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Numerous studies on national wildlife refuges are focusing on the decline in bat populations.

It's Your Turn!

What are you most passionate about in your work? Are you working on a project or tackling a challenge that you would like to share with others in the U.S. Fish and Wildlife Service and in the Refuge System? Give us the details in 150 words or less and we will run it in a future issue of *Refuge Update*. Send your story to Martha_Nudel@fws.gov. Please remember to give us your job title.

RefugeUpdate

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Rocky Mountain Cleanup On Schedule



Lake Mary is just one place where people already enjoy wildlife-dependent recreation on Rocky Mountain Arsenal National Wildlife Refuge, expected to be completely cleaned of military contaminants by 2011. Nearly 5,000 acres of arsenal land was transferred into the Refuge System in April 2004. The Environmental Protection Agency is proposing to delete an additional 7,400 acres at Rocky Mountain Arsenal from the National Priorities List this year. By the year's end, only two contaminated areas will remain. (Rich Keen)

By Dean Rundle

Fourteen years after Congress established Rocky Mountain Arsenal as a national wildlife refuge, the refuge's \$2.2 billion cleanup has progressed on schedule and on budget, and with an enviable safety record. We are seeing the proverbial light at the end of the tunnel.

Some History

The idea of converting national defense lands into national wildlife refuges isn't new. It has been more than 100 years since the last roll call of the 9th Cavalry Regiment at Fort Niobrara, Nebraska. In 1912, the fort became Fort Niobrara National Wildlife Refuge and today supports bison and elk as well as migratory birds and prairie dogs on its rolling grasslands.

After World War II, Congress transferred the lands and waters of the Illinois Ordnance Plant to the U.S. Fish and Wildlife Service and renamed the area as Crab Orchard National Wildlife Refuge. Since the end of the Cold War, as defense needs have changed, many other former defense sites with significant wildlife habitat resources have become part of America's Refuge System.

In the mid-1980s, the Service's Environmental Contaminants program became involved with Rocky Mountain Arsenal (RMA), an Army chemical weapons production site on the northeast corner of Denver. Service contaminants biologists were stationed at RMA to evaluate the impacts of contaminants on birds and other wildlife. Following discovery of a major winter roost site for

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From the Director

The Enduring Value of Wetlands

About 60 national wildlife refuges in the southeast – nearly half of all

our refuges in the region – were damaged last year when hurricanes Katrina and Rita left devastation in their paths. An estimated 234 square miles of coastal wetlands and bottomland forests were damaged on national wildlife refuges in the Gulf Coast region, including expanses of coastal marshlands along the Louisiana-Mississippi coast and important inland systems like the Atchafalaya basin. These losses were severe, but we will compound them if we lose the opportunity they present to talk to the American public about the importance of wetlands.

Out of the tragedy came the unexpected chance to see firsthand that wetlands provide protection for people and property. As I travel across the country, I

note whenever I can that wetlands protect levees and levees protect people.

National wildlife refuges played a huge role during the storm because the flooding and winds they absorbed helped lessen the danger to people and structures. When I toured Sabine and Cameron Prairie National Wildlife Refuges in June, I saw for myself just how bad the damage was. But I could also imagine how much worse the damage would have been without the buffering effects of these natural areas. In fact, the U.S. Geological Survey estimates that, on average, for every 2.7 miles a hurricane travels across marshes, the storm surge is reduced by one foot. History has given us a vivid picture.

Both Hurricane Camille in 1968 and Hurricane Katrina in 2005 were Category 5 storms. Both followed similar paths as they came on shore. But, when Camille hit Biloxi and Gulfport in Mississippi, the

old homes along the gulf shore weathered the storm. Then came Hurricane Katrina. Both Biloxi and Gulfport were nearly leveled along the shoreline.

What made the difference? Some argue it was the 1,000 square miles of marsh lost between 1968 and 2005.

Now, as we plan the rebuilding of the Gulf Coast, we must help people recognize the importance of wetlands as storm damage abatement structures. By using the lessons learned from Katrina and Rita, we have another chance to connect the upstream river with the downstream building of marshes.

Just as they are important wildlife habitat, national wildlife refuges are also important educational venues. This is one lesson that merits repetition anywhere the public gets information about wildlife and habitat.



Chief's Corner

Taking Control For the Benefit of Wildlife

By the time this issue goes to press, Fish

and Wildlife Service Director Dale Hall will have already testified before the House Resources Committee about the Refuge System efforts to address the difficult financial times in the years to come and still deliver conservation and wildlife-dependent recreation to the American people. Many regions have already begun to deal with the realities of shrinking management and purchasing capacity, which leads us to the assessment that we are now taking System-wide.

Our Refuge System work spans many scientific, environmental, regulatory

and social arenas. To continue to manage effectively, 20-30 percent of a refuge's base budget must be devoted to non-salary costs – such day-to-day costs of doing business as fuel, utilities, monitoring wildlife, restoring habitat, and maintaining equipment and facilities for wildlife and people, just to name a few expenses that rise each year.

We also know there isn't enough staff to do all the good things we want to do, and our budgets will, at best, remain static.

All of the Service's regions are working together to look carefully at estimated

RefugeUpdate

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Patrolling For Avian Influenza

By Brad Bortner and Susan Saul

During this year's spring migration, staff from the Pacific Region and the California/Nevada Operations Office worked with partners from state wildlife agencies, USDA-Animal and Plant Health Inspection Service and U.S. Geological Survey to develop plans to monitor birds in the Pacific Flyway and Pacific Islands for highly pathogenic H5N1 avian influenza (HPAI H5N1). Refuges also began preparations to respond to detection of HPAI H5N1 in birds on U.S. Fish and Wildlife Service lands.

The states are receiving funding for H5N1 monitoring from the Service and USDA-Wildlife Services.

Analysis of bird migration patterns indicates that birds could possibly move from areas in Asia that have had HPAI H5N1 outbreaks to North America and the Pacific Islands. Stepping down the U.S. Interagency Strategic Plan, the Pacific Flyway Council developed *Surveillance for Early Detection of Highly Pathogenic Avian Influenza H5N1 in Wild Migratory Birds – A Strategy for the Pacific Flyway*. This plan established priorities for conducting a coordinated early detection surveillance to detect HPAI H5N1 in wild migratory birds.

In addition, every refuge manager has updated the field station's disease contingency response plan and caches of personal protective equipment are being assembled at key field stations for use by employees who may be asked to respond to a disease outbreak. Disease response training has been scheduled for employees in Region 1 throughout the summer.

Surveillance activities are focusing on key species of waterfowl and shorebirds that are most likely to have contact with the virus, based on exposure to birds migrating from Asia or sharing flyways with potentially infected birds. Species migrating to the Pacific Flyway from Asia originate from a relatively small number of locations, and spread throughout the flyway as they migrate.

Coordinating Sampling on Refuges

In the Pacific Islands, several species of shorebirds and waterfowl hopscotch from Asia through the islands on their way to Siberia and Alaska and return through the Pacific after the breeding season. The Service, other federal agencies and state wildlife agencies are coordinating sampling efforts so that birds originating from different locations are adequately sampled, and there is no duplicate sampling of flocks with the same origin.

In partnership with the states, some surveillance activities are taking place on national wildlife refuges throughout the summer and into the fall. Ridgefield National Wildlife Refuge in Washington is sampling hunter-harvested northern shovelers. Stillwater National Wildlife Refuge in Nevada is sampling juvenile mallards and dowitchers captured during banding; northern pintails and other dabbling ducks recovering from avian botulism outbreaks; tundra swans, pintails, mallards and other dabblers killed by waterfowl hunters; and fecal material from swan roosting locations.

In Idaho, Deer Flat and Bear Lake National Wildlife Refuges are sampling hunter-killed waterfowl. Umatilla National Wildlife Refuge in Oregon is testing hunter-killed pintails and other dabblers. In addition, Service personnel are assisting Oregon Department of Fish and Wildlife with live sampling of pintails and green-winged teal at some state wildlife areas.



Stillwater National Wildlife Refuge in Nevada is sampling tundra swans for highly pathogenic H5N1 avian influenza. The swans are one of many migratory bird species being monitored on national wildlife refuges this summer (USFWS).

In California, the Klamath Basin refuges are sampling pintails. Humboldt National Wildlife Refuge is sampling hunter-harvested black brant and ducks, while Sacramento Refuge is looking at hunter-killed ducks. San Luis National Wildlife Refuge is working with the California Department of Fish and Game to capture and sample Aleutian cackling geese.

In Hawaii and the Pacific Islands, all wetland refuges are monitoring bird morbidity or mortalities. In addition, Midway Atoll National Wildlife Refuge is conducting live and fecal sampling of Pacific golden-plover, ruddy turnstone, and wandering tattler. Midway Refuge staff also are collecting fecal samples on bristle-thighed curlew foraging sites.

The Pacific Region is coordinating sampling efforts with Montana and Utah, which are also Pacific Flyway states. Montana refuges are sampling live and hunter-killed ducks and hunter-killed tundra swans. Utah sampling is occurring at hunter check stations for waterfowl in addition to live sampling for shorebirds. ♦

Brad Bortner is division chief for Migratory Birds in the Pacific Region Office. Susan Saul retired as an outreach specialist in External Affairs in the Pacific Region Office.

Fulfilling the Promise: A Better Way to Count Birds and Study Habitat

Consider the refuge biologist who believes burning grasslands in the summer may improve Henslow's sparrow habitat. The refuge may be able to burn only one or two areas each year – far short of what's needed to validate the idea. But if the refuge is able to enter its results into a database that pools it with similar data from several other refuges, national wildlife refuges with similar habitat may be able to derive some statistically valid conclusions about the impact of summer burning and Henslow's sparrows.

It's just such a methodology that a collaborative, pilot project – the Biological Monitoring Team – is employing as it works to standardize collection of biological data. The Biological Monitoring Team – or BMT, as it is commonly called – was launched in 2004 by Nita Fuller, regional refuge chief in the Great Lakes-Big Rivers Region, and Tony Léger, regional refuge chief in the Northeast Region, in hopes that its work will help improve the science capacity of the Refuge System.

