, says that "scheduling nearly 30,000 yearly fighter jet landings in smack dab the middle of the wintering area for tens of thousands of these birds is a recipe for disaster." North Carolina Governor Mike Easley weighed in against the proposal as well, telling the state's Congressional delegation that "spending millions of dollars to build the proposed OLF next to a world-renowned wildlife refuge for migratory birds is not an acceptable resolution." The state Wildlife Resources Commission further said that the Navy's possible use of the pesticide Avitrol as a deterrent to keep birds away from the landing field would be illegal in North Carolina.

Background

The landing field proposal was initiated by the Navy in 2002 as it looked for a site where Super Hornet jet pilots could practice aircraft-carrier landings. Four North Carolina sites were considered; an environmental impact statement in July 2003 selected the site near Pocosin Lakes Refuge as the preferred alternative. The Southern Environmental Law Center, representing several state and national environmental organizations, filed suit against the Navy. In March 2005, a U.S. District Court issued a permanent injunction preventing the Navy from proceeding with the landing field until it complied with all requirements of the National Environmental Policy Act (NEPA).

The Navy issued its draft plan in March 2007, still calling for the landing field to be built near Pocosin Lakes Refuge. This statement includes a BASH (Bird Aircraft Strike Hazard) plan that calls for "habitat modification and exclusion, repellant and harassment techniques and wildlife removal." This could include

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Dismal Swamp Discoveries

The Great Dismal Swamp National Wildlife Refuge — a sprawl of forested wetlands along the Virginia-North Carolina border — has already been identified as an important thoroughfare in the Underground Railroad to Freedom. Now an archaeologist has uncovered evidence that the swamp played an even greater role in enslaved African-Americans' struggle for freedom.

For the first time, the remains of largely self-sufficient settlements established deep in the swamp between the colonial era and the Civil War by fugitive slaves known as "maroons" have been discovered by Dan Sayers, a College of William and Mary doctoral candidate. Some of the camps may have been inhabited by generations of maroons, according to Sayers.

Throughout the early centuries of American history, the Great Dismal Swamp was a sanctuary not only for fugitive African-Americans but also for enslaved canal workers and displaced and disenfranchised Native Americans.

The number of slaves who fled to the swamp — then widely regarded as a fearsome place thick with impenetrable bogs and bloodthirsty beasts — increased sharply after the Revolutionary War, which disrupted the Southern plantation system and eventually led to the gradual abolition of slavery in the North. Many runaways paused in the swamp before continuing their quest for freedom. Thousands of others remained to live in hidden, largely self-sufficient island settlements, far from the chains and tracking dogs of "civilization".

The remains of largely self-sufficient "maroon" communities have been found on Great Dismal Swamp Refuge. (David Strother)

"The swamp may have had the largest maroon population in North America," says Sayers.

His field research got underway a few months before Great Dismal Swamp NWR became the first refuge included in the National Park Service's Underground Railroad Network to Freedom Program. Following that designation, Sayers successfully applied for a prestigious Canon National Parks Science Scholar award, which helped pay for his research.

At the start, the 34-year-old Sayers was hardly a seasoned bog walker. "I wasn't especially interested in swamps when I was growing up; they've pretty much drained the swamps in Michigan. But I had a professor at Western Michigan University who one day mentioned how significant a study of maroon communities would be because they were evidence of African-American resistance to slavery." His academic advisers at William and Mary also encouraged him to search for maroon living-places.

"I had to start from scratch," Sayers recalled. Interestingly, his is the first sustained archaeological research undertaken in the swamp. Drawing on advice from refuge staff members and local naturalists, he concentrated on a handful of isolated islands. And in the fall of 2003, he strapped on his tools, picked up a machete and headed into the refuge, whose 111,000 acres encompass a remnant of what was once a million-acre swamp.

Sayers and the volunteers who accompanied him in the early going had to work around (and through) the destruction left by Hurricane Isabelle, an especially savage storm that ravaged much of eastern Virginia and North Carolina. In the swamp, Isabelle downed tens of thousands of trees and significantly raised water levels.

After carefully examining several sites, Sayers struck pay dirt. "I found some things — like lead shot and hand-made tools — that I expected to find," he says.

"And things that I did not find — like pipe bowls and stems, mass-produced ceramics, glass vessels, iron tools

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Finding a Balance:

Moose, Bears, Wolves and People on the Yukon Flats

By Mark Bertram

Predators – people, wolves and bears – are blamed for the failure of the moose population to grow at Yukon Flats National Wildlife Refuge in Alaska. (USFWS)

In some areas of interior Alaska, specifically the Yukon Flats, the moose population is well below levels the habitat can support. In the last 25 years, the population has changed little. So what limits it? We think it is a combination of predators — bears, wolves and people — and the U.S. Fish and Wildlife Service has begun collaborating with the State of Alaska and the Council of Athabascan Tribal Governments (CATG) to address what may be one root cause.

The Yukon Flats is a large wetland basin bisected by both the Arctic Circle and the Yukon River. Its annual temperature extremes are among the greatest in North America, ranging from 70 degrees below zero to 90 degrees in the summer. It is encompassed by the Yukon Flats National Wildlife Refuge, at 8.6 million acres, the third largest refuge in the Refuge System.

Although the refuge is internationally known as a major waterfowl production area, it is also known by local residents for its significant populations of fish, furbearers, moose, bears and wolves. Some 1,200 local residents in seven villages have subsisted on the fish and wildlife resources of the Yukon Flats for hundreds of years — well before the refuge's establishment in 1978.

Moose are the livelihood and primary source of protein for families across the Yukon Flats. So, when moose become scarce, local residents want resource managers to take action.

Studying Species and Habitats

Refuge staff and the Alaska Department of Fish and Game (ADF&G) have been studying moose, bears and wolves and their habitats in this part of the northern boreal forest for nearly 25 years. More recently, the Council of Athabascan Tribal Governments (CATG), a consortium of Yukon Flats villages, has joined the team.

We have learned that the moose population has changed little in the time we have been studying the issue. With high twinning rates and large body sizes for both cow and calf moose, moose habitat on the Yukon Flats appears to be under used and very likely under carrying capacity. The number of wolves also is low, but bear populations are likely thriving.

Our study of moose calves showed that 20 percent survive their first year. Eighty-four percent of calves that died were killed by black and grizzly bears. Wolves are likely having an impact on adult moose during winter, but we have not yet measured their effect.

One in five moose harvested on the Yukon Flats by local residents is a cow. Currently local residents are taking at least 200 moose annually; up to 26 percent of this harvest is illegal take of cow moose. This may well be a significant factor in the population stagnation. Most cows on the Yukon Flats are healthy, can produce twins, and have a high annual survival rate.

Wolf harvest has remained steady. The bear harvest has tripled in recent years. Despite the increased harvest of these moose predators, we have not yet detected significant growth of the moose herd. To address illegal cow harvest, the refuge is collaborating with CATG to:

- educate subsistence hunters about harvesting cows, using not only a Power Point presentation, but also radio shows that are aired in Yukon Flats villages and classroom programs. Students in a village school designed a wall mural for the school that depicts the implications of taking cow moose.
- increase enforcement efforts. The refuge recently hired a full-time law enforcement officer/pilot to focus on illegal moose harvest.
- collaborate with ADF&G and the Village of Beaver through a Tribal Wildlife Grant to study the impacts of wolves on moose. The study will be initiated in late 2007.

We hope that the emphasis on education, enforcement and research will influence the next generation of moose hunters on the Yukon Flats and make growth of the moose population in Yukon Flats a reality. ◆

Mark Bertram is wildlife biologist at Yukon Flats National Wildlife Refuge in Alaska.

Fighting a Fern in Florida

Arthur R. Marshall Loxahatchee National Wildlife Refuge in Florida has 10 years to get the noxious Old World climbing fern — *lygodium microphyllum* — under maintenance control, which generally means the fern would cover less than 2 percent of the refuge. Those are the terms of a licensing agreement with the state of Florida that allows the U.S. Fish and Wildlife Service to manage the refuge lands in the Everglades on behalf of the South Florida Water Management District. The work will be aided by $7 million in exotic control funding the refuge will receive over 18 months from the state of Florida.

The warm lush climate of Florida welcomes all newcomers, perhaps especially those with roots in the ground. Exotic plants are the second greatest threat to biodiversity in Florida after habitat development. Almost a third of the plants found in South Florida are exotic, mostly introduced by the nursery trade. Each year, $75 million is spent in South Florida alone to control invasive pest plants.

It takes both time and money to tackle the Old World climbing fern. Ten years would seem plenty long enough, but the fern is a powerful enemy. Native to Australia, southeast Asia and parts of Africa, it arrived in South Florida in the 1950s as one more pretty fern. It became naturalized in several Florida counties in the late 1950s, which means there are now self-sustaining populations of the fern. The fern simply smothers native vegetation.

"It's an impressive invader," says Bill Miller, refuge biologist at Loxahatchee Refuge. Sperm can germinate in sun or shade; the fern survives in a wide range of water levels — only long-term inundation or drought can be detrimental. Its wind-borne spores spread long distances quickly and easily. The plants even produce a compound enabling them to change from male to female and continue reproducing. It has adapted to saline environments and infested large areas of mangrove wetlands.

"If untreated, *lygodium* will decimate the habitats of South Florida," says Miller. The roots can be six feet deep, affecting water drainage. It grows up into the canopy and affects fire ecology because it's a ladder fuel. And on the ground, turtles get stuck in the fern.

Arthur R. Marshall Loxahatchee National Wildlife Refuge has just received $7 million in exotic control funding from Florida to help tackle invasive plants including melaleuca and lygodium fern. The fern smothers native vegetation and is virtually impossible to eradicate. (USFWS)

The Goal is Control

In 2002, it was estimated that 55,000 acres of the refuge were infested with *lygodium*. The goal is to achieve maintenance control of the fern over 10 percent of that acreage this year, 50 percent by 2012 and 100 percent by 2017. The refuge also has target control dates for other invasives, including melaleuca, Brazilian pepper and Australian pine. Control of these other species is further along in part because they have been around longer and more effective means of attack have been developed.

A major stumbling block to speedier control of the invasive fern has been funding. When Florida committed $7 million to help the refuge control exotics, "it was a huge day," said Miller. "The state is providing even more ownership in the control process at a very critical time for our program."

Refuge and state partners immediately initiated Operation Blue Juice, more familiarly called Operation ExLox, in which state contractors are canvassing and treating invasive plants in areas of the refuge that have never before received initial treatment. Aerial and ground treatments will be used for this initial attack effort. One way to control the fern on heavily infested tree islands includes cutting it at chest level so the top dies off. The remaining fern stems are then sprayed with herbicide in what is commonly known as the "poodle cut" technique.

Research throughout the process will document best practices: too much fire can burn trees and peat and leave a lake. Too much herbicide can kill plants that need to be saved. Miller expects to refine performance measures and provide a quantifiable definition of "maintenance control."

"We're working as effectively as we can," said former Refuge Manager Mark Musaus. "We're trying to use all the technologies available to us." ◆

Remembering Rachel Carson

Rachel Carson wanted people to appreciate nature with a child-like sense of wonder that would nourish them all their lives. "Help Your Child to Wonder," she wrote in a popular women's magazine in 1956 — half a century before Richard Louv took up the call with renewed urgency in *Last Child in the Woods.* May 27 marks the 100th anniversary of Rachel Carson's birth.

As the first editor-in-chief at the U.S. Fish and Wildlife Service, Carson put a public face on the National Wildlife Refuge System. During her 15-year career with the Service, she planted the seeds of environmental awareness that is still bearing fruit. She found an eager audience for her seven-minute radio programs on marine life ("Romance Under the Waters"), the *Conservation in Action* series about individual refuges, and books like *The Sea Around Us,* which stayed on the *New York Times* best-seller list for 81 weeks after it was published in 1951. Her final book, *Silent Spring,* became her most famous.

Rachel Carson National Wildlife Refuge, near Carson's summer home on the coast of Maine, was named in her honor five years after she died of cancer in 1964 at the age of 57.

Parker River National Wildlife Refuge

Kate Toniolo, supervisory park ranger at Parker River National Wildlife Refuge in Massachusetts, created lesson plans for the *Conservation in Action* paper that Carson wrote about Parker River Refuge (there were similar papers about Chincoteague, Mattamuskeet and Bear River National Wildlife Refuges). "The original document is still relevant," said Toniolo. The black duck, for example, is not in as much trouble at Parker River Refuge as it was when Carson was writing.

Yet, Toniolo has linked *Conservation in Action* to Massachusetts state curriculum standards and expects it to be used at many different grade levels, including high schools that offer environmental science as an elective. The original paper identified Parker River as one of the greatest highways of bird migration. Toniolo's activity guide asks students to decide if this statement still holds true today.

Rachel Carson, who wanted children and adults to see and feel nature, would have enjoyed these egrets silhouetted against the brilliant red glasswort at Parker River National Wildlife Refuge in Massachusetts. (Jim Fenton/USFWS)

Students are also asked to compare resource management in the 1940s and 50s to current refuge management. "We want kids to think about their own experiences out of doors."

Toniolo nurtures an enthusiasm for science in young women today in her lists of Rachel Carson activities to help Girl Scouts earn merit badges:

- Be an explorer on a trek into unknown territory. Carry a small notebook to write a description and make a sketch of three animals or plants that you observe.
- Interview or visit with a woman who is a scientist.
- Participate in a project that helps wildlife in your community.

Celebrating Carson in Canaan Valley

Canaan Valley National Wildlife Refuge in West Virginia began celebrating Rachel Carson while snow was still on the ground. Wildlife biologists Ken Sturm and Marquette Crockett created posters that were displayed at Main Line Books in Elkins. The posters explained Carson's work and also promoted a local presentation of *Sense of Wonder* by actress Kaiulani Lee. Sturm spearheaded a first-ever collaboration between the biology and theatre departments at Davis and Elkins College to support Lee's presentation.

Carson's books, many donated by the local bookstore, were given free to families and college students. The Sierra Club, West Virginia Highlands Conservancy, Mountaineer Audobon, and Friends of the 500th (Canaan Valley Refuge was the 500th refuge in the system) all contributed to the full-house Rachel Carson event in Elkins on February 16.

Refuges can access a variety of activities, materials and ideas to commemorate the Rachel Carson anniversary. An online book club initiated by the Friends of the National Conservation Training Center is underway at http://www.rcbookclub.blogspot.com. Other interpretive and educational materials, including the original *Conservation in Action* series, are available at http://www.fws.gov/rachelcarson/. For more information on these materials, contact Julie Study, Northeast regional environmental education coordinator, at Julie_Study@fws.gov. ◆

2006 National Realty Awards

National wildlife refuges, spanning about 97 million acres, encompass valuable wildlife habitat that is often acquired through purchases carefully coordinated with private landowners and nonprofit organizations. The Refuge System's National Realty Awards program honors organizations and individuals who have been key to the success of these land acquisitions.

Ross Grimwood, chief of Realty Management in the Midwest Region, is the recipient of the 2006 Rudolf Dieffenbach Award. Grimwood's unique working relationship with the Iowa Department of Natural Resources facilitated acquisitions in the Iowa Waterfowl Production Areas (WPA) program. The program has acquired, preserved and protected more than 22,000 acres during Grimwood's career. His work with The Nature Conservancy is directly responsible for the donation of 2,306 acres to help establish Glacial Ridge National Wildlife Refuge in 2004, slated to become one of the largest tallgrass prairie and wetland restoration projects in the country's history. As one of the founders of the Realty Academy at the National Conservation Training Center, Grimwood has mentored realty specialists, land surveyors, appraisers, realty assistants and administrative officers. He even wrote the script for a Midwest Region video, called "The Good, the Bad and the Ugly," which explains negotiations, case processing and budget allocation.

The Nature Conservancy, Montana Chapter, has received the 2006 National Land Protection Award. TNC Montana has worked closely with the U.S. Fish and Wildlife Service on private funding, grassroots advocacy and support for three successful projects — Centennial Valley, Western Montana (Blackfoot Valley) and the Rocky Mountain Front Conservation Area. Over the past two years, TNC helped conserve more than 62,000 acres of important trust species habitat in these three project areas. In 2005 alone, the Montana Chapter donated $2,277,000 to the Service's land acquisition program in the state. TNC was also instrumental in championing support for the state's first legislation that authorizes the use of conservation easements for land protection. Montana now has nearly 1.5 million acres under easement, much of it placed in permanent protection by local citizens who value their rural lifestyles and working landscapes.

Andrew French, manager of Silvio O. Conte National Fish and Wildlife Refuge, has received the 2006 Land Legacy Award, which honors significant contributions to the Service's land acquisition systems, operations or mission. As leader of the Land Acquisition Priority System Team, French is credited with developing land acquisition criteria that are informative, transparent and highlight the importance of Service trust resources. After two unsuccessful attempts to fix a complex system, French stepped forward to produce a system that has credibility in the Service and with the environmental community. The revised Land Acquisition Property System (LAPS) has been a success. The General Accounting Office audit of the program found not a single deficiency. ◆

Andrew French, manager of Silvio O. Conte National Fish and Wildlife Refuge, has received the 2006 Land Legacy Award, which honors significant contributions to the Service's land acquisition systems, operations or mission. The Mollie Beatty Bog is just one of the outstanding landscapes on the refuge. (Ryan Hagerty/USFWS)

Bird Call: *Eagle over Hawaii*

A white-tailed eagle, a Eurasian species typically seen no closer to Hawaii than northern Japan, was spotted at Kilauea Point National Wildlife Refuge. A refuge volunteer first saw the majestic bird on December 30, 2006, near the refuge on Kauai. There were a few subsequent reports of "a large bird that looked like an eagle," but it was refuge wildlife biologist Brenda Zaun who saw

65th Anniversary of the Battle of Midway

Midway Atoll National Wildlife Refuge and Battle of Midway National Memorial is commemorating the 65th anniversary of the Battle of Midway this year. The battle on June 4, 1942, was one of the most decisive of World War II, a key to turning the tide against the Japanese war effort in the Pacific.

Midway Atoll Refuge was established in 1988 as an "overlay" refuge allowing the U.S. Fish and Wildlife Service to assist the U.S. Navy in managing the atoll's unique wildlife and resources. After 93 years of U.S. Navy administration, Midway Atoll was transferred to the Service on October 31, 1996.

The Navy worked with the Service to demolish deteriorated buildings, remove old fuel storage tanks and clean up environmental contaminants. There are still 63 sites on the refuge eligible for the National Register of Historic Places, including the seaplane hangar and ramps, torpedo shops, radar buildings, gun emplacements, pillboxes and Eastern Island runways. Nine defensive features on Midway were designated as a National Historic Landmark in 1986, and the entire refuge was named the Battle of Midway National Memorial in 2000.

Now Midway Atoll Refuge is also part of the new Papahānaumokuākea Marine National Monument, established in 2006 by President Bush as the largest marine protected area in the world. Currently, Midway welcomes only a few visitors on preapproved cruise ships or those willing to volunteer on the refuge for three months at a time.

Pillboxes are among historic buildings on Midway Atoll Refuge (Barbara Maxfield (USFWS))

"We would very much like to welcome visitors back on a more regular basis," says Barbara Maxfield, the Service's external affairs chief for the Pacific Islands, "not only to share all of the wildlife and historic features of Midway but also as a window to the marine national monument." A draft plan for a regularly scheduled visitor program has generated more than 6,000 comments.

The refuge is planning a special commemorative event for the 65th anniversary of the Battle on June 4, hosting visits by Military Historical Tours and Princess Cruises, which has often included Midway in its ports of call. Approximately 1,800 people are expected to participate in the ceremony and island tours.

Beyond Midway

Numerous refuges actually have well-preserved World War II sites. There is a museum and several old structures at Dutch Harbor in the Alaska Maritime National Wildlife Refuge, where the Japanese bombed and occupied two islands. A year after the attack on Pearl Harbor, the United States secretly hurried to produce chemical weapons in Colorado, amid fears that the Germans or Japanese would use chemical warfare. About 40 years later, in 1986, the discovery of an eagle roost sparked a grass roots movement that led to creation of Rocky Mountain Arsenal National Wildlife Refuge. A $2.2 billion cleanup has seen about 4,500 acres reseeded as part of the native short-grass prairie restoration.