The BMT is taking to new levels the science that has been part of the Refuge System. In fact, the Team was created in response to one of the *Fulfilling the Promise* wildlife and habitat goals. An earlier *Fulfilling the Promise* team began by surveying all refuges about wildlife and habitat monitoring procedures and how the data are collected, stored and managed. In just one year, refuges conducted more than 1,970 distinct biological surveys, using more than 180 different procedures.

Ultimately, the BMT's work could refashion how the Refuge System conducts and tracks its science work. Nita Fuller recalls that when she joined the U.S. Fish and Wildlife Service as a biological technician 30 years ago, one of her jobs was to count waterfowl. She filled out the monitoring forms by hand. Today the system is vastly changed.

Dan Ashe, science advisor to the Service Director, believes the BMT is an “exciting and inspiring concept that will support scientific and adaptive management of natural resources on a system-wide scale.” The BMT is working at a particularly difficult time.

Setting Priorities

Most refuges are conducting a large number of monitoring programs but are facing flat budgets, explains Melinda Knutson, wildlife biologist with the BMT in La Crosse, Wisconsin. “This means refuges will need to set priorities. A recent survey indicated that there is a big need for technical assistance regarding baseline inventories, invasive species monitoring management, standardized methods for monitoring migrating waterfowl and habitat monitoring.”

Knutson says the BMT will create a broader understanding of bird behavior, for example, by employing a protocol for marsh bird surveys already being used by about 90 national wildlife refuges. One database for land bird data is already in use and an associated protocol should be

ready this fall. Additionally, a database to manage water level data from impoundments is also scheduled to be ready this fall.

When these centralized databases are fully operational, all refuges will be able to enter data over the Internet and access the same type of data gathered in the same way. Léger says this kind of monitoring and testing, combined with other biological initiatives, will help the Refuge System make the best choices for wildlife. “Then,” adds Fuller, “we can show the American public what our contribution to this country is in terms of wildlife resources.”

Two Active Research Projects

The BMT is cooperating with the U.S. Geological Survey on two active research projects that combine the scientific experience of USGS with the land management expertise of the refuge staff. For one project, five national wildlife refuges are evaluating the effectiveness of

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Biologist Kari Ranallo collects soil samples at Trempealeau National Wildlife Refuge in Wisconsin as part of a Biological Monitoring Team project. The BMT is a pilot project in Regions 3 and 5 whose goal is to develop systematic biological monitoring and database programs. (Todd Sutherland/USFWS)

Honors

Two projects on national wildlife refuges were honored with Department of the Interior Cooperative Conservation Service Awards, the highest honor bestowed on government employees, nongovernmental groups and individuals for exceptional contributions to conservation through collaboration and partnering.

The Cathlapotle Plankhouse Project Steering Committee was cited for its cooperative, community-based work to build a full-sized traditional Chinookan-style cedar plankhouse on Ridgefield National Wildlife Refuge in Washington. The plankhouse serves as a center for hands-on environmental and heritage education. On Earth Day in April, 35 charter members created the Friends of the Cathlapotle Plankhouse. Funds to support ongoing activities and construction at the plankhouse are being raised by sales of surplus cedar logs from the plankhouse for 50 cents per board foot.

The Bahia Grande Restoration Partnership on Laguna Atascosa National Wildlife Refuge in Texas was also honored. Through the collaborative efforts of more than 55 organizations and individuals, a major milestone was achieved in July 2005, when a constructed pilot channel reflooded approximately 6,500 acres of the Bahia Grande basin. Fish and wildlife immediately started to return to the flooded basin. (Learn more on page 16 of this issue.)

U.S. Fish and Wildlife Service Environmental Leadership Awards

Missisquoi National Wildlife Refuge in Vermont has earned this year's Refuge of the Year Award for sustainable design of its headquarters and visitor contact station. It uses large glass areas on the façade not only to give visitors spectacular views of the surrounding landscape, but also as a passive solar feature, warming the stone floor and wall surfaces that reradiate heat to the interior. The Service's design team partnered with Efficiency Vermont to develop geothermal, solar and wind alternative



Mike Granger, Charles M. Russell Refuge

energy systems for the facility, which opened in April 2005.

Also in New England, the Rhode Island National Wildlife Regional Headquarters and Kettle Pond Visitor Center received a facility/office award for sustainable design. The building uses such durable and long-lived recycled building materials as plastic lumber, bamboo flooring and engineered wood. Abandoned airfield runway pavement removed from Ninigret National Wildlife Refuge was recycled as base material for the entrance road. Roads and parking spaces were constructed on an existing cart path, and a two-story design minimized land disturbance.

Honors for individual environmental leadership were awarded to Mike Granger, Environmental Management System (EMS) coordinator at Charles M. Russell National Wildlife Refuge in Montana. Through Granger's diligence, the refuge has significantly reduced its use of traditional fuels by using bio-diesel fuel. He also arranged to have all refuge electricity purchased from wind generation farms, saving almost 500,000 pounds of carbon dioxide production in 2005. Thanks to Granger's forward thinking and commitment, the refuge has become the first within the Service to have a fully implemented and certifiable EMS program.

American Recreation Coalition

Refuge Park Ranger Jim Burkhardt at Okefenokee National Wildlife Refuge in

Georgia has been honored with a 2006 American Recreation Coalition Legends Award. First hired as an outdoor recreation planner at Okefenokee in 1978, Burkhardt is credited with building local and national recognition of the refuge. He helped establish the Okefenokee Wildlife League to support education and public use opportunities within the refuge and expanded interest in ecotourism through the Georgia Nature-Based Tourism Association and the Okefenokee Trail Association. The American Recreation Coalition says Burkhardt's efforts "to promote public use on the Okefenokee Refuge and the mission of the Fish and Wildlife Service have achieved near legendary status with FWS."



Jim Burkhardt, Okefenokee Refuge

Service Chief Cartographer Douglas Vandegraft received the coalition's Beacon Award for his efforts to promote the visibility of the National Wildlife Refuge System. In 2001, Vandegraft spearheaded the creation of a new interactive online map of the Refuge System, which enables visitors to locate refuges in areas where they plan to travel (www.nationalatlas.gov). In April, Vandegraft created two new maps of the Refuge System's trails, showing, for example, where National Scenic and Historic Trails and the travels of Captain John Smith cross refuge boundaries (<http://www.fws.gov/refuges/roads/trails.html>). ♦

Around the Refuge System

Oregon

Tualatin River National Wildlife Refuge, one of the nation's urban national wildlife refuges, opened to the public for the first time on June 3, fulfilling a long-held community dream. The refuge was established in 1992 with the support of residents in Sherwood, who were concerned about the loss of green space in the Willamette Valley. Until now, the refuge has been open only for such special events as the annual spring migratory bird festival. The construction of an entrance road, parking lot and visitor information kiosks – along with other elements to welcome visitors – cost \$1.5 million, funded by a combination of monies from the U.S. Fish and Wildlife Service, the City of Sherwood and Friends of the Refuge. Other elements include construction of a trail with five environmental education study sites, two overlooks, a photography blind and a wetland observation deck.

Last year, Congress approved the largest single appropriation for the refuge – \$3.9 million – to build a visitor center, environmental education shelter, wildlife center and administrative offices. The Tualatin River floodplain wetlands support thousands of ducks, arctic-nesting Canada geese, tundra swans and a variety of other waterbirds. It is also



Tualatin River National Wildlife Refuge opened to the public in June for the first time since the refuge was created in 1992. The Tualatin River floodplain wetlands support ducks, Canada geese, tundra swans and a variety of other waterbirds like this American bittern. (©Ed Bustya)

an important breeding area for neotropical migrating birds.

North Dakota

The American white pelican colony at Chase Lake National Wildlife Refuge has rebounded, reaching near-record numbers of nests. Photos taken during a May 31 flight over the nesting islands revealed 17,302 pelican nests. Biologists, estimating two adults per nest, estimate there are about 34,604 birds, almost double last year's count. Since record keeping began in 1972, Chase Lake pelican populations have ranged from 6,164 birds in 1974 to 35,466 in 2000. The 2006 figure is second only to the 2000 population. Scientists speculate the gain might be due to chicks from the population peak now returning to the colony as breeding adults.

In 2004, up to 30,000 white pelicans abandoned thousands of eggs possibly because of coyote intrusion, and then a year later, only about 150 chicks out of 9,000 nests reached fledging stage. U.S. Geological Survey scientists blame a combination of predators, severe weather and disease for the unusually high number of deaths in the past two years.

Pelicans began returning to Chase Lake in early April this year, and continued to arrive through late May. They confined their nests to two islands, avoiding the peninsula that suffered a coyote intrusion in 2004. Observers from the Service and the USGS Northern Prairie Wildlife Research Center, with support from the North Dakota Game and Fish Department, will continue to monitor the colony closely.

New Mexico

Senior Biologist John Taylor was admired and respected for his habitat restoration efforts and work with migratory waterbirds at Bosque del Apache National Wildlife Refuge until his sudden death of a stroke in 2004. Taylor was only 49. His dream, to restore thousands of acres of salt cedar dominated land to productive habitat on the refuge's south end, was a work in progress at the time of his death. Today, salt cedar removal and habitat restoration are underway on 800 acres that will ultimately be developed as wetland habitat.

This spring, the Socorro Chapter of Ducks Unlimited and the Friends of the Bosque del Apache raised money through a dinner and art auction to help continue Taylor's work. Funds will be used to build a water control structure that will move water to the newly developed wetland area. A plaque honoring Taylor will be placed near the project when it is completed by the end of next year.