Sandwiched between the Chesapeake Bay and the Atlantic Ocean, the Eastern Shore of Virginia National Wildlife Refuge is the site of large bunkers containing 16-inch guns that protected nearby naval bases and shipyards. Refuge Manager Susan Rice says that only one of the guns was ever shot and only in practice. Now, the refuge's Wildlife Trail has an overlook where people can view one of the bunkers.

Ninigret National Wildlife Refuge in Rhode Island was a Naval Auxiliary Landing Field during World War II. Most refuge trails still follow the old asphalt of runways and taxi ways. A 2.5 mile "Trail through Time" provides interpretative panels that guide hikers through history, from native Americans to naval field. ◆

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the eagle flying within the Crater Hill area of Kilauea Point Refuge on March 5 and took a photo.

There is only one record of the white-tailed eagle in the Hawaiian Islands. A nearly complete skeleton, estimated to be 3,300 years old, was found in a lava tube on Maui.

The white-tailed eagle at Kilauea Point Refuge was believed to be eating local feral chickens, large fish and rodents. It was also observed preying on three Laysan albatrosses. *(Photo by Brenda Zaun)*

Have you recently seen a rare, unusual or particularly interesting bird on a refuge? Let us know at RefugeUpdate @fws.gov. ◆

FOCUS. . .*On Urban Refuges*

With an Urban State of Mind

We left our hearts in San Francisco, we might consider leaving Las Vegas, and we may be in a New York state of mind — at least in song. But do we know what these cities and others are doing to national wildlife refuges? This issue of *Refuge Update* explores the myriad ways refuges are meeting the challenge of urbanization.

In 1991, the U.S. Fish and Wildlife Service officially adopted an Urban Refuge Policy to encourage the creation of refuges that offer places for recreation, scientific research and environmental education in and near cities. "The primary purpose for the establishment of new urban refuges will be to foster environmental awareness and outreach programs to develop an informed and involved citizenry that will support fish and wildlife conservation," says the policy.

New refuges have been established specifically because of their proximity to urban areas. But many more refuges are adapting management strategies and education programs to serve populations that are growing larger along on their borders.

California State University Professor Emilyn Sheffield suggests that all

Every Refuge is an Urban Refuge

by Emilyn Sheffield

What, exactly, is an urban wildlife refuge in a country that has added 100 million people to its population since 1967? We can no longer consider just a handful of refuges as urban refuges.

Perhaps all national wildlife refuges are urban because they function in a context dominated by the concerns of metropolitan America. Urbanization and other population changes influence every wildlife refuge and require new strategies to connect people to the mission of the National Wildlife Refuge System.

The U.S. population passed the 300 million mark last fall, according to the U.S. Census Bureau. While most people still live east of the Mississippi River, growth in the south and west is inexorably moving the country's population center. West of the Mississippi, the pull of heartland interstates and Interstate 5 on the Pacific Coast concentrates growth in the cities and suburbs connected by these great transportation arteries.

Transportation made suburban growth a critical aspect of mid-to-late 20th century. Between 1950 and 2000, the percentage of people living in city centers stabilized at about 30 percent. The percentage of people living in suburbs steadily increased from 23 percent in 1950 to 50 percent in 2000. Currently, more than

Urbanization affects every national wildlife refuge, especially those like John Heinz at Tinicum National Wildlife Refuge near Philadelphia. Engaging the hearts, hands, heads and human spirit of a vibrant, urban and diverse 21st century America can only increase the support for the National Wildlife Refuge System. (USFWS)

refuges could be considered urban because they operate in the context of metropolitan America. Today, anywhere from 80 to 150 national wildlife refuges could be considered "urban" refuges, in close proximity to metropolitan areas with populations of 50,000 or more — sometimes, far more.

Refuges like Sherburne National Wildlife Refuge in Minnesota and Balcones Canyonlands National Wildlife Refuge in Texas, established in what then were relatively rural areas, are now coping with major development pressures directly on their borders.

As cities become more ethnically diverse, refuges are discovering the benefits and creativity of reaching out to visitors whose first language is not English. Environmental education programs must be adapted for children whose play space is more asphalt than grass. Habitat protection on urban refuges means careful attention to issues of water quality and fire at the wildland urban interface (WUI). Almost a quarter of the Service's fire management budget is devoted to hazardous fuels reduction in urban areas near refuges.

The urbanization of America is a seemingly continuous process. Where or when it will stop can be debated by demographers, urban planners and a host of other organizations and individuals. In the real world of habitat conservation, national wildlife refuges are facing challenges and opportunities in a nation that grew from 200 million people to 300 million in less than 40 years. ◆

80 percent of the U.S. population lives in urban or suburban areas, a near reversal of the rural-urban percentages in the first decade of the 20th century.

California, the Carolinas, Florida, Georgia, Tennessee, Virginia and Washington, already more densely populated than the U.S. as a whole, grew faster than the national average between 1990 and 2000. Arizona, Arkansas, Colorado, Idaho, New Mexico, Nevada, Oregon, Texas and Utah also experienced fast growth, though from a less densely populated-base. At the other end of the continuum, several plains and mid-western states grew more slowly than the U.S. average or lost population. The Great Lakes and the northern New England states remained fairly stable during the 1990s.

Older, More Diverse

Changes in composition of the U.S. population also have implications for wildlife refuges. Two aspects are especially important: the population is growing older and becoming more racially and ethnically diverse. Between 2000 and 2030, the number of people 65 and older are projected to grow from about 12 percent to almost 20 percent of the population.

The growing diversity of the United States is reflected most clearly in the ranks of the young. In 1980, slightly more than a quarter of the population under the age of 25 was Latino or other-than-white; by 2000 that percentage had increased to almost 39 percent. Today, according to a 2006 Census Bureau report, 45 percent of all children in the United States under the age of five belong to racial or ethnic minorities. These population trends are transforming the country and are more concentrated in metropolitan areas, now home to more than 8 in 10 Americans.

Do these trends align with the traditional national wildlife refuge visitor or advocate? Refuges are alive with opportunities to engage and inspire urban Americans. New partners are emerging with the time, talent and connections to bind wildlife refuges to the hands, heads, hearts and human spirits of urban America. In the past year, I had the pleasure of addressing gatherings of Friends groups in four different regions. In each region, there are innovative and exciting programs that are connecting refuges to new audiences in powerful and enduring ways.

By providing opportunities for family recreation, refuges and their partners can promote active healthy lifestyles. With partners from the arts and humanities, refuges can connect with the human spirit. Through stewardship opportunities and volunteerism, refuges and their partners can engage the hearts and passions of urban Americans. The ultimate goal must be to engage all Americans as partners in efforts to preserve nature and protect wildlife. ◆

Emilyn Sheffield is professor of recreation and parks management at California State University, Chico.

FOCUS. . .On Urban Refuges

Polishing a Jewel: Bair Island Restoration Project

Bair Island at the Don Edwards San Francisco Bay National Wildlife Refuge, part of the largest tidal wetland restoration ever undertaken on the West Coast, is being returned to its natural state of tidal wetlands. The restoration is essential for the endangered clapper rail and salt marsh harvest mouse, as well as these avocets. (Bill Purcell/USFWS)

An outstanding example of wetland preservation in the midst of a major urban area is the Bair Island Restoration Project. Bair Island at the Don Edwards San Francisco Bay National Wildlife Refuge, part of the largest tidal wetland restoration ever undertaken on the West Coast, is being returned to its natural state of tidal wetlands. The restoration is essential for the endangered clapper rail and salt marsh harvest mouse.

Bair Island is composed of three low-lying islands — Outer, Middle and Inner Bair — surrounded by narrow tidal sloughs, marshes and mud flats. The island complex lies along the western shore of southern San Francisco Bay. The project is expected to restore the natural tidal drainage network and high quality tidal salt marsh habitat, improving water quality as well as habitat for fish and endangered species.

Timing is Everything

With the final environmental impact statement completed last summer, project implementation began last fall. It is expected to last three to four years at a cost of $12 million. By the time the project was underway, there were other construction projects throughout the Bay area looking for places to dump dirt that the restoration project needed.

The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service reached a key agreement to allow

Bienvenida! Welcome!

More immigrants came to live in the United States in the 1990s than in any decade in the country's history, according to the Urban Institute. Refuges are reaching out to serve them — with environmental education, interpretive programs and printed materials in multiple languages as well as initiatives to entice and actually bring these new residents to a refuge.

Ann Blankenship, park ranger at Upper Mississippi River National Wildlife and Fish Refuge, gave a presentation last summer to a group of newly arrived Hmong children, with the group leader serving as a translator. The refuge also

Rocky Mountain Arsenal National Wildlife Refuge hosts first and second graders from nearby Commerce City for "Operation Sense-ations," offered in Spanish. (USFWS)

dredge material from the nearby Port of Redwood City Shipping Channel to be used as fill on low-lying areas of Inner Bair Island. The goal is to raise the bottom of Inner Bair Island by about two feet to the mean high-tide line. This will alleviate concern about the formation of a lake on top of the sunken island and the possible entanglement of ducks with the small planes that fly into and out of the adjacent San Carlos Airport.

"Once we fill the area to the right elevation," says Mendel Stewart, manager of the San Francisco Bay National Wildlife Refuge Complex, "we will breach the levees and water will flow for the first time in 80 to 100 years." The elevation will vary across the islands to create varied habitat, from upland to tidal wetlands and subtidal channels.

Restoration through Cooperation

Two other urban complications include power lines and sewer mains. Since a Pacific Gas and Electric tower lies within the former salt pond, a catwalk will have to be built for access to the tower once tidal waters are reintroduced to the salt pond. Similarly, the South Bay System Authority has a sewer force main that must be protected from erosion by those same tidal waters.

In 2009, flow restrictors will be built to minimize the impact on both the adjacent Pete's Harbor Marina and the sedimentation rate for the Port of Redwood City. By adjusting the original restoration plan to provide better protection for the neighboring airport, marina, port, sewer line and power lines, the refuge transformed potential opponents into project partners.

The public will begin to see the difference after fill and levee improvements on Inner Bair Island are complete. School buses will have an improved parking lot. An accessible pedestrian bridge will go to Inner Bair Island. The walking trail on the island will be improved and people will have three observation platforms (including one on Middle Bair Island for boaters) and information signs in the sloughs and near harbor seal haul-out locations.

The nonprofit Save the Bay organization is recruiting volunteers to plant 40,000 native wetlands plants on Bair Island and seven other sites. Volunteers canoe to Bair Island and also to Marin Islands National Wildlife Refuge, which is home to hundreds of nesting herons and egrets and normally closed to the public.