Wisconsin and Maryland

The eastern migratory population of reintroduced whooping cranes is celebrating the first birds hatched in captivity at Patuxent Wildlife Research Center in Maryland. The eggs were retrieved from Necedah National Wildlife Refuge in Wisconsin on April 24 after the nest had been left unattended for several hours. The eggs were placed in an incubator until May 4, when they were flown to Patuxent Refuge. The eggs had their own seat and a container fitted with hot water bottles. Onboard was an

employee of the International Crane Foundation, who monitored the temperature of the two eggs. One bird could be heard peeping inside upon arrival in Maryland, and that egg hatched the following day, with its sibling coming along May 7.

Necedah Refuge Manager Larry Wargowsky says the two young cranes trained at Patuxent Refuge to learn how to follow an ultralight aircraft. By October, they should be able to make their first migration south to the Chassahowitzka National Wildlife Refuge in Florida.

Wargowsky is very pleased with results so soon in the reintroduction project. There are already 64 birds in the experimental project after only five years, and five pairs were observed incubating eggs this year. Normally, it takes whooping cranes four to seven years to successfully reproduce.

Two whooping cranes were born in captivity at



Patuxent Wildlife Research Refuge in Maryland, the first offspring of the eastern population of reintroduced whooping cranes. (USFWS)



New Fire Chief Brian McManus

New Fire Chief

Brian McManus, deputy chief of the U.S. Fish and Wildlife Service's Fire Management Branch since 2003, has been selected Fire Chief upon the retirement of former Chief Phil Street. A veteran fire professional, McManus began his federal career in 1978 at White River National Forest in Colorado. He worked for six years with the National Park Service, including on the fire crew at Big Cypress National Preserve in Florida, before he joined the U.S. Fish and Wildlife Service in 1990. He began his Service career as the fire control officer at Florida Panther National Wildlife Refuge in Florida. Prior to serving as deputy chief, McManus was regional fire management coordinator for two years in the Great Lakes Region, zone fire

management officer for Service units in North and South Dakota for six years, and complex fire management officer for the Savannah Coastal Refuge complex in Georgia and South Carolina for three years. He holds an undergraduate degree in forestry from Michigan Technological University. His secrets for success: Remember that staff is our most important resource, see the big picture, and think outside the box.

Indiana

The Muscatatuck Photography Club, founded in the mid-1970s at Muscatatuck National Wildlife Refuge, finds sunrise a real lure. The club, founded about the same time the visitor center was built, attracts wildlife photographers of varying experience levels, but all are especially interested in being allowed to enter the refuge early enough to capture a shot of the perfect sunrise. Some members are selling or exhibiting their work nationally. Club secretary Jennifer Regruth, who takes portraits professionally and grew up visiting Muscatatuck Refuge, says the club meets once a month and often mounts photography exhibits for refuge festivals or special events.



Photographer Tim Watson, president of the Muscatatuck Photography Club, surprised this fawn at Muscatatuck National Wildlife Refuge in Indiana. The Photography Club has been meeting at the refuge for more than 30 years. (Tim Watson)

What's Happening to the Mysterious Mercury?



Recent tests showed elevated levels of methyl mercury in prairie potholes on Lostwood National Wildlife Refuge in North Dakota, but it has not become a significant issue for wildlife like this blue-winged teal and her brood. Scientists are still trying to figure out why the methyl mercury is not traveling through the food chain at Lostwood Refuge as it has in the Everglades. (John and Karen Hollingsworth/USFWS)

This is a story with more questions than answers. It is also the story of government agencies being proactive about a potential problem rather than reactive to a crisis.

A few years ago, officials with the North Dakota Health Department heard a U.S. Geological Services scientist talking about the impact of mercury contamination on the environment of the Florida Everglades. Realizing that the prairie potholes on Lostwood National Wildlife Refuge present some of the same hydrology issues, North Dakota decided it was worth looking into mercury levels on the refuge.

Both the Everglades and the prairie potholes on Lostwood Refuge have fluctuating water levels. The potholes at Lostwood Refuge range from several hundred acres to a tenth of an acre, with water levels higher or lower depending on the amount of rain and snow melt. There is similar natural fluctuation in the Everglades, combined with management

practices that intentionally draw down and re-flood certain areas.

Mercury is inorganic and nontoxic as a naturally occurring element in the environment. Through drying and re-wetting of the soil, mercury is chemically transformed into methyl mercury, which is toxic and organic. With funding from North Dakota, the Environmental Protection Agency and USGS, researchers for the first time ever in 2003 began sampling levels of methyl mercury on Lostwood Refuge.

The results were stunning. The levels of methyl mercury in the prairie potholes of Lostwood Refuge exceeded the levels in the Everglades. The levels were higher than EPA's acceptable standard.

"Now that we know that the prairie potholes are mercury sensitive," explained Kevin Johnson, an environmental contaminants specialist in the Mountain-Prairie Region, "we need to determine if these elevated levels are having an effect on wildlife." He emphasizes that it is

strictly a wildlife issue at Lostwood Refuge, with no human health implications.

Invertebrates, amphibians, birds and eggs were all sampled in the fall of 2005 – from the aquatic invertebrates at the very bottom of the food chain to the amphibians and then the birds.

Data are still being analyzed, but so far, says Johnson, "the mercury is not accumulating in animals at levels that would be high enough to negatively affect wildlife. No populations are dying off." Interestingly – and without explanation – this differs from the Everglades, where the methyl mercury did get into the food chain and there are elevated levels of methyl mercury in fish and birds.

Johnson plans to write a final report by this fall on the extent and impact of methyl mercury at Lostwood. Studies so far have determined that mercury is falling onto the ground from the atmosphere. It has also been determined that mercury is in the environment regardless of whether the refuge engages in prescribed burning, which had been considered a possible source. Johnson says the mercury could emanate from the coal-fired power plants that surround Lostwood, although that has not been confirmed.

So far, concludes Johnson, "we are finding that methyl mercury is not a significant issue for wildlife at Lostwood, but it was better to learn this upfront than after a crisis or die off of wildlife."

Scientists are still trying to figure out why the methyl mercury is not rising through the food chain at Lostwood Refuge as it is in the Everglades. Johnson suggests it would be prudent for other refuges to consider methyl mercury testing if they are near potential sources of mercury and have wetlands with fluctuating water levels. ♦

Taking the Bighorns Home

By Victoria Fox and Mara Weisenberger

What does it take to move wild desert bighorn sheep? Camaraderie, dedicated people, good cowboy coffee and an experienced helicopter capture crew working around Arizona's spectacular Kofa Mountains.

Thirty bighorns were captured in November 2005 on Kofa National Wildlife Refuge in Arizona and transported in a customized trailer to San Andres National Wildlife Refuge, N.M., as part of a continuing program to re-establish a bighorn population at San Andres Refuge, which now has an estimated 108 animals. Another transfer of about 10 animals is planned.

While the vast majority of the animals stays on the fenced refuge that is their historic habitat, they are free to roam. The state can move the desert bighorn from its endangered to threatened list when there are at least 500 free-ranging animals in at least three geographically distinct populations.

The first transfer took place in November 2002, when 51 animals were moved from Kofa Refuge and the New Mexico Department of Game and Fish breeding facility at Red Rock onto San Andres Refuge. The refuge population is slowly moving toward being viable and self-perpetuating. Over the past two years, an average of 15 lambs annually have survived past weaning.

The U.S. Fish and Wildlife Service, Arizona Game and Fish Department, New Mexico Department of Game and Fish, Department of the Army White Sands Missile Range and Arizona Desert Bighorn Sheep Society work as partners in the program.

Some History

The San Andres Mountains rise from the desert floor against a clear blue sky. It's perfect terrain for the sheep: rough and rocky, with steep slopes. The vegetation is sparse. To the east lies White Sands

National Monument. In the fall, when the sheep arrive, the air is cleanly crisp.

Before the scabies outbreak in the 1970s that eventually decimated the herd, as many as 200 animals roamed the mountain range. As a result of the disease outbreak, prolonged drought and predation by mountain lions, only one ewe remained from the indigenous San Andres bighorn herd by 1997.

According to wildlife experts, San Andres Refuge contains the best sheep habitat in New Mexico. Indeed, to maintain healthy habitat, the Service has undertaken prescribed burning. Approximately 45,600 acres have been treated with fire since 1999, reducing woody species, rejuvenating grasslands and enhancing watersheds. Burning increases open grasslands that provide increased visibility for the sheep, in turn reducing predation.

On the Front Lines

The transfer of these huge animals – bighorn rams can weigh as much as 200 pounds – is dramatic and yet delicate. After helicopter crews net the bighorns at Kofa Refuge, people on the ground called “muggers” free the animals swiftly, fit them with blindfolds and hobbles, and send the bighorns by helicopter to the base camp.

Bighorn enthusiasts then help load the sheep onto stretchers, where they are given radio collars and checked by a veterinarian. After that, the sheep are herded into specially designed trailers



Thirty bighorns were captured in November 2005 on Kofa National Wildlife Refuge in Arizona and transported to San Andres National Wildlife Refuge, New Mexico, as part of a continuing program to re-establish a bighorn population. Once transported, the sheep are loaded onto stretchers, where they are given radio collars and checked by a veterinarian. (Chris Lohrengel/USFWS)

with as little trauma as possible for the 10-hour drive to New Mexico.

An extensive entourage escorted the animals through the White Sands Missile Range and onto the refuge itself. Voices were soft as the crate doors opened. A tapping of padded hooves and the sheep burst out, instinctively headed for the mountains.

Some sheep momentarily paused to look back at the human assembly. A ram, mistakenly heading out on the flat, suddenly made a sweeping turn around the trailer, righted himself and headed for higher terrain. Exhilarated observers hoped to savor the experience a little longer. Few in the human audience really wanted to leave.

In return for Arizona's help in re-establishing New Mexico's desert bighorn sheep population, New Mexico will send some of its plentiful Rocky Mountain bighorns to Arizona, where the population has dwindled. The tradeoff between the two states is helping both sheep populations. ♦

Mara Weisenberger is a wildlife biologist at San Andres National Wildlife Refuge in New Mexico, and Victoria Fox is a public affairs specialist with the U.S. Fish and Wildlife Service.