The Bair Island Restoration Project will maximize protection for area wildlife and improve public opportunities for wildlife-dependent recreation. "The San Francisco Bay is one of the jewels of the world and having a healthy bay is the foundation of that," said John Bradley, deputy manager for the San Francisco Bay National Wildlife Refuge Complex. ◆

has brochures in Hmong printed by the Fishery Resources Office.

An Americorps volunteer at Tualatin River National Wildlife Refuge is translating plant and animal names into Spanish with a similar project planned in Russian. Portland, Oregon, has at least 60,000 Russian-speaking residents, as well as an increasingly diverse population working in Western Oregon's booming plant nursery/grass seed industry. Tualatin River Refuge partnered with the regional transit system to provide a bus stop exclusively to access the refuge. "Now anyone can hop on a bus in downtown Portland and be on the refuge trails in less than an hour," says Kim Strassburg, outdoor recreation planner at Tualatin River Refuge.

Tualatin River Refuge is also collaborating with the Oregon Forestry Education Program on an environmental education program targeted to middle and high school students for whom English is a second language. During the first pilot workshop for teachers in April, teachers were given pre-field trip activities they could complete at school as well as hands-on activities at the refuge to help students learn new vocabulary words like wetlands, migration and prairie.

Excite the Kids — Families will Follow

Rocky Mountain Arsenal National Wildlife Refuge has both environmental education and interpretive programs targeted to the Hispanic community, which comprises more than half the population of nearby Commerce City, Colorado. On the refuge's Web site, an entire section in Spanish offers a schedule of Spanish-language tram tours. "The kids are also getting the information at school," says Sherry James, supervisory park ranger, "and when the kids are excited, they go home excited."

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FOCUS. . .On Urban Refuges

Development Knocking at the Door

"We've been priced out of the game."

Sherburne National Wildlife Refuge in Minnesota was established in 1965 with the support of hunters who wanted to maintain habitat for waterfowl. Now, there are 2,200 new homes bordering the refuge with more to come; the refuge is in the second fastest growing county in Minnesota.

Balcones Canyonlands National Wildlife Refuge in Texas covers 22,000 acres, but had planned to acquire an additional 46,000 acres as habitat for the endangered golden-cheeked warbler and black-capped vireo. Three subdivisions are already under construction on some of that additional acreage.

"We know more of this land is going to disappear," says Balcones Canyonlands Refuge Manager Deborah Holle, "because more people want their own piece of Texas Hill Country." Holle works with The Nature Conservancy and the Trust for Public Land to identify tracts that are valuable and in danger of being developed and also works through the land acquisition system to make get those tracts listed. At Sherburne Refuge, Manager Anne Sittauer says the refuge isn't acquiring any more land because "we've been priced out of the game."

The Triple Challenges

Within their existing boundaries, the managers of Sherburne and Balcones Canyonlands Refuges are coping with three challenges in the face of encroaching development:

- Prescribed burns
- Trespassing
- An identity crisis

Sherburne Refuge burns 5,000 to 10,000 acres each year as part of its mission to restore and maintain oak savanna habitat. Rural residents understand

Hands-on, Ears-on, Noses-on

City Kids Learn about Refuges

Children from Washington, D.C. participate in a summer GeoCamp at the National Wildlife Visitor Center, Patuxent Research Refuge, in Maryland. (USFWS)

Jane Lane first walks into classrooms in Dorchester and Worcester, Massachusetts, carrying skulls and pelts of deer and raccoon. By the time this volunteer urban educator sees the children later at the Eastern Massachusetts Refuge Complex, she says, "they are over-the-top with excitement to begin their explorations." The complex hosts 130 third graders three times each school year.

Visitor Services Manager Michael Dixon echoes most refuge educators when he says that "school administrators are reluctant to permit field trips if they do not support some facet of the state public school curriculum standards." So the Eastern Massachusetts Refuge Urban Education Program addresses such curriculum objectives as making observations to identify organisms and understanding life cycles, an ecosystems and animal adaptations to winter or spring.

The Urban Education Program is run entirely by volunteers like Lane, who says the refuge visits provide not just

the need for carefully planned burning but both managers agree that to urban residents, fire is scary, ugly, smoky and dirty. "They smell smoke and they call 911," says Holle.

At Sherburne Refuge, smoke management is an issue. To mitigate this, Sittauer is considering burning smaller units rather the larger burns that are more efficient. She is also using helicopters to start a fire more quickly and enable the smoke to rise faster. Both refuges depend on improved education — getting the word out more widely and sooner about prescribed burns. Balcones Canyonlands Refuge has used a flashing sign to announce a prescribed burn is in progress.

Holle also maintains regular contact with emergency personnel at state and local agencies. "They will bring in a double shift to help us out and we will respond to wild fires off the refuge," says Holle. "There is back and forth cooperation."

People and animals trespass onto refuges on the edge of development. Lost or abandoned cats contribute to a growing population of feral cats which eat the birds the refuges are trying to protect. People use the edges of a refuge as a dumping ground.

The problem of trespassing is directly related to the third threat, what Sittauer calls an identity crisis. "Many people don't understand the difference between a refuge and a county park. They don't understand our wildlife mission," explains Sittauer. People expect a refuge to have campgrounds, horseback riding, bike trails and a place to let the dog run.

"We want their support, so we show them other recreational opportunities," says Holle. "Ride your bike on public roads through the refuge. Or park your bikes at our public use areas and hike on the trails." Urbanization also puts more pressure on refuges to limit hunting and control larger predators like coyotes. Balcones Canyonlands Refuge has reorganized its hunting space to force hunters to shoot in one direction, assigned hunters to specific areas, and allowed fewer to hunt at any one time.

At Sherburne Refuge, Sittauer increasingly depends on a Friends group that is 250-members strong to educate the public about the role of refuges. The Friends of Balcones Canyonlands uses its Web site to inform the public about the opportunities available on the refuge as well as the need to secure additional habitat. "It is not too late to get habitat acquisition back on track…Doing so is a very big job and Friends needs your help," says the Web site. ◆

hands-on activities, but ears-on (listening for the calls of birds or the sound of the wind) and nose-on (smelling a sassafras leaf or the marshy odor of the wind off the lowland river) activities. Before leaving the refuge, children write a note to a 75-year-old oak tree and receive a "refuge ranger" badge made of an oak tree cookie.

Rattlesnake Rattles and Eagle Talons

Refuges must work creatively since budgets have been tightening or even disappearing for field trips and environmental education. The 72-acre Two Ponds National Wildlife Refuge, about 15 miles northwest of Denver, has lent its big green trunk to more than a dozen schools over the past year. The trunk is designed for all ages, though it is used primarily by elementary schools, and includes DVDs, games, books, a digital camera, activity guides (such as exploring the schoolyard, water education, and teaching children about the environment with picture books) and such artifacts as rattlesnake rattles, coyote skull and an eagle talon. Two Ponds Refuge is also developing a conservation stewardship project for short-grass prairie habitat at a predominantly Hispanic middle school in Denver.

Patuxent Research Refuge Outdoor Educator Jennifer Hill held a popular GeoCamp at Smothers Elementary School in Washington, D.C. Fourth and fifth graders learned about the value of habitats for wildlife around their school and neighborhood and wrote their own rap song:

I don't know, but I've been told…
Litterers are mighty cold.
They never pick up any trash.
Now it's stuck between the grass.
If we don't clean it, who will do it?
Come on ya'll, let's get to it.

When Hill visited the school recently to make arrangements for this summer's camp, she said, "I saw a lot of the students from years past who immediately ran up to me and wanted to know when the camp was, and could they come back. I love that!"

Birders Across the Ages

The overwhelming majority of children at Patterson Elementary School in Philadelphia come from families living below the poverty line. Twenty of those children — selected for their motivation and interest in nature — come to John Heinz at Tinicum National Wildlife Refuge every week to go birding with members of the suburban Delaware County Birding Club. Maury Hutelmyer, the Patterson science teacher who organized the activity, says the children return to school with their mentors to write up what they've learned about "their" birds, including red shouldered hawks, red winged blackbirds, great blue herons, egrets and ducks.

Hutelmyer and Longstreth Elementary School Teacher Chuck Lafferty have taken most of the professional development workshops organized by the refuge's environmental education

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FOCUS. . .*On Urban Refuges*

The Modern Interface of Fire Management

By Karen Miranda Gleason

The subject of fires next to cities — the wildland urban interface (WUI) — is squarely in the spotlight for fire managers as housing comes closer and closer to national wildlife refuges. The National Fire Plan initiative is dedicated to reducing fire risk by clearing out dead vegetation, accumulated largely because natural fire cycles have been interrupted by fragmented landscapes and aggressive fire suppression in wild lands.

About $19.5 million of the Service's $75 million fire management budget this fiscal year is dedicated to hazardous fuels reduction in WUI areas near national wildlife refuges. There are more than 700 such communities identified at high risk from wildfire.

Most hazardous fuels reduction on refuges is accomplished with prescribed fire, a Service land management tool since the 1930s. These management-ignited burns involve detailed, long-range planning, including monitoring of weather information to keep smoke away from communities and major roads. When conditions aren't right, the burn is called off or delayed. Mechanical removal of vegetation and treatment of invasive plants with herbicides are also used to reduce hazardous fuels.

Refuge fire managers routinely work with neighboring landowners who are responsible for reducing hazardous conditions around their own property. Maintaining safe conditions on both sides of refuge boundaries provides the best protection against the spread of unwanted fire in any direction.

Whatever goes into the upper reaches of a watershed eventually work its way down. So, Minnesota Valley National Wildlife Refuge, through the Service's Environmental Contamination Program, is collaborating with the University of Minnesota to investigate stormwater run-off. The project will provide a scientific basis for recommending improved stormwater management techniques with nearby Bloomington to improve habitat quality in Long Meadow Lake. (USFWS)

Water Quality Challenges on an Urban Refuge —

An Integrated Service Approach to Management Solutions

by Dave Warburton and Vicki Sherry

Minnesota Valley National Wildlife Refuge, in addition to providing exceptional wildlife habitat, also is critical in acting as a filter to help clean water before it enters the Minnesota and Mississippi rivers. Whatever goes into the upper reaches of the watershed eventually works its way down to Minnesota Valley. How Minnesota Valley Refuge, stretching 34 miles from the Twin Cities to the community of Jordan, has faced the magnified effect of being at the bottom of an urban watershed is instructive.