FOCUS ... on *Transportation*

The Roads of the National Wildlife Refuge System

The 40 million people who annually visit national wildlife refuges think about the birds they will see, the wildlife festivals they can share as a family, the next fish they will catch, or an easy hike to see wildlife habitat. They and most refuge staff don't think of the National Wildlife Refuge System's roads, parking lots, bridges, land and water trails as part of a national transportation system. Yet, that transportation network is vital to making wildlife refuges accessible to the public.

For that reason and others, the Federal Highway Administration and the U.S. Fish and Wildlife Service entered into a cooperative agreement for the management and improvement of public use roads within the Refuge System, and no wonder.

More than 60 percent of people who visit national wildlife refuges drive auto tour

routes and travel the refuge trails. With more than 4,800 miles of roads and over 2,500 miles of land and water trails, national wildlife refuges and waterfowl production areas provide some of the best places in the country to learn about wildlife, fisheries and habitat management. Without the transportation network, much of the visiting public has little chance of getting close to the wildlife that drew them to national wildlife refuges in the first place.

In this issue, we look at many of the programs that comprise the Refuge System's transportation network, including National Scenic Byways and the National Trails System. Today, more than 100 national wildlife refuges and fish hatcheries are along 55 state and nationally designated byways in 32 states.

Enjoying Wildlife from a Distance on the Oregon Coast



by Susan Saul

Protecting habitat for seabirds and other coastal wildlife is Roy Lowe's job. As project leader of the Oregon Coast National Wildlife Refuge Complex, he oversees six refuges that span 320 miles and attract approximately 1.6

The Simpson Reef Overlook, a transportation project of the Oregon Coast Refuge Complex, provides fully accessible views of the Oregon Islands Refuge from Cape Arago State Park. (Roy Lowe/USFWS)

Refuges along designated byways can apply for funds from the Scenic Byway grants program. Perhaps more importantly, refuges across the country have become partners with the Scenic Byway program in their communities, attracting local and national attention to the conservation ethic of the Service.

Refuges also have taken advantage of funding in the six-year Transportation Bill, including Transportation Enhancements to improve the cultural, historic, aesthetic and environmental aspects of the Refuge System's transportation infrastructure. Refuge Friends organizations have often assisted refuge staff in competing for these funds.

More than a quarter of refuge visitors travel the 2,500 miles of land and water trails to experience new adventures. Many refuges, wetlands and hatcheries are associated with the National Historic, Scenic and Recreation Trails. Forty-four National Recreation Trails are on Service units in 22 states.

million visitors a year, even though three refuges are closed to public use and the others offer very limited public access.

So how does the refuge complex, renowned for its spectacular headlands, pristine beaches and wild character, accommodate that much visitation?

Lowe's secrets are a dedicated staff and a savvy and aggressive pursuit of state and federal transportation funds to create ways for visitors to enjoy wildlife from a distance without affecting the birds and mammals or their habitats. "Wildlife use has increased at some locations due, in part, to visitor facilities that prevent people from trespassing," he says.

Bandon Marsh National Wildlife Refuge

In 2002, \$91,000 in Refuge Roads funds was used on the south coast to replace a



With more than 4,800 miles of roads and over 2,500 miles of land and water trails, national wildlife refuges and waterfowl production areas provide some of the best places in the country to learn about wildlife, fisheries and habitat management. (USFWS)

The Service and the Federal Highway Administration will host a training conference at the National Conservation Training Center in August. The Bureau of Land Management, National Park Service and U.S. Forest Service will participate in the conference, where about 120

participants can learn about various transportation programs and how they can benefit public lands and neighboring communities. ♦

dangerous gravel parking area and a muddy trail with a paved parking area, elevated boardwalk and viewing deck. Lowe says enthusiastic local support greeted the project.

When a 400-acre tract of diked pastures and seasonal wetlands known as the Niles'tun Unit was acquired in 2000, it came with an abandoned barn/silo complex on top of a cultural resource site. All ground disturbance requires a cultural resource investigation, which the Coquille Indian Tribe enthusiastically led. The site was then closed, capped and planned as an overlook and interpretive area to tell the archaeological story. The project will be completed with \$156,000 in Refuge Roads funds.

To complement the changes at the Niles'tun Unit, Representative Peter DeFazio (OR-4th) obtained congressional

support for \$4.2 million worth of improvements to the Charleston-Bandon Loop State Tour Route. Two miles of this highway through the Niles'tun Unit will be raised above the flood elevation to facilitate the refuge's planned tidal marsh restoration project in 2009.

Other projects illustrate the same devotion to both public access and wildlife conservation:

- At peak, 5,000–7,000 California and Steller sea lions, harbor seals and northern elephant seals, as well as migrating whales can now be viewed at Oregon Islands Refuge from the Simpson Reef overlook in Cape Arago State Park. Prior to the reef overlook, park visitors were climbing down the headland, trespassing on the refuge and disturbing the wildlife. The Oregon Coast Refuge Complex

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FOCUS ... on *Transportation*

Access for People Amid Wildlife

With nearly 40 million annual visitors to national wildlife refuges, the Refuge System is constantly evaluating public access so visitors are welcomed while wildlife is protected. Creative use of highway and transportation funds as well as broad partnerships have improved public access to numerous refuges.

In 1998, the Transportation Equity Act for the 21st Century (TEA-21) was enacted to provide federal funds for transportation, highway safety and transit. Some of these funds are distributed as grants for transportation-related activities – from hiking and biking trails to mitigating water pollution from highway runoff – that strengthen cultural, aesthetic and environmental aspects of the nation’s transportation system.

Last year, for example, Prairie City, Iowa, received a \$593,500 grant for a visionary

project, “Bringing Prairie and People Together,” that was the work of the Neal Smith National Wildlife Refuge, the Prairie City Business Association, the city council and numerous other partners and citizens.

“Working together,” said Scott Ford, supervisory park ranger at Neal Smith Refuge, “everyone explored how Prairie City could take economic advantage of opportunities that came with being a neighbor to one of the largest native tallgrass prairie reconstruction projects in the country.” Plans call for a traveler information and entry plaza, roadside landscaping with native grasses and flowers, prairie plant and animal sculptures placed around town, and a recreational trail through town connecting to the refuge entrance road.



Using \$34,100 in Federal Highway Administration grants, Prime Hook National Wildlife Refuge rehabilitated more than eight miles of walking and canoeing trails. (USFWS)

The Gas Tax that Encourages People to Walk

By Bill Jones

Using a \$19,100 grant from the Federal Highway Administration through the Recreation Trail Program, Prime Hook National Wildlife Refuge in Delaware will finish connecting four individual

hiking trails this fall into a single loop system. Best of all, visitors will get a fresh view of freshwater marshes as well

as deciduous and evergreen forests, scrub and fields.

The marshes host thousands of shorebirds and migrating snow geese and ducks, while the forests are home to songbirds and the Delmarva Peninsula fox squirrel. The refuge also used the funds to buy a brush mower to assist with trail construction and maintenance, and improved the interpretive and directional signs.

It was not the first grant Prime Hook Refuge received from the Federal Highway Administration, the nation’s largest single source of funding for shared-use paths and trails. In 2001, the refuge received \$15,000 to enhance



“Bringing Prairie and People Together,” the work of the Neal Smith National Wildlife Refuge, the Prairie City Business Association, the city council and other partners, allowed Prairie City, Iowa, to take economic advantage of its proximity to one of the nation’s largest tallgrass prairie restoration project. Wildlife sculptures were placed around the city, alerting visitors and residents to the chance to see elk and other wildlife on the refuge. (USFWS)

“I’ve never seen this community so energized,” said Leland Braun, who operates the Prairie Lodge Smokehouse Restaurant and the Cardinal Inn.

Bringing People and Wildlife Together

Prairie City will coordinate development of a 1.2-mile multi-purpose, fully accessible recreational trail connecting the city with Neal Smith Refuge to the west and the Central Iowa Trail System to the east. Part of the trail will go through the refuge, ultimately providing a one-of-a-kind prairie trail loop.

Right now, pedestrians and bikers share the refuge’s entry road with vehicles, stopping or parking their bikes when they want to see wildlife. This safety hazard will be eliminated when the new trail is completed in 18 to 24 months.

The Fish and Wildlife Service will begin building its portion of the trail this year at a cost of \$3 million. The pedestrian/bike trail, part of Neal Smith Refuge’s Master Plan, will follow existing refuge roadways to the Prairie Learning Center. Visitors will look across stretches of bluestem, pale purple coneflower, oak savannah, prairie dropseed and butterfly milkweed, much like the landscaped that the first European travelers to Iowa saw. Visitors, including those with disabilities, will be able to visit portions of the refuge that are now inaccessible.

Almost a third of Iowa’s population lives within 50 miles of Prairie City. “The

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walking and canoeing trails. By using both grants, the refuge rehabilitated more than eight miles of walking and canoeing trails and added three miles of walking trails.

Ironically, \$450 million of a federal tax on gasoline sales for off-road vehicles funds construction of walking and hiking trails and pedestrian/bicycle paths. Each state receives funds in proportion to its use of non-highway recreational vehicles. Projects on national wildlife refuges are eligible for the money.

Prime Hook Refuge’s grants helped expand Black Farm Trail to include a quarter-mile section leading to a new photography blind, where enthusiasts can watch and photograph waterbirds and wildlife in the marsh. New kiosks and brochure boxes were built, interpretive signs were installed, and trail maintenance equipment was purchased with the 2001 grant.

Funds from the Recreational Trails Program may cover no more than 80 percent of a project’s costs. Prime Hook Refuge depended on volunteer labor for the 20 percent match, which could be provided in cash, materials, labor and in-kind services.

Volunteers came from many organizations, including homebuilders Centex Corp., The Conservation Fund, Delaware Department of Corrections, M.R. Designs and the Friends of Prime Hook Refuge. In addition to grant funding, staff at the Delaware Division of Parks and Recreation helped design and print a trail map, and assisted with site evaluations.

The new trails provide additional areas to conduct environmental education programs structured around Delaware’s state curriculum standards. There will also be more interpretive bird and nature walks for visitors to view wetland and

forest habitat, migratory songbirds and beavers at work in the adjacent marshes.

In all but California, refuges can apply for Recreation Trail Program funding by contacting the state recreational trails program administrator. In California, refuges must partner with state, regional or local government to apply for RTP funds. For more information, go the FHWA Web at <http://www.fhwa.dot.gov/environment/recreational/trails/rtpstate.htm>, or contact Trails, Byways and Transportation Enhancements Coordinator Nathan Caldwell, at 703-353-2205. ♦

Bill Jones is park ranger at Prime Hook National Wildlife Refuge in Delaware.

FOCUS ... on *Transportation*

Partnerships Along the Scenic Routes



Great egrets greet visitors along the Creole Nature Trail, an All-American Road in Louisiana. This first scenic Byway in the Gulf South crosses Sabine and Cameron Prairie Refuges and touches Lacassine Refuge. (USFWS)

National wildlife refuges are precious jewels along many of the country's 33 National Scenic Byways and All-American Roads. The marketing muscle of byway committees can be a powerful tool to attract people onto a refuge so they can experience how refuges protect the nation's natural resources.

To be part of America's Byways®, a route must contain an intrinsic quality related to archaeology, culture, history, nature, recreation or scenery. All-American Roads must possess multiple nationally significant qualities as well as unique features that exist nowhere else.

Refuges can be one of the partners that assists with nominating a new route or promoting an existing one. "One of the main benefits of being along a byway is partnering with groups that the refuge may not have dealt with in the past," says Nathan Caldwell, the Fish and Wildlife Service's byways coordinator.

One of the newest National Scenic Byways is the Wetlands and Wildlife

Byway in Kansas, the only Scenic Byway with two wetlands of international importance as designated by the Ramsar Convention – Quivira National Wildlife Refuge, a salt marsh in south central Kansas that is a winter home to thousands of snow geese and sandhill cranes, and Cheyenne Bottoms Wildlife Area, a freshwater marsh managed by the Kansas Department of Wildlife and Parks.

The Great Bend Convention and Visitors Bureau in 2001 sponsored a "Wings and Wetlands" Festival on Quivira Refuge and Cheyenne Bottoms. Soon after that first festival, community groups began a region-wide economic development strategy based on attracting visitors to view the wildlife resources protected at Quivira Refuge and Cheyenne Bottoms.

The Convention and Visitors Bureau began the process of determining a scenic byway route that would link the wetlands of Quivira Refuge and Cheyenne Bottoms. The Friends of Quivira treasurer served on the development committee, and the Wetlands and Wildlife Byway won its federal designation in September 2005.

Cris Collier, director of the Great Bend Convention and Visitors Bureau, says Quivira Refuge and Cheyenne Bottoms are such important destination points that the Byway Committee voted to give all proceeds from the sales of byway merchandise to the volunteer support groups for the two sites.

Creole Nature Trail

A few states to the south is the Creole Nature Trail and All-American Road in Louisiana, the first National Scenic Byway in the Gulf South and the only one named for its natural qualities. The 180-mile driving trail crosses Sabine National Wildlife Refuge and Cameron Prairie National Wildlife Refuge and touches Lacassine National Wildlife Refuge.

The profound value of the partnerships that led to the designation of the Creole Nature Trail has been evident in

rebuilding efforts following Hurricane Rita. While the main highway trail between Sulphur and Holly Beach can be driven, stopping points on Sabine Refuge like the Wetland Walkway, remain closed. The Wetland Walkway's boardwalk was washed away by storm surge, the observation tower and ramp were severely damaged, and the restroom was condemned.

The Creole National Trail All American Road District, which had received federal transportation funds to build kiosks, obtained permission instead to spend the \$450,000 to replace the restroom, boardwalk and observation tower on the refuge.

The district also added three scenic pull-offs along the byway, two of which are on Sabine Refuge, which worked closely with district planning officials to make sure the pull-offs are located on already disturbed upland areas, rather than in the much more sensitive wetlands.

"We work regularly and very positively with the All American Road District and the Convention and Visitors Bureau," explains Diane Borden-Billiot, refuge outreach coordinator for the Southwest Louisiana National Wildlife Refuge Complex. At one of the scenic pull-offs the All American Road District paid for an elaborate parking area to let those in buses and RVs pull off the highway safely and see salt marshes and wildlife. Now called the Blue Goose Trail scenic pull-off, the area includes an accessible observation tower and a one-mile primitive walking trail.

The Convention and Visitors Bureau brings or sends many writers and photographers to the refuge. "It's a perfect opportunity to tell an even wider audience about the refuge's special projects and how the refuge contributes to the broader goals of the National Wildlife Refuge System," suggests Borden-Billiot.

Nominate a Road

National wildlife refuges are encouraged to nominate a Service road as a Scenic

Byway or collaborate to promote an existing one. A complete guide to the program, including requirements for

nomination and funding, is available at <http://www.fws.gov/refuges/roads/NSBGuide.doc>. ♦

Want to Know More?

FICMNEW (Federal Interagency Committee for Management of Noxious and Exotic Weeds, of which FWS is a member), which coined the term "invasives" in 1999, offers training, publications, conferences and Web sites with information on controlling the spread of invasives during transportation projects.

- ❖ Be aware that mowing a refuge road can accidentally carry plants and seeds to a new site if the equipment has been borrowed or rented from another area.
- ❖ Get rid of invasive species before construction begins. Weeds are pioneers – they will take over bare ground.
- ❖ If gravel is to be used, work with an established gravel pit that is certified as "weed free."
- ❖ Disturb a planned transportation corridor such as a refuge road as little as possible.
- ❖ Look for native seed sources. Watch for regional versions of eco-sod from Bitterroot Nursery in Corvallis, Mont., which is using a Federal Highway Administration grant to develop sod that can be grown on steep highway slopes, will provide immediate erosion control and will include native grasses and flowers for different regions.
- ❖ *Greener Roadsides* newsletter – <http://www.fhwa.dot.gov/roadsides>
- ❖ *Common Roadside Invasives, A roadside field guide to showy herbaceous weeds* (laminated brochure)

The Nature of Roadsides and the Tools to Work with It Publications - contact Bonnie.Harper-Lore@fhwa.dot.gov

Green Infrastructure

Transportation planning can increasingly demonstrate respect for the environment. The Service's Branch of Advanced Planning and Habitat Conservation is partnering with other federal agencies to address issues of landscape ecology at the watershed or landscape level. "By working at a larger scale and in the earliest point of planning," says Joseph Burns, Service national transportation liaison, "the Service is able to guide federal planning efforts at the most efficient and effective point of their planning processes, where they have the greatest flexibility to avoid or minimize impact on the environment."

- ❖ *Eco-Logical: An ecosystem approach for development infrastructure projects* http://www.environment.fhwa.dot.gov/ecological/eco_index.asp
- ❖ Green Infrastructure training at the National Conservation Training Center <http://www.greeninfrastructure.net>
- ❖ EPA's Green Highways Initiative <http://www.greenhighways.org>
- ❖ Executive Order on Cooperative Conservation <http://www.whitehouse.gov/news/releases/2004/08/20040826-11.html>

FOCUS ... on Transportation

Restoring Habitat by Building Roads



On July 16, 2005, with great public celebration, water flowed into the Bahia Grande basin when a small “pilot channel” was opened, connecting it to the ship channel. By the next day, water birds came. (USFWS)

Highway construction typically reduces or even destroys habitat. At Laguna Atascosa National Wildlife Refuge in Texas, however, highway expansion actually helped pave the way for massive habitat restoration.

Laguna Atascosa Refuge is the largest protected area of natural habitat left in the Lower Rio Grande Valley.

A shipping channel built in the 1930s stopped the normal flow of water into the Bahia Grande, a shallow bay of nearly 7,000 acres. Construction in 1953 of State Highway 48 parallel to the shipping channel in 1953 further restricted the limited tidal exchange to the Bahia Grande.

Previously home to crab, flounder and thousands of terns, gulls and black skimmers, Bahia Grande eventually became a huge barren flat, relieved only periodically by heavy rains or tropical storm tides. As commerce and traffic

increased along Highway 48 between Brownsville and Port Isabel – adjacent to Laguna Atascosa Refuge – blowing dust became a substantial safety and health concern.

Health experts, local government officials, environmental groups, and the U.S. Fish and Wildlife Service all had a stake in solving multiple problems. “Everyone had a need at the same time,” says Sonny Perez, assistant refuge manager at Laguna Atascosa Refuge, “and it was a perfect situation for a partnership.” Initially, the partnership had eight member groups; now there are more than 60. The connection between highway expansion and bay restoration was powerful.

In the late 1990s, The Conservation Fund led a complicated effort to acquire the Bahia Grande and surrounding lands for the National Wildlife Refuge System. Highway 48 on the southern boundary of the refuge was to be expanded to accommodate the increased traffic. To restore the Bahia Grande and two smaller, adjacent tidal basins, several channels would be dredged. Engineers began analyzing possible routes for the channels and the refuge began looking at potential funding sources.

Perez read in *Refuge Update* about dirt that was removed from a marshy corner of Squaw Creek National Wildlife Refuge, leading to a new highway for the state of Missouri and a restored wetland on the refuge. The same plan worked in Texas.

Reciprocal Needs

“The Texas Department of Transportation needed fill material to complete the

expansion of Highway 48,” explains Perez. “We had fill because we needed channels to be dredged between the basins of Bahia Grande. Texas Department of Transportation contractors dredged 60 to 70 percent of our channels, saving money on highway construction and saving the Service about \$200,000 in hauling.”