With land being continually developed for the more than 3 million residents of the Minneapolis-St. Paul area, the amount of impervious surfaces — roads, parking lots, building roofs — has intensified run-off to the refuge. The area's manufacturing and transportation needs rely on significant quantities of oil and chemicals that produce byproducts that must be discharged. To prevent these potential threats to water quality from impacting refuge resources, refuge staff and the Twin Cities Ecological Services Field Office are working with watershed partners and stakeholders to develop solutions that limit inputs and increase the filtering capability of the refuge.

Through the Service's Environmental Contamination Program, the refuge is collaborating with the University of Minnesota

At Don Edwards San Francisco National Wildlife Refuge, California Conservation Corps crews supported by the refuge fire program have joined residents every year since 2001 to remove brush adjacent to homes in the densely populated subdivision of Mayhews Landing. This project maintains a 30-foot wide fire break along the perimeter of the refuge. Homes in this San Francisco Bay community had plank wood fences directly adjacent to refuge land that were often totally obscured by a tangle of brush and grass.

Burn at NASA? No problem!

At Florida's Merritt Island National Wildlife Refuge, where the Service manages land owned by the National Aeronautics and Space Administration (NASA), refuge fire managers burn about 17,000 to 20,000 acres of hazardous fuels annually. "As you can imagine, we have to do an amazing amount of coordination with NASA when we do these burns because of all the space program equipment and fuel around there," said Glen Stratton, fire management officer at the refuge. "You want to be careful when you're burning around solid rocket fuel storage areas."

A 590-acre burn, conducted over a weekend to minimize disruption for NASA personnel, was designed to rid the area of pine and oak scrub undergrowth. Veteran fire managers pulled off the project near the power substation and main transmission lines for the space center and within a half-mile of the space shuttle assembly and storage area.

Spencer Woodward, a test director at NASA who has worked for several years with fire managers at the refuge, was impressed by the precision. "It was the first time I'd gone out to see where they burned," he said. "They burned exactly where they said they would and the whole area was lightly singed. They even created a break around a bald eagle nest so they wouldn't disturb it."

Denver: Population 2.2 million

Rocky Mountain Arsenal National Wildlife Refuge uses prescribed fire to manage habitat near downtown Denver. With new subdivisions popping up around the refuge, it could well be completely surrounded by urban development. Prescribed fire is one tool that will help the refuge reach its primary purpose to restore the native shortgrass ecosystem.

Over the next 10 years, nearly 8,000 acres of former cropland will be re-seeded with grasses, wild flowers and shrubs that are native to Colorado's high plains. As prairie restoration proceeds, fire is an indispensable tool because it stimulates the native prairie vegetation and helps control noxious weeds. This spring the Service also reintroduced bison to the refuge, returning native grazers as a natural complement to fire in sustaining the prairie. ◆

Karen Miranda Gleason is national fire outreach coordinator at the National Interagency Fire Center.

to investigate stormwater run-off. The project, to be completed this summer, will provide a scientific basis for recommending improved stormwater management techniques with the nearby city of Bloomington to improve habitat quality in Long Meadow Lake on the refuge. The lake is an important breeding and resting area for mallards, blue-winged teal, wood ducks and other migratory waterfowl, wading birds and shorebirds.

- Spill response strategies have been developed to protect critical habitat on the refuge. This will help ensure the refuge and its neighbors can quickly and efficiently respond to any contaminant spills that may harm fish and wildlife populations on or off the refuge. By working with emergency responders and industry, the refuge and field office have increased awareness and appreciation that could prevent impacts to important areas such as Black Dog Lake should a spill occur.
- At Round Lake — a 152-acre unit of the refuge adjacent to the Twin Cities Army Ammunition Plant, a designated Superfund site — wastewater discharges from former plant operations once drained into the lake, contaminating the deepwater marsh with PCBs, DDT and a variety of metal compounds. The Environmental Contaminants Program and refuge staff have provided technical assistance to the Army and the Superfund team over the past 10 years to evaluate the ecological risk to refuge resources from these contaminants. The U.S. Fish and Wildlife Service recently joined with state trustees in a natural resource damage assessment at the site, designed to help restore Round Lake and other migratory bird habitat.

Wildlife Refuge Manager Patricia Martinkovic appreciates the exchange of technical expertise: "I'm convinced when different programs work collaboratively, there are three winners: the natural resource, the employees and the American public. I've witnessed how employees from each program expand their knowledge by learning from their fellow employees. They develop an awareness, understanding and appreciation for the other programs."

The partnership between Minnesota Valley Refuge and the Twin Cities Ecological Services Field Office is proving to be a model for how two Service programs can work together to improve populations of fish and wildlife and their habitats, while also providing a safer environment for the people of the Twin Cities. ◆

Dave Warburton is a contaminants biologist in the Twin Cities Ecological Services Field Office. Vicki Sherry is the Minnesota Valley Refuge biologist.

From Burrowing Owls to Mickey Mouse

by Scott Flaherty

A class project that will help protect burrowing owls and other raptors on Stone Lakes National Wildlife Refuge in California resulted in an all expense paid trip to Disneyland for teacher Mitch Carnie and his fifth-grade class at Sutterville Elementary School. The youngsters were recognized during a special "Heroes" award ceremony.

The project, "*The Great Watershed Investigation: Saving Our Burrowing Owls & Raptors,*" is California's grand prize winner of the 2006 Jiminy Cricket Environmentality Challenge, sponsored by The Walt Disney Company in partnership with the California Environmental Education Interagency Network.

The students' focus on burrowing owls began after touring "The Bufferlands," 2,500 acres of wetlands and wildlife habitat maintained by the Sacramento County Regional Sanitation District (SCRSD). During their tour, the class learned about the habitat values of riparian forests and wetlands.

"The class heard about our decline in burrowing owls and wanted to help us bring them back. We gave them the opportunity and away they went," said Beatrix Treiterer, deputy project leader for Stone Lakes National Wildlife Refuge. Using historical survey data provided by refuge biologists, the class built data tables that tracked the numbers of owls by season, breeding pairs and chicks observed since 1996. Using plastic irrigation pipe, concrete block and other materials provided by the refuge, the class eventually constructed six artificial owl dens.

Teacher Mitch Carnie (standing left of center) and Biologist Roger Jones (sitting) assemble proudly around a burrowing owl nesting den they constructed on Stone Lakes National Wildlife Refuge in California. (Sutterville Elementary School)

The class posted details of their burrowing owl habitat construction, owl population data and other parts of the project — including a project song, reports and slide presentations — to a Web site, http://schools.scusd.edu/sutterville/grades/fifth/index.html.

"I was impressed by the amount of time and dedication these students had for their project," said Treiterer, who has witnessed scores of student projects on refuges in her 15 years of Service. "They had a great teacher and showed a high level of commitment to a project that not only benefits the refuge but will leave a lasting impression on them."

Mitch Carnie has been a teacher for 22 years and has participated in the Environmentality Challenge for the past six years. He said connecting the environmental project to state curriculum standards, especially mathematics, improved his students' focus on the lesson at hand.

"When I would tell the kids, 'today's lesson on ratios or graphing concerns burrowing owls' I would have their full attention. It wasn't about math anymore, it was about the owls, and they weren't even aware they were doing school work," Carnie said.

In California, the Environmentality Challenge is a partnership between The Walt Disney Company and the California Environmental Education Interagency Network. The Network includes representatives from the U.S. Fish and Wildlife Service and Environmental Protection Agency; California Departments of Education, Food and Agriculture, Environmental Protection Agency and the Resources Agency. More than 1,000 California students in grades 3-5 participated in the Challenge this year. ◆

Scott Flaherty is in the Public Affairs office of the U.S. Fish and Wildlife Service's California-Nevada Operations Office.

A Whale of an Interpretive Project

Retired biology teacher Stacy Studebaker is coordinating the reassembly of a gray whale skeleton. The whale washed up on Alaska's Pasagshak Beach on May 28, 2000. By late this year, the skeleton will hang in the new visitor center at Kodiak National Wildlife Refuge in Alaska. (Lee Post)

By Stacy Studebaker

As a retired high school biology teacher, I viewed the 37-foot-long gray whale that had washed up on Alaska's Pasagshak Beach on May 28, 2000, as a tragedy, but also as a golden opportunity for a marine education project.

I was granted permission from National Marine Fisheries Service to fully reassemble the skeleton for an educational community project to be displayed in Kodiak. Then the experiment began.

To my knowledge, no one in Alaska had ever buried a whole gray whale as a method of cleaning a skeleton. Mike Anderson of Anderson Construction Company contributed the equipment, time and expertise to drag the 30-ton whale to the 10-foot-deep and 45-foot-long burial trench he excavated at the head of Pasagshak Bay. The whale's flippers were wrapped with landscaping fabric and duct tape to ensure the small bones would not be lost.

In 2003, the U.S. Fish and Wildlife Service offered to assist with unearthing and treating the whale skeleton. The fully rearticulated skeleton will be displayed in Kodiak Refuge's visitor center when it is completed in late 2007.

A test pit was dug in May 2004 to determine how much the whale had decomposed and to see if it was ready for a full excavation. With Pasagshak Bay drenched in bright sunlight as the dramatic backdrop, then Kodiak Refuge Manager Leslie Kerr led a ceremony to honor the whale and the respectful intent of all involved. Nearly 100 people, both volunteers and refuge staff, have been involved from the first day.

We dug an eight-foot hole over the whale burial site and hit bare bones. The bones were placed in metal mesh crates (old king crab cookers supplied by Alaska Pacific Seafoods) and grass sod was used as natural padding between the bones to cushion them for their ride back to town on the rough, unpaved road. Later, volunteers scrubbed each bone with warm soapy water. "Dawn" dishwashing liquid has proven to be the most effective soap for removing oils, which we learned from the Exxon *Valdez* oil spill in 1989, when hundreds of sea birds and marine mammals were drenched in oil.

Building a Whale to Scale

In winter 2005, I paid my own way to the Smithsonian Institution's Museum of Natural History and the New Bedford Whaling Museum to research whale skeleton restoration and rearticulation. The bones were moved to a dry, heated room at the Kodiak Fisheries Research Center where they would be reassembled.