State DOT funds were also used to enhance visitor experiences on the refuge and accommodate the needs of wildlife. State highway planners worked with Service staff to add a 40-foot bridge along the highway to serve as a wildlife underpass for land animals like the endangered ocelot. The wildlife underpass was built adjacent to a natural travel corridor that ocelots used in the past. Parking areas were also planned for birders and anglers.

“People thought ahead to the time when the area would draw the public,” said Perez. “It has really been amazing how everyone listened to each other and shared expertise.”

On July 16, 2005, with great public celebration, water flowed into the Bahia

Grande basin when a small “pilot channel” was opened, connecting it to the ship channel. By the next day, water birds came, followed by shrimp and crab, all coming in naturally.

Graduate students at the University of Texas at Brownsville and Texas Southmost College are organizing classes of elementary school students to plant black mangroves and other wetland plants in the basin to give a variety of aquatic organisms a place to live and spawn. The massive project has really only just begun.

The refuge is digging channels from Bahia Grande to two smaller, adjacent basins: Little Laguna Madre and Laguna Larga. These channel connections will not only help address dust abatement and salinity levels in the smaller basins, but also create permanent wetland habitat needed by wildlife. Eventually the main channel, which needs to be 10 times wider and three times deeper than the pilot channel, will be constructed at a cost of about \$800,000 to \$1.4 million, according to Perez.

Need dirt anyone? ♦



A shipping channel built in the 1930s stopped the normal flow of water into the Bahia Grande, a shallow bay of nearly 7,000 acres. Construction in 1953 of State Highway 48 parallel to the shipping channel further restricted the limited tidal exchange to the Bahia Grande. (USFWS)

Access —from pg 13

opportunity to bring people and prairie together hasn't been this good for more than 150 years,” says Ford.

Squaw Creek National Wildlife Refuge in Missouri has developed a strong relationship with the Missouri Department of Transportation (MoDOT), which has repeatedly helped improve access to the refuge. At the request of Squaw Creek Refuge, MoDOT installed general directional signs on Interstate 29 as well as shuttle bus parking signs for the annual Eagle Days in December. When the refuge wanted to protect a bank swallow nesting colony on MoDOT right-of-way, the state built a

highway pull-off, a gravel parking lot and barriers. The refuge only had to make a bank swallow sign.

In Ohio, a visit by a member of Congress led the way to improved access to Ottawa National Wildlife Refuge. Congresswoman Marcy Kaptur attended an open house for a new visitor center and learned about plans to build a new entrance road. She brought in the Ohio Department of Transportation as a partner.

The result will be a four-way intersection at the visitor center, with turn lanes built by Ohio DOT along State Route 2, which the state is also widening. “It worked well,” said

Refuge Manager Doug Brewer, “everyone got what they needed and construction is underway.” ♦

FOCUS ... on Transportation



Refuge Roads funds are being used to remodel a parking lot at Cape Meares National Wildlife Refuge, making it fully accessible to nearly half a million visitors a year. (Roy Lowe/USFWS)

Enjoying Wildlife – from pg 11

partnered with the Oregon Department of Transportation, Oregon State Parks, Bureau of Land Management and Friends of Shore Acres State Park in 2002 to pull together \$322,000 to construct a parking area and overlook that attract more than 315,000 visitors a year.

- ☛ Cape Meares Refuge overlooks Three Arch Rocks Refuge, the oldest refuge west of the Mississippi River, and shares the headland with Cape Meares State Scenic Viewpoint and the picturesque Cape Meares Lighthouse. Interpretive overlooks let visitors view seabirds, nesting peregrine falcons and marine mammals.

Volunteers are available during spring and summer to interpret the falcons and seabirds. Refuge Roads funds are being used to remodel the parking lot and make it fully accessible to accommodate nearly half a million visitors a year.

- ☛ Established in 1991, Nestucca Bay Refuge supports the only coastal population of dusky Canada geese, as well as other waterfowl, shorebirds and raptors. The world's only population of approximately 125 Semidi Islands Aleutian cackling geese winters nearby. The bay, its tidal marshes and tributary streams provide habitat for large runs of chinook and coho salmon and steelhead and cutthroat trout. The refuge complex received an Oregon Department of Transportation grant for \$559,100, which will be combined with \$210,800 in Refuge Roads funds to construct visitor facilities that will open this refuge to public use for the first time. ◆

Susan Saul retired as an outreach specialist in the Pacific Regional Office.

Ecology and Service at Hanford Reach National Monument

by Ron Crouse

A new type of volunteering called “service learning” is increasingly making a presence in schools across the country. Service learning offers students an opportunity to gain hands-on learning experiences in a real world environment while they provide community service with tangible results. I was intrigued to learn from Jeff Dong, a veteran teacher at Pasco High School in Pasco, Washington, about a new service learning requirement for every student in the school.

Dong asked me to create a research-based service learning project for 50 “at-risk” students. Most were bilingual and struggling with poor English reading and writing skills, and two had hearing losses. I saw an opportunity to create a program in which students could learn about monument resources while conducting habitat inventories. The goal was to engage them in real life research at their level and not bedazzle them with scientific theory.

Two in-school programs were presented, one to familiarize the students with monument history, resources and management, and another to outline field trip protocols. These provided an opportunity to assess their skill and knowledge level and determine what could be incorporated into the program without overwhelming them.

During the day-long field session, two groups of 25 students each conducted a terrestrial inventory or an aquatic survey in the morning and rotated in the afternoon. Refuge Operations Specialist Jack Heisler had his terrestrial groups conduct a line-point indicator inventory in shrub-steppe habitat, recording plant species at one meter intervals along a 100-meter transect. The first inventory was in an undisturbed shrub-steppe habitat of sagebrush and native bunchgrasses and the other in an overgrazed site with heavy cheatgrass infestation. The youngsters learned the composition of native shrub-steppe habitat, the loss of plant diversity



Students participate in a research-based service learning project at Hanford Reach National Monument. Information and Education Specialist Ron Crouse saw an opportunity to create a program in which students could learn about Monument resources while conducting habitat inventories. (Ron Crouse/USFWS)

with annual cheatgrass versus perennial bunchgrass, and the interdependence of plant species.

I facilitated the aquatic sampling inventory, studying juvenile fish and macroinvertebrates. Armed with kick nets and beach seines, students swept the Columbia River and Spring Creek in search of life under water. Students recorded their catch using identification manuals and dissecting scopes to determine numbers of each species. Students learned to compare species diversity and density between the river and the stream and relate those figures to tolerance indices for pollution to determine a level of water quality for both habitats.

The program garnered excellent feedback. By day’s end, students with minimal science knowledge and low interest were actively participating. To learn by doing, without struggling through foreign textbooks, was the highlight. For staff, it was an enlightening experience to

perform beneficial scientific investigations that expand our resource database with students who would otherwise never experience the Monument from a biological perspective.

This was the first field trip for many of the students; hands-on learning made a strong impression. Student Yasleidy Boada echoed the class’ sentiment when he said, “I remember that you said that if you at least got through to one student, then you were doing your job. Well I’d like to let you know that I did learn something and that I’m more aware of what is really going on in that waste land outside of the city.” Success can be measured one student at a time. ♦

Ron Crouse is the information and education specialist for Hanford Reach National Monument and is a graduate student in the Master of Science Teaching program at Portland State University.

First Step for Critical Migratory Bird Stopover

Two critical land acquisitions for Eastern Shore of Virginia National Wildlife Refuge should be completed early this fall, a step toward permanently protecting some of the most pristine coastal areas on the Atlantic Coast. The \$2.3 million funding, included in the President's fiscal year 2007 budget, would be used in a partnership with the Commonwealth of Virginia, which will also acquire land from The Nature Conservancy (TNC). Protection of this critical migratory bird stopover has the support of Virginia Senator John Warner, senior Republican on the Senate Environment and Public Works Committee.

Eastern Shore of Virginia Refuge is at the southern tip of the Delmarva Peninsula, stopover habitat for nearly 200 species of birds representing approximately 70 percent of all breeding birds in North America. Migration through the area includes 5-6 million neotropical birds and 10-12 million temperate birds.

In recent years, the Eastern Shore of Virginia has become incredibly appealing to people, placing this important habitat at risk of major development. With reduction of a daily commuter toll on the Chesapeake Bay Bridge Tunnel and completion of two professional golf courses and a marina, the area's desirability to retirement and second homeowners and vacationers has increased dramatically.

Spending just over \$12 million, TNC purchased the 82-acre Dixon Tract, adjacent to the refuge and highly threatened by development, and another 496 acres on the nearby Bull Tract to keep them both available as migratory bird habitat. Now, the U.S. Fish and Wildlife Service expects to close on the first phase of the Dixon acquisition from TNC in early fall, with funds from the Land and Water Conservation Fund appropriations.

The Service anticipates closing on its 210-acre portion of the Bull Tract using a

combination of available Land and Water Conservation Funds and Migratory Bird Conservation Funds.

Additionally, an application is pending for North American Wetlands Conservation Act funds. The Commonwealth of Virginia will acquire the remaining 286 acres of the Bull Tract, using a combination of state and federal funds, including a Coastal Wetlands Grant.

TNC also acquired a right of first refusal over an additional 430 acres and a conservation easement on 44 more acres, ensuring that the land won't be developed. Eventually, the refuge hopes to acquire these lands as well, which are adjacent to the refuge to the south, and, with a State Wildlife Management Area to the northeast, would form a nearly contiguous block of conserved land.

The refuge's Comprehensive Conservation Plan, approved in 2004, calls for expanding the refuge to just over 6,000 acres from its current 1,123 acres. "The tracts acquired by TNC would probably have been lost to development if TNC had not intervened," says Rick Jorgensen, senior realty specialist with the Service. "I can't say enough about TNC's courage for having stepped into the breach. They put out \$12.24 million to acquire the Dixon and Bull tracts for critical wildlife habitat. That 'bridge investment' has a \$300,000 annual debt service, which TNC can't recover when public agencies like the



Eastern Shore of Virginia National Wildlife Refuge is at the southern end of the Delmarva Peninsula, forming the tip of a long funnel through which nearly 200 species of birds migrate, including raptors like the peregrine falcon. (USFWS)

Service acquire the properties from them."