I used a grant from the Alaska Conservation Foundation to hire some experts to help with the rearticulation. Lee Post of Homer, a whale skeleton expert and author of the *Bone Book Series*, has been working on every step of the process.

We began by building scale models of the whale and the room where the skeleton will be displayed. We decided to reconstruct the bones in a graceful S-curve. The bones of both flippers were rearticulated with metal rods and epoxy. All the vertebrae were lined up, numbered and measured so we could determine their precise spacing. Local metal expert and welder Stanley Wolrich built a long steel cart to support the main part of the skeleton while it was being rearticulated. The cart has wheels so the skeleton can be moved onto a flat bed trailer for transport to the visitor center.

Kodiak Refuge Manager Gary Wheeler is facilitating placement of the skeleton. The skeleton sections will be moved in one by one and hung from the second story ceiling as a complete and magnificent gray whale skeleton for all to admire. ◆

This article is adapted from the Web journal Stacy Studebaker maintains at http://www.kodiakgraywhaleproject.org/. Studebaker last wrote for Refuge Update in May-June 2006.

Seals and Swamps: Collaborating with NOAA

Twin Hawaiian monk seals are thriving in a captive enclosure at Midway Atoll National Wildlife Refuge. The refuge works with NOAA to maintain the enclosure and prepare the seals for reintroduction to the open ocean. (USFWS)

Twin seal pups are thriving at Midway Atoll National Wildlife Refuge in Hawaii because of a collaborative effort with the National Oceanic and Atmospheric Administration (NOAA). On the opposite side of the country, Florida's National Key Deer Refuge Complex is a key partner in the operation of the new Florida Keys Eco Discovery Center.

NOAA projects and activities intersect in myriad ways with the mission and goals of the National Wildlife Refuge System.

NOAA is celebrating its 200th birthday in 2007, honoring Thomas Jefferson's establishment of the Survey of the Coast in 1807 to provide nautical charts for safe passage into American ports and along the coast. By 1970, when NOAA officially came into being, the organization was also charged with preserving fish and marine mammals.

In May 2006, two newly-weaned, rare and critically endangered Hawaiian monk seals were observed at Midway Atoll Refuge. The undersized pups were taken from the refuge to the NOAA Pacific Islands Fisheries Science Center in Honolulu for supplemental feeding.

In October, the seals — with the less-than-endearing names PO22 and PO26 — were returned to a captive care program at Midway Atoll Refuge. NOAA (National Marine Fisheries Service, Protected Species Division), the Marine Mammal Center and Sea World Texas all have one or more full-time employees working on the project.

The refuge provided logistical support to move equipment, personnel and seals and assist in the construction of the enclosure. The pen is half in the ocean and half on land, so the seals can swim but also bask in the sun. NOAA and the Marine Mammal Center are responsible for feeding the seals and providing health care.

Seal Population Dropping

There have been several captive care programs for Hawaiian monk seals over the past 15 years with NOAA as the lead agency and involving Midway Atoll or Hawaiian Islands National Wildlife Refuges. The population of these seals in the northwestern Hawaiian islands is declining rapidly. There are currently about 1,200 seals, and Refuge Biologist John Klavitter says the number is expected to dip below 1,000 in the next few years.

Monk seal mothers stay with their pups for about six weeks. After the mother leaves, the pups are on their own, often without enough blubber to sustain them while they learn to forage for themselves. By feeding pups until they can be released at a heavier weight, explains Klavitter, "they are kept out of harm's way — sharks, starvation, marine debris — for their first winter."

Klavitter says PO22 and PO26 weighed less than 90 pounds when they were brought into captivity; by mid-March, they weighed approximately 150 pounds. They are expected to be released into the wild this spring, identified with unique colored flipper tags and tiny satellite transmitters glued to the fur between their shoulders. The transmitters will be lost when the seals molt within the year. Their survival during the next year will be one of the factors in determining whether the captive care program at Midway Refuge will continue into the future.

On the opposite side of the country, the refuges of the Florida Keys — National Key Deer Refuge, Crocodile Lake, Great White Heron and Key West National Wildlife Refuges — are partners in another collaboration with NOAA, the $6 million Florida Keys Eco-Discovery Center, an environmental education facility operated by NOAA's National Marine Sanctuary, the National Park Service and the U.S. Fish and Wildlife Service. Funding for the center came from the National Marine Sanctuary Foundation, the National Fish and Wildlife Foundation, South Florida Water Management District, Royal Caribbean Cruise Lines and Comcast.

The center opened in January. Just two months later, it was already drawing as many as 200 visitors on a single Saturday.

National Key Deer Refuge Manager Jim Bell was a member of the team that designed interpretive information for the center, which includes displays on the eco-system of the Keys as well as specific information about the Service and the Keys refuges. Bell staffs the center one day a week. He expects to reach visitors who would otherwise pass right by the refuge to get to Key West, as well as visitors from cruise ships that are expected to offer shore excursions including visits to the center. ◆

For more information on the Florida Keys Eco-Discovery Center visit http://www.floridakeys.noaa.gov/eco_discovery.html.

Bienvenida!! Welcome! — *continued from pg 13*

Rocky Mountain Arsenal Refuge has an added challenge. Because parts of the refuge are still being cleaned up from previous military activity, the refuge is surrounded by a fence and there is a guard booth at the entrance. James says this intimidates many potential visitors.

"We realized that it doesn't matter how much publicizing we do, they are not going to come to us," says James. "So we have to go out into the community to reach them. We try to make ourselves seen."

Refuge Staff: Visible and Spanish-speaking

The refuge sets up a booth at community outreach events in Commerce City, gives presentations to churches and business groups, maintains steady involvement with the local recreation center and even offers nature programs at the center. During the summer a refuge van is available to pick up people up from the recreation center; James says 10-15 people will fill the van and come to the refuge for a nature program or wildlife tour. For the past five years, James says the refuge has also had one Spanish-speaking staff member and "it makes a huge difference to have someone wearing the uniform who speaks Spanish."

Mike Carlo knows that in a big way at the South Texas Refuges Complex, where refuge staff regularly give interviews in Spanish to the many Spanish language media outlets in the Lower Rio Grande Valley. There are Spanish-speaking employees in almost all departments and the Friends groups that operate the gift shops stock Spanish-language natural history titles. "The percentage of Spanish-language materials is small," says Carlo, "but it illustrates the point that the refuges and their Friends groups are coordinating their efforts and trying to make Spanish-speaking visitors feel welcome."

In December 2006, the complex's newest visitor center opened right on the U.S.-Mexico border, a short walk across a suspension bridge to Ciudad Miguel Aleman. All exhibits, brochures and signs are bilingual. "Not only do we want to welcome U.S. residents who speak only Spanish to our facility," says Carlo, "but we recognize the wonderful opportunity to attract and educate our Mexican neighbors — who are often closer to the visitor center than Roma residents — about conservation and the FWS mission." ◆

Rocky Mountain Arsenal National Wildlife Refuge has environmental and interpretive programs targeted to Hispanic communities. (USFWS)

Ride a Jet Plane — Plant a Native Tree — *continued from pg 1*

National Wildlife Refuge in Louisiana. In both cases, the trees were planted in habitat damaged by Hurricane Katrina.

Travelocity Trees at Bogue Chitto Refuge

Trees planted at Bogue Chitto Refuge, located 45 miles north of New Orleans, were funded in part by customers of Travelocity, the online travel agency. Travelocity accepts donations to Go Zero℠ whenever travel services are purchased. "A contribution of just $10," says the Travelocity Web site, "offsets an average trip including air travel, a onenight hotel stay and rental car for one person."

"By leveraging new sources of conservation capital," says The Conservation Fund President Larry Selzer, "we're demonstrating the extraordinary results that can be achieved when public and private partners support a balanced approach to conservation."

Selzer noted that Go Zero℠ appeals both to people who care about global warming but also those who "simply care about re-generating our nation's forests and wetlands and the wildlife that inhabits them." The Conservation Fund says the Go Zero℠ program has planted five million trees on 25,000 acres which will sequester seven million tons of carbon dioxide over the next century.

During the tree planting ceremony at Santee Refuge, Service Director Dale Hall acknowledged the value of creatively working with partners to restore America's native forests. "The issue of climate change can be overwhelming," said Hall. "There is a fair amount of debate about some aspects of the subject for sure. But there is no debate about the benefit of planting trees."

Need Trees?

More plantings are scheduled this year and next at refuges in California, Mississippi, Illinois, New Jersey, South Carolina, Oklahoma and Michigan. Additional refuges may be added to the list if they have five or more acres of fallow or unproductive agricultural land that once was forest. Each acre is planted with about 400 seedlings. Parcels should be at low risk for destruction from fire or wind. All Go Zero℠ forests are native trees but individual refuges determine the mix of species. Interested refuges should contact Jena Thompson at The Conservation Fund at jthompson@conservationfund.org. Learn more at http://www.conservationfund.org/?article=3128&back=true. ◆

Around the Refuge System

Alaska

A creative and energetic volunteer has figured out how to dovetail her work for the Arctic National Wildlife Refuge with the Literacy Council of Alaska. The council's Forget-Me-Not used bookstore originally served just the community around Fairbanks. While completing a clean-up project on the refuge's remote runways and lake shores, Shari Boyd — who volunteers for both the refuge and the Literacy Council - wondered about extending the Literacy Council's reach to the bush. Wilderness specialist and pilot Roger Kaye agreed to drop off books when there was room in the plane and the Literacy Council agreed to supply the books. Soon Boyd also enlisted

Arctic National Wildlife Refuge volunteer Shari Boyd is shown with pilot Roger Kaye. Boyd organized a program to ship used books to bush villages on the refuge. (USFWS)

Wright Air Service to carry books on its passenger and cargo flights, dropping at community centers in the bush villages. Back on the refuge, Boyd has helped maintain a digital photo library and prepare for outreach events in Fairbanks. Last October, she received a cash award and certificate of appreciation from Arctic Refuge Manager Richard Voss along with a copy of *Arctic Wings: Birds of the Arctic National Wildlife Refuge,* signed by photographer Subhankar Banerjee.

Florida

Arthur R. Marshall Loxahatchee National Wildlife Refuge helped 40 students from low income schools become amateur photographers during the annual Trail Spruce-Up volunteer event sponsored by the Arthur R. Marshall Foundation. "The Everglades through the Eyes of Children" project is funded by the Palm Beach County Cultural Council. Students ages nine to 17 learned basic photography from skilled mentors and then took pictures of people and nature around the refuge. "It's never boring," said 16-year old Stephanie Dorsainvil. Josette Kaufman, Marshall Foundation executive director, says the project also introduces urban youth to the Everglades. "We hope that giving them a positive, hands-on experience will help them develop an interest in the wetland wilderness in their backyards," says Kaufman. One photo from each child will be in an exhibit traveling around Palm Beach County later this year.

A group of students and mentors at the Marshall Foundation's "Everglades through the Eyes of Children" Photography Project focuses lenses on an alligator at the Arthur R. Marshall Loxahatchee National Wildlife Refuge in Florida. (Steve Tisci/Arthur R. Marshall Foundation)

Oregon

Tiny Steigerwald Lake National Wildlife Refuge northwest of Portland, Oregon, is getting some big help from the Vancouver Audubon Society, the Georgia Pacific Mill in Camas, Washington, and a host of local volunteers. Approximately 2,300 mostly potted native shrubs were purchased by the refuge and Vancouver Audubon, then cared for at a nursery operated at Georgia Pacific by employee Wilson Cady, who also volunteers at the refuge. The Columbia Gorge Refuge Stewards, the Friends group for Steigerwald Lake Refuge as well as Franz Lake and Pierce National Wildlife Refuges, solicited volunteers for Stewardship Saturdays, held just about every Saturday from December through early April. Refuge Manager Jim Clapp says it looks as if they will reach the goal of planting six acres with such species as Oregon ash, black hawthorn, mock orange, willow, dogwood, all flowering shrubs to attract birds. Fifteen to 20 volunteers have shown up every weekend; a Boy Scout troop even served breakfast before the work started one morning. Clapp said that refuge staff is also working with the Federal Lands Highway Division to design an interpretive kiosk and trail that will pass right by the new planting.

Wyoming

Volunteers at National Elk Refuge plan to spend more time roving at the Visitor Center this summer. Two volunteers — Bud and Elaine Hamm - became the refuge's first roving naturalists last summer, making themselves available four days a week on the upper deck observation platform at the Visitor Center. The viewing area offers excellent vistas of nearby Flat Creek, rich in bird life. The Hamms, equipped with binoculars, spotting scopes and bird identification books, enthusiastically made the transition. "We felt so much more tied to the resource and the refuge's messages," explained Bud Hamm. His wife Elaine used a cardboard cutout to demonstrate the wingspan of the trumpeter swans that often came within close range of the viewing platform. The Hamms had contact with 1,260 visitors during their first four weeks as roving naturalists. They're eager for the next roving season and the expansion of the program with additional volunteers.

Volunteers — including Georgia Pacific employee Wilson Cady and Washougal Mayor Stacee Sellers — are planting 2,300 native shrubs at Steigerwald Lake National Wildlife Refuge near Portland, Oregon. (USFWS)

North Carolina

The Mattamuskeet Foundation has recently released a new DVD starring birds and other wildlife at Mattamuskeet National Wildlife Refuge. "A Winter Day — Lake Mattamuskeet" features 40 species you can spot on the refuge during the winter. A second DVD will feature Pungo Lake at Pocosin Lakes National Wildlife Refuge, also in eastern North Carolina. Each DVD features natural sights and sounds with original music but no narration. The DVDs will be distributed to all fourth, eighth and tenth grade classes, Boys and Girls Clubs, assisted living, mental health group homes and nursing home facilities as well as state and national parks in North Carolina. The Foundation is also sending complimentary DVDs to Ronald McDonald Houses and all national wildlife refuge managers for use as a training tool. Additional DVDs are being sold to raise funds for the complimentary distribution. The Mattamuskeet Foundation engages in research and educational activities to preserve the history and ecology of Lake Mattamuskeet and surrounding areas of eastern North Carolina. (www.mattamuskeet.org or call 252-746-4221)

Duck Stamp Celebrates 75 Years

The duck stamp is coming home. Judging for the 2008-9 Federal Duck Stamp Contest will be held in October at the J.N. Ding Darling National Wildlife Refuge near Sanibel, Florida. Darling, a cartoonist and conservationist, designed the first duck stamp in 1934. Adjusted to 2005 dollars, Duck Stamp sales from 1934 through 2004 actually total nearly two billion dollars. Every waterfowl hunter over the age of 16 is required to buy a duck stamp and the stamps are also purchased by collectors. Retired NBC weatherman Willard Scott has been invited to host this year's judging. Refuge Manager Rob Jess says Scott is a regular on Sanibel Island, often delivering his popular weather reports from the refuge. Jess asked if Scott would like to participate in the duck stamp event when they chanced to meet at the local grocery store. Scott was delighted and already well informed about the duck stamp. Besides, added Jess, "this island loves him to death."

Special Report Available

Countering Resource Challenges and Building Community Bridges is a brand new special report from the National Wildlife Refuge System. Service Director H. Dale Hall writes that the report is "designed to make it easier to navigate some untried management terrain by bringing you the lessons learned by others." Fourteen case studies covering every region of the country address controversies involving habitat restoration, law enforcement, compatible recreation, community involvement and disaster response. Copies have been sent to all refuges and Friends groups. Additional copies are available by writing to Martha_Nudel@fws.gov. ◆

Honors

Three national wildlife refuges have won *Sunset* Magazine's 2007 Environmental Awards. The magazine says these "preserved paradises…are amazing success stories, won by complex public-private partnerships." **Alaska Peninsula National Wildlife** in southwest Alaska collaborated with The Conservation Fund to acquire 50,000 acres of habitat for salmon, caribou and brown bears. "Backpack, fish, hike, or just bliss out amid nature's abundance," says *Sunset.*

The **Northwestern Hawaiian Islands Marine National Monument** is acknowledged as one of the world's largest single acts of conservation. **Tualatin River National Wildlife Refuge** in Oregon, not far from Portland, is home to more than 50 species of mammals and more than 200 species of birds. "In late winter and early spring, cackling Canada geese, northern pintails and mallards blanket the marshlands" of one of Oregon's newest refuges.

Public Use Specialist **Gay Gannaway Brantley** of the North Louisiana Refuge Complex has been honored with the Governor's Award for conservation achievement. She was cited for her professional and volunteer contributions to educating citizens through outstanding programming and outreach at all five units of the complex. The award is presented annually for contributions toward the protection and wise use of Louisiana's natural resources. ◆

Hands-on, Ears-on, Noses-on — *continued from pg 15*

specialist Erika Scarborough. Lafferty grew up near Tinicum Marsh before it became a refuge, cutting cattails his blind uncle used to make cane chairs. His kindergarteners regularly plant vegetables and flowers in a vacant lot near their classroom.

Two years ago, after a city contractor allowed a house that was being demolished to fall on the garden, the Friends of Heinz Refuge helped publicize the incident and ultimately won damages from the city and the contractor to restore the habitat. Kindergarteners now harvest marigold and sunflower seeds from the garden and package them for sale in the Friends of Heinz bookstore.

During one visit to the schoolyard habitat, a little boy was sitting next to a butterfly bush when a monarch almost landed on his head. "Why did that butterfly almost land?" Lafferty asked. "Because he was sitting still and the butterfly wasn't afraid. When you sit still in nature, you can see things." Within seconds, recalls Lafferty, there were 16 small children sitting quietly under the butterfly bush. ◆

Protecting Birds from Jets at Pocosin Lakes Refuge — *continued from pg 3*

reduced or altered vegetation that would not be as attractive to wildlife, thereby "lowering the abundance of wildlife that might contribute to BASH;" it could also include "lethal removal of wildlife through the application of toxicants, shooting or trapping."

In his testimony, Hall said "we respectfully disagree" with the Navy's conclusion that this BASH plan would cause only moderate impacts to the distribution of waterfowl. Hall noted that other North Carolina sites identified in the Navy's statement "present far fewer risks to the resources we are charged with managing on behalf of the public."

He concluded his testimony by saying "we look forward to continuing to work with the Navy to address these issues." ◆

Building Support at Vieques National Wildlife Refuge

When the Vieques National Wildlife Refuge was created primarily from former Navy lands in 2001 and 2003, no one from the federal government was welcome in this island municipality of Puerto Rico. Four years later, with a draft CCP newly released to the public and arduous outreach work, Vieques Refuge has the first inkling of a local Friends group.

For almost sixty years (1943-2001), local residents on the island knew the federal government only as the U.S. Navy which operated a bombing range using live ammunition as well as munitions storage and disposal facilities, fleet training and support services. When the Navy lands began to be transferred to the U.S. Fish and Wildlife Service, recalls refuge manager Oscar Diaz-Marrero, some local residents "called us everything, including the new conquistadores."

Diaz-Marrero is Puerto Rican himself, but "I'm from the big island, not from Vieques." Initially, he said, local residents only wanted to talk to him because they had a big issue over who would control and manage their land. "We are in the middle of managing a refuge with a lot of areas closed to the public because of unexploded ordnances," says Diaz-Marrero, who decided to dive into this murky lagoon head first.

One goal of the CCP process was to "develop effective and open communication with the community to raise public awareness of refuge programs, management decisions, the mission of the Service and the National Wildlife Refuge System by working closely with the Vieques citizens." During some of the early public scoping sessions, 100 people attended out of a total island population of only 9,200. "The public is very concerned about how the Service is going to administer these resources," says Diaz-Marrero.

Three of the world's seven species of sea turtles live on Vieques National Wildlife Refuge in Puerto Rico. Local students patrol the beaches to protect sea turtle nests from predators and poachers. Members of the broader community are now involved in protecting the sea turtles and are about to become a Friends group for the refuge. (USFWS)

Protecting Sea Turtles

One of those resources — the giant, gentle sea turtle — became a collaborator in improving relations between the refuge and the local population. Vieques Refuge has three of the seven species of sea turtles that exist in the world. A sea turtle conservation group was established with a local biology teacher. Students patrolled the beaches during the night to protect sea turtle nests from predators and poachers. The small group expanded to include members of the broader community.

The Service provided training, tools and equipment to the group and the local community has taken "ownership of this resource and that's a major accomplishment," explains Outreach Specialist Gisela Burgos. She adds that the community group that works on sea turtle conservation has now incorporated itself as a non-governmental organization and is expected to become the refuge Friends organization.