Cooperative Protection

Refuge Manager Susan Rice is pleased as well about a Memorandum of Understanding for the cooperative protection and management of the habitat at the southern tip of the Peninsula. The Service, TNC's Virginia Coastal Reserve, and Virginia's Departments of Game and Inland Fisheries and Conservation and Recreation signed an agreement in June that Rice says "will solidify our partnership and get us thinking in new ways for the future. The MOU will provide the mechanism to pool resources, equipment and personnel, creating a unified management plan and implementation regime for habitats previously managed independently by the partners."

Rice says building blocks for this partnership are already evident. For example, loblolly pines, which provide no fruit for migrating birds, are encroaching on habitat at Kiptopeke State Park adjacent to the refuge. "Refuge staff had the heavy equipment needed to cut down some of the small invading pines so other

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Living and Learning the Desert

By Betty Mulcahy

How can a person canoe wetlands in the morning chill then hike desert trails in afternoon heat without leaving the vicinity? Volunteer at Imperial National Wildlife Refuge in Arizona.

My husband Chuck and I spent almost five months volunteering at Imperial Refuge, creating interpretive programs to take to schools and leading tours and winter visitor hikes through the Sonoran Desert.

The remoteness of the refuge was staggering, as we turned off the highway, drove 13 miles past the Yuma Proving Grounds and another three miles along a winding dirt road to Imperial's Visitor Center. We pulled our trailer to the one remaining site in a campground designed for six volunteer rigs.

Five other couples had already set up camp in trailers and motorhomes, each recruited for different tasks, including maintenance, staffing the Visitor Center and assisting biologists studying migrating birds.

To entice visitors to leave the convenience of the city, we worked with Refuge Visitor Services Manager and Volunteer Coordinator Sue McDonald to create an interpretive hike through a wash and over burro trails in a remote area of the refuge. Brochures encouraged people to sign up, and soon we had waiting lists for our adventures.

In the meantime, schools responded to our brochures offering either a slide program describing adaptations of desert flora and fauna or a snake program that included our own live specimens. It wasn't long before our schedule for the winter was filled.

And we learned about the desert. We learned that feral burros compete for the little vegetation with native desert bighorn sheep. We learned about the Colorado River's change in ecology after several dams redirected its flow. We

learned how introduced saltcedar affects surrounding habitat and influences native species. We learned the differences among desert plants, as well as the fact that many, if not most, are in the pea family. We learned that ocotillo is not a cactus. We learned that badgers are about the only animal that can dig up a packrat that dens beneath a prickly pear cactus, that the common gray fox is the only canid that climbs trees, and that Mexican freetail bats fly south to Mexico for the winter.

Education by Full Immersion

Our four days off each week allowed us time to explore the desert, canoe the wetlands, and absorb as much as possible of local history and geography. In the evenings, we could join others around the fire pit to compare our day's work. Or we could sit behind our trailer with a glass of wine and watch the Gambel's quail scurry between creosote bushes and an occasional bobcat saunter by.

Whether entranced by the glowing embers of a sunset over the Chocolate Mountains or exploring an arroyo in the brilliance of a full moon, our experience at Imperial Refuge remains an education available only by full immersion in its mission.

"So, are you relaxing?" a friend asked. After some thought, we decided that relaxed was not what we felt. We felt invigorated. We felt stimulated. We felt awed by the

knowledge we'd gained and the magnitude of knowledge yet to be learned.

A national wildlife refuge caters to its inhabitants; and while we were free to roam among them, we were completely aware that this was their home and that their needs take precedence. We were visitors. ♦

Betty Mulcahy retired last June after 21 years as a dental assistant in Aurora, Colorado. She and her husband have volunteered for various organizations for the past 17 years. They spend summers volunteering at the National Fish Hatchery in Jackson, Wyoming, and plan to return to Imperial Refuge at the end of October to spend the winter.

Betty and Chuck Mulcahy spent almost five months volunteering at Imperial National Wildlife Refuge in Arizona, creating interpretive programs and leading tours and winter visitor hikes through the Sonoran Desert. (Family photo)



Florida Panther Road to Recovery

The endangered Florida panther, plummeting toward extinction 10 years ago, is rebounding so successfully in south Florida that it's on the road to recovery. But that road will almost certainly, ultimately, have to cross the Florida line into other parts of the southeast, possibly including some national wildlife refuges, if the Florida panther is ever to be taken off the endangered species list.

Viewed as dangerous predators, most of the big cats had been killed by the 1930s. By the 1990s, the south was so paved over and plowed under for urban and agricultural development that the few remaining panthers had been driven into the Big Cypress Swamp area, a small part of south Florida that amounted to only 5 percent of the cat's original range. Indeed, 10 years ago, only 20-30 Florida panthers – the number of cats estimated to be living in the Big Cypress area – were known to exist in the world.

The 26,000-acre Florida Panther National Wildlife Refuge, in the heart of the Big Cypress Basin, was established in 1989 expressly to restore and protect habitat for the endangered panther. The refuge is the linchpin of protected habitat for the panther. Public use of the refuge is restricted to a few hiking trails and limited tours, says Refuge Manager Layne Hamilton, in order to provide the panther with undisturbed areas for hunting, traveling and denning. An estimated five to 11 panthers use the refuge every month.

But by the time the refuge was established, the shrinking numbers of panthers had led to so much inbreeding that male kittens were born without testicles. That's when wildlife biologists introduced eight western cougars into the Florida population.

Paul Souza, deputy field director of the U.S. Fish and Wildlife Service's office in Vero Beach, Florida, says, "Seeding the gene pool was a huge success. The panther population, now up to about 80

cats, is healthier and larger than it was 10 years ago." But pressures on the panther persist.

In January, the Service published an updated version of its Florida Panther Recovery Plan, which will probably be put into action later this year.

Hamilton says stabilizing the habitat and cat population in south Florida is the "most important part" of the recovery because any cats relocated to other areas will have to be drawn from the existing Florida population.

The larger number of cats and people competing for space in south Florida over the last 10 years has led to a marked increase in panther roadkills. Five panthers were killed on Florida roads in just the first three months of 2006. So the recovery plan envisions construction projects to enable panthers to roam without having to cross heavily trafficked roads.

In all, 12 Florida panthers were killed in the first four months of 2006, compared to the same number killed in all of 2005. Since most panthers are killed by other panthers in territorial disputes, Hamilton says the higher mortality rate is a clear sign that habitat loss has pushed the big cats into life and death struggles over hunting and mating territory. "They're trying to find a place to live," she says.

Stephen Williams, founder of the Florida Panther Society, speculates that today's larger cat population is all that rapidly developing south Florida can absorb.



The U.S. Fish and Wildlife Service in January published an updated version of its Florida Panther Recovery Plan, which will probably be put into action later this year. The 26,000-acre Florida Panther National Wildlife Refuge, in the heart of the Big Cypress Basin, is the linchpin of protected habitat for the panther. (George Gentry/USFWS)

There are pockets of possible panther habitat, "islands of diversity," says Williams, but the cats "can't run the gauntlet of urban development" to get from one island of forest to another. "Once the territory exists for them, they'll find a way to survive," he says. "But they need help to find new territory."

Room to Roam

The Service's long-term recovery plan contemplates just that sort of help by re-introducing the panther to its historic home range beyond south Florida. Potential sites include Okefenokee National Wildlife Refuge on the Florida-Georgia border and locations in Alabama, Mississippi, Arkansas and Louisiana.

Identifying appropriate habitat is relatively easy, says Souza, especially compared to winning local support. Although there are no documented cases of Florida panthers attacking humans, "people's anxiety is real. There's no short cut for sitting down with land-owners and local governments," he concludes. But, he adds, human awe at the panther's size and wildness can also take the form of pride at living in a world that accommodates such untamed creatures. ♦

Putting Girls Scouts on North Dakota Refuges

By Ken Torkelson

Some folks at national wildlife refuges are sporting different uniforms these days: they're Girl Scouts.

They're earning the first Girl Scout North Dakota Wildlife and Habitat Badges for completing projects detailed in a series of new activity booklets developed for North Dakota Girl Scouts and now being distributed by the North Dakota Girl Scout Councils.

The U.S. Fish and Wildlife Service's North Dakota Education Team joined forces with the North Dakota Girl Scout Councils in 2004 to develop the activity booklets filled with hands-on activities for scouts, ages six to 17.

"Scouts can build bird houses or feeders, plant native wildflowers and grasses for a butterfly garden, learn about aquatic life on a wetland, or job shadow refuge employees to earn a badge," notes team member Jackie Jacobson, outdoor recreation planner at Audubon National Wildlife Refuge.

In addition to activities about national wildlife refuge and endangered species, the booklets also cover the wetlands and prairies of North Dakota. Scouts in each of three age levels can earn badges in any or all four of these topics.

"The four North Dakota Girl Scout Councils collaborated on this idea up-front," said Jacobson, "and they provided guidance and editing on the materials." They'll help evaluate the project after a year's use.

Like many of the North Dakota Education Team's projects, this one came in response to a need. "One of the most frequent frustrations we hear from educators and youth leaders is the lack of materials and publications specific to the Dakotas," noted Jacobson. "This project was a good fit for the Education Team because our mission is to provide educational materials that focus on the unique wildlife and natural resources of North Dakota."