Nerves of Steel

The cleanup itself is another challenge for the refuge. The Navy says as many as 9,000 of the refuge's 14,500 acres on the eastern side of the island may contain munitions. All areas affected by military contaminants are classified as a "superfund site." Officials expected to clear 400 acres in seven months but it has taken almost a year-and-a- half to clear just two acres.

While the Navy is responsible for the cleanup, the actual process requires considerable coordination and diplomacy, says Diaz-Marrero. He meets quarterly in San Juan with representatives from the Navy, NOAA, the Puerto Rican Departments of Natural Resources and Environmental Quality Board, the Environmental Protection Agency and half a dozen Navy contractors. Cleanup operations must be scheduled around visits by other federal officials — such as the fire management officer who wanted to evaluate areas where the

continued pg 27

Hakalau Forest: This Land is Your Land

By Susan Newton

Hawaii, in its native, pre-contact state, was extremely fragile ecologically. It was lovely, hospitable, warm, open, fertile — a place that everything on the planet loved. However, due to its extreme isolation, very few species had actually managed to make it there. The ones that did came slowly and sparsely and, over time, they had speciated and become something new: uniquely adapted to the island and to their fellow inhabitants.

Post-contact Hawaii has been the scene of biological and botanical violence that is not easily perceived by a casual onlooker. One needs a trained eye, which Dick Wass provided for us. Dick has been refuge manager of Big Island National Wildlife Complex Refuge since 1987, in charge of the 33,000 acres on the east flank of Mauna Kea. The refuge's mission is to return the land to its native state.

At this stage in its restoration, Hakalau Forest National Wildlife Refuge is largely koa forest: home to eight endangered bird species and 12 endangered plant species. When the property was acquired by the U.S. Fish and Wildlife Service, cattle grazing had destroyed the original koa forest and the resulting treeless land had become tangled with gorse.

Gorse is a dreadful, non-native thorny species that arrived from Ireland around 1910 in the wool of sheep. It quickly took hold, and choked out what had lived there for hundreds of thousands of years. Trying to control the gorse with fire only made it worse. What few surviving native species the gorse didn't strangle, the feral pigs ate and tore up.

Stopped at the Service Gate

After dodging gorse, feral cattle, feral pigs and a staggering number of ground-dwelling birds native to Europe and Asia, the ocean of noxious weed stopped abruptly at a fence and a gate with a Service logo. It bore a warning sign stating that beyond lay refuge property, and that visitors needed to clear their shoes and clothing of stray seeds and bits of vegetation. Beyond the gate lay a smooth and clear expanse of grasses, dotted by dignified and stately native koa trees.

At this stage in its restoration, Hakalau Forest National Wildlife Refuge in Hawaii is largely koa forest, home to eight brilliantly colored by endangered bird species and 12 endangered plant species. (Jim Clark/USFWS)

Koa (the "warrior tree") is an ancient Hawaiian species known for its crescent-shaped adult leaves, stately posture and life-giving properties. Koa (*Acacia koa*) pre-dates the arrival of humans by millions of years. As home to an estimated 40 insect species, it is vital to native bird species as well. The refuge's main focus at the moment is reconstructing the koa forest.

Distant koa trees stood ghost-like and half-visible. I heard "ee-ee-weeeee!" and raised my field glasses just in time to see a flash of red. The splashy little bird who had been making all the racket had a thick, hooked, orange beak, and this one was hanging upside down on an ohia blossom gathering nectar.

Dick told us that little bird is an endangered i'iwi, one of those birds that conveniently says its own name. Hakalau Forest is a terrific place for the i'iwi, and the refuge has managed to restore the habitat to sustain a good-sized population.

Leaving Hakalau, the ecological devastation wrought by the runaway gorse and feral pigs was many times more obvious to me than it was going in. I'm not convinced I could really thank Dick enough for what has been accomplished at Hakalau Forest. So thank you again, Dick Wass, and the U.S. Fish and Wildlife Service. ◆

Susan Newton wrote this journal entry after she was shown around by Big Island National Wildlife Complex Refuge Manager Dick Wass. Newton works for the Colorado Department of Public Health and Environment.

Chief's Corner *— continued from pg 2*

today, many refuges are working with the National Wild Turkey Federation to offer "Women in the Outdoors" programs, which give expert instruction to people who might otherwise never pick up a fishing rod, consider hunting, or even go hiking.

The program is a good start because women are especially important if we hope to motivate children away from the computer and into the outdoors. About a quarter of American households are headed by women. Women have always greatly influenced what a family buys and how it spends its leisure time.

Already, 45 percent of Americans take part at least once a month in outdoor recreation as a family. How would our society and our

Dismal Swamp Discoveries — *continued from pg 4*

— supported the notion that the residents of many camps got little of what they needed from the outside world."

Elsewhere, he also uncovered the remains of temporary 18th and 19th century camps first occupied by the slaves who dug ditches and canals and then by woodworkers who subsequently turned the swamp's cedar and cypress into shingles, staves and other wooden products that were floated out on the waterways.

Sayers methodically sifted soil from carefully selected plots—often, in the case of a suspected maroon site, rectangles that followed the outlines of rough-hewn cabins — through a screen supported by a tripod. On one island, Sayers recalls, a black bear took a keen interest in his work — or, rather, in the thick black plastic he used to cover tools left at the site overnight. On many a morning, he would find the plastic ripped and bitten. The bear also had a taste for tripod legs; they looked like toothpicks when he was through gnawing.

Sayers has not yet completed work on his doctor's degree, but news of findings—which he and other cultural specialists have reviewed in several public appearances — has already found a wide audience.

An award-winning television documentary on the Great Dismal Swam — and its important place in African-American history — included an update on Sayers' discoveries. The documentary, produced by the city of Chesapeake (VA) public communications department, was first aired in the fall of 2005.

The mounting interest in the life and times of the maroon communities, together with the Underground Railroad designation, have made Great Dismal Swamp Refuge an increasingly popular destination for African-Americans and others interested in the rich history of the region.

In response, the refuge is installing interpretive panels at its entrances. New fact sheets — long and short versions — are also available for visitors. Tour guides now must be well-versed in the swamp's extraordinary wealth of plants and animals and its role as a safe haven for African-Americans.

"So many people come in and ask about the maroons — 'Who were they?', 'Where did they live?', 'How did they sustain themselves?', " says Delores Freeman, the refuge's visitor services professional. "It's opened us up to a whole new audience — including church groups. Bus loads of people come in, and they all want to hear about the maroons." ◆

Building Support at Vieques National Wildlife Refuge — *continued from pg 25*

Navy intends to use prescribed burns to clear an area or news reporters whose access is strictly limited.

An Associated Press reporter was the first to observe the cleanup in February. "It is dangerous work," wrote Andrew Selsky, "requiring concentration, keen eyesight and nerves of steel."

Removing all the munitions could take a decade. What seems a long time is seconds in the life of the island. Archaeological excavations in the area of Barracuda Bay (Puerto Ferro) have uncovered human bones from almost 4,000 years ago — one of the most ancient human remains of the Caribbean. The draft CCP calls for stabilizing and interpreting these historic resources while expanding opportunities for the current population.

"We are administrators of the resources," Diaz-Marrero reminds the residents, "but there are lots of economic opportunities for people who want to work with FWS by supporting compatible recreation like wildlife observation and horseback riding. People are beginning to see ecotourism as an economic engine." These activities can start in public areas as soon as the CCP is approved, says Diaz-Marrero. ◆

conservation ethic be different if that were 65 percent — or 85 percent?

Change in society's recreation habits will only come incrementally, and national wildlife refuges are on the cusp of promoting that change. That is demonstrated in many of the stories in this *Refuge Update* focus on urban refuges, which highlights how refuges are making a real effort to reach new and diverse populations. With a national wildlife refuge less than an hour's drive from most major metropolitan areas, we have the power to reach millions of families and the children who will not only become tomorrow's anglers and hunters, but also the backbone of its conservation ethic. ◆

Barging in on the Whooping Cranes

"Grab your binoculars and head for the Sky Deck to glimpse the ecological wonders of this federally protected sanctuary." The sanctuary is Aransas National Wildlife Refuge in South Texas, a prime stop for RiverBarge Excursions. The company's River Explorer is a floating hotel built on two connected barges that plies the great rivers of middle America — Mississippi, Ohio, Cumberland, Tennessee, Illinois and Atchafalaya.

The River Explorer was launched in 1998 and offers 99 outside staterooms, many with balconies. Birders often set up their spotting scopes and binoculars in the lobby to begin searching for pelicans, roseate spoonbills, black-necked stilts or double-crested cormorants as soon as they board.

The Galveston to Port Isabel excursion along the Gulf Intracoastal Waterway is timed for people who want to see the whooping cranes that winter in Aransas Refuge. Travelers typically count 65 to 85 cranes as the barge passes through the refuge.

The refuge staff learned about the RiverBarge visits early this year when Cathy Porter, coastal conservation coordinator for The Nature Conservancy, asked to borrow several refuge videos to show cruise participants. Bernice Jackson, supervisory outdoor recreation planner at Aransas Refuge, says the whooping crane videos were shown several times to a total of 250 barge passengers.

River Explorer, a barge-hotel run by RiverBarge Excursions, passes through Aransas Refuge as it sails the Gulf Intracoastal Waterway. (Steve Hillebrand/USFWS)

Expanding Ecotourism

Jackson would like to develop a stronger connection with RiverBarge but she is also busy with other ecotourism opportunities on the refuge. The refuge, which hosts 60,000 visitors a year, provides information about three tour boat companies that offer regular day trips through Aransas Refuge during whooping crane season. Several of the naturalists on these boats are refuge volunteers.

Aransas Refuge has a good working relationship with the local chambers of commerce and newspapers in three surrounding counties, who refer out-of-state visitors. The refuge also provides programs to Elderhostel groups in partnership with the University of Texas Marine Science Center in Port Aransas and Galveston. It is a featured site on the Great Texas Coastal Birding Trail. ◆

Send Us Your Comments

Letters to the Editor or suggestions about *Refuge Update* can be e-mailed to RefugeUpdate@fws.gov or mailed to *Refuge Update*, USFWS-NWRS, 4401 North Fairfax Dr., Room 634C, Arlington, VA 22203-1610.

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