Connie Mueller, a refuge operations specialist at Waubay National Wildlife Refuge, a Girl Scout leader and the mother of a scout, brings a special perspective. "I was excited to see these activity booklets and the suggested activities," exclaimed Mueller, "and so were the Scouts. These activities focus the girls on something they may have some control over. They may not be able to save the rain forest, but they can have some influence over their family's application of lawn chemicals after they understand their effect on the



U.S. Fish and Wildlife Service's North Dakota Education Team joined forces with the North Dakota Girl Scout Councils in 2004 to develop activity booklets for scouts, ages six to 17. Connie Mueller, Girl Scout leader and refuge operations specialist at Waubay National Wildlife Refuge, S.D., notes that the activities focus the girls on aspects of conservation that they can affect.

environment," she continued. "It does my heart good."

Mueller is planning an endangered species camp for her scouts this summer. "We'll have a 'Welcome Back' party for animals that have recovered from near-extinction," she said. "The girls will learn how to dance like whooping cranes. We'll also use a scent maze to teach them how important the sense of smell is to pallid sturgeon." ♦

Torkelson is a writer-editor in the Mountain-Prairie Regional Office.

Migratory Bird – from pg 20

berry-producing plants can grow," says Rice. In addition, while TNC has access to funds for land acquisition, the refuge provides fire training for TNC staff. All partners also work cooperatively in research projects that provide information on best habitat management techniques.

"Protection of land to expand Eastern Shore of Virginia Refuge will result in increased eco-tourism, improved water quality and more open space," says Jorgensen. The preservation of both rural character and habitat will serve the local human and natural communities.

Every day during migration, up to 600 mallards, 700 black ducks, 250 greater and

lesser scaup and 150 pintail are expected to use the high priority wetland acres being protected. Rice explains, "Acquisition is critical to fulfilling the refuge's primary objective of preserving and restoring forest and shrub habitat that is needed for successful bird migration along the Atlantic flyway." ♦

Studying Bats, Coast to Coast



This summer, scientists at Great Swamp National Wildlife Refuge in New Jersey are learning more about the Indiana bat's summer habits in order to manage the habitat to support the bat, considered endangered both by the federal government and the state of New Jersey. These tiny bats have just enough energy to last through the winter, when they hibernate in caves or mines. In summer, they live in large trees. (Andy King/USFWS)

Numerous studies on refuges from one coast to the other focus on the decline in bat populations. Sometimes called

nature's crop-dusters, bats play a key role in maintaining healthy ecosystems. Yet, human disturbance to their hibernation

and maternity colonies is a major factor in the decline of many bat species.

This summer, scientists at Great Swamp National Wildlife Refuge in New Jersey are learning more about the Indiana bat's summer habits, researching where they roost, raise their young, forage and sleep. A colony of Indiana bats was found on the refuge in summer 2005. "Their presence was suspected but not verified until last summer," says Michael Horne, watershed biologist at Great Swamp Refuge.

Horne kicked off the summer-long project during a three-day workshop at the refuge in June. The workshop, funded and organized by the refuge's Friends group, highlighted Great Swamp Refuge as a summer home for the Indiana bat and sent participants into the field to gather data.

The goal is to help the refuge manage the habitat to support and encourage the colonies of the bat that is considered endangered both by the federal government and the state of New Jersey, which is on the perimeter of the bat's range. In winter, Indiana bats hibernate in caves or mines. In summer, they look for large trees.

Rocky Mountain – from pg 1

bald eagles in 1986, the Service identified hundreds of other species of wildlife thriving in the thousands of acres of uncontaminated buffer zone lands that surround the Arsenal's industrial core.

After years of debate about the future of Rocky Mountain Arsenal, Congress in 1992 established the future use of the site – following cleanup – as a national wildlife refuge. Much has changed at RMA since then.

Following signing of the cleanup Record of Decision (ROD) in 1996, the Service entered a partnership – the Remediation Venture Office – with the U. S. Army and

Shell Oil Company. The RVO's dual missions are to conduct a safe, cost-effective cleanup and to smoothly transition the site into a national wildlife refuge. Refuge staff has been intimately involved every step of the way, from conduct of the remedial investigation/feasibility study to negotiation of the ROD and implementation of cleanup projects.

Since signing of the ROD, nearly half of the 9,000 acres of the native shortgrass prairie restoration has been seeded. Biological monitoring of wildlife species proves that the cleanup is effective in cutting pathways for contaminants to enter the wildlife food chain.

The Arsenal's major manufacturing facilities, South Plants and North Plants, were demolished between 2001 and 2004. Nearly 500 buildings and other structures have been removed. Blue gramma and buffalo grass are gradually replacing the weeds and foreign grasses that blanketed Rocky Mountain Arsenal for nearly 60 years.

By the year's end, only two contaminated areas will remain. By 2009, removal of all contaminated soils and structures will be complete. The cleanup is on schedule for completion in September 2011.

Making RMA a Successful Refuge

Besides a successful cleanup, we have

The U.S. Fish and Wildlife Service's Ecological Services, New Jersey Field Office has been working with the State of New Jersey to protect three hibernacula sites in abandoned mines. Staff from the Great Swamp Refuge assisted by helping to construct a bat conservation gate at one mine, allowing the bats to come and go, but stopping human entry.

Hibernating Indiana bats are particularly susceptible to human disturbance because of their lower respiration rates and body temperature. These tiny bats have just enough energy to last through the winter. Repeated disturbances may force them to use up their fat reserves too quickly and so starve to death before spring arrives.

During a spring study funded by the Department of the Army at New Jersey's Picatinny Arsenal, radio transmitters were attached to 10 female Indiana bats as they left two of the mines. Annette Scherer, senior endangered species biologist for the New Jersey Field Office, says most of the bats flew straight south to Great Swamp Refuge and vicinity. "We expected some would go south because there is good habitat, but there are other areas closer to the mine that also appear to have suitable habitat."

This summer, scientists will be trying to figure out why the bats are seeking out a particular habitat so the information can be used to influence land use and management decisions by both government agencies and private landowners. Scientists want to find out whether the Indiana bats show a preference for wilderness areas or actively managed areas in Great Swamp Refuge, and how close they are willing to roost near occupied buildings.

In the West

At Willapa National Wildlife Refuge in Washington, a forest bat study begun last summer will continue through the fall. One night each week, biologists set up specialized mist nets and hart traps to capture the bats, which are then identified, measured, weighed and released. Knowledge of how bats use forested habitats will help Willapa Refuge develop a forest management plan to consider the needs of the refuge's eight species of bats.

In the Southwest Region, Ozark Plateau National Wildlife Refuge was established to assure the continuing existence and aid in the recovery of federally listed endangered and threatened cave species

and reduce the need for any future listings. One of the bats generating interest is the Ozark big-eared bat. Scientists believe only about 2,000 of these bats exist, mostly in Oklahoma.

A forestry specialist with the Cherokee nation found a new colony of the bats and called in experts from Ozark Plateau Refuge. Refuge personnel helped identify the bats and worked with the landowner and the Cherokee Nation to develop a conservation easement to protect the bats. Because the land was being timbered, the refuge could not acquire funding quickly enough to purchase the easement, but Hensley says the Cherokee Nation acquired the easement on a portion of the property surrounding the caves and will manage it jointly with the refuge.

The refuge has been working for more than 20 years with private landowners, conservation organizations, tribes and other state and federal agencies to protect important habitat for these endangered and threatened bats in the Ozarks of eastern Oklahoma and western Arkansas. ♦

seen significant progress in the last few years in the transition to refuge. In April 2004, former Interior Secretary Gale A. Norton joined Assistant Secretary of the Army Geoffrey Prosch, Senator Wayne Allard and Representatives Bob Beauprez and Diana DeGette in celebrating the formal transfer of nearly 5,000 acres of RMA land into the Refuge System.

The Environmental Protection Agency deleted an additional 7,400 acres at RMA from the National Priorities List, or Superfund List, on July 31. Those acres will be available for transfer to the refuge by the end of September.

At the end of the remedy, over 15,000 acres of the Arsenal's original 27 square

miles will be refuge lands. The refuge is fully "in business," restoring and managing habitat and serving the public with an array of popular wildlife-dependent recreation programs.

The refuge is working hard in partnership with neighboring Commerce City and the National Audubon Society to develop a top-flight visitor and education center. We hope the new Refuge Visitor Center and Audubon's Center for Conservation Careers – serving the diverse youth of the adjacent metropolitan areas – will open a year or two before the cleanup is completed in 2011.

An Update on Rocky Flats

Just 20 miles west, across the South

Platte Valley from Rocky Mountain Arsenal Refuge lies another battlefield of the Cold War. The Department of Energy's 6,400-acre Rocky Flats site is also slated by Congress to become a unit of the Refuge System. Within the massive concrete warrens of gigantic buildings in the 380-acre industrial area, thousands of women and men worked in secret for nearly 50 years, building nuclear components for America's deterrent arsenal.

Beginning in 1996, DOE embarked on an unprecedented accelerated cleanup program at Rocky Flats. Nine years and nearly \$7 billion later, in November 2005, the physical work – decontamination and

continued pg 26

Ice-Age Archaeology in the Koyukuk National Wildlife Refuge

By Daniel Odess

Near the end of the last ice age, a little over 13,000 years ago, people living in what is now Koyukuk National Wildlife Refuge may have been the original “leave no trace” campers. Archaeologists have been making some surprising discoveries on the refuge, located about 60 miles from the Arctic Circle.

In 2001, while biologists from the Koyukuk National Wildlife Refuge and the University of Alaska Museum were surveying for rare plants in the sand dunes, they stumbled on an ancient camp that had been exposed by movement of a sand dune. Rather than the normal collection of worn



The Nogahabara site demonstrates that early Alaskans carried a lot of unfinished tools, apparently waiting to work a stone into a finished tool only when they knew exactly the function it would serve. (USFWS)

out, discarded tools, they found a remarkably complete ice age toolkit.

Two years later, I visited the site with Refuges Supervisory Park Ranger Karin

Lehmkuhl and three volunteers. We systematically mapped and collected all of the artifacts we could find because of the site’s significance and the possible loss of integrity from erosion. In addition to the

Rocky Mountain – from pg 25

demolition of buildings and movement of waste to other sites – was completed.

In 2001, Congress decreed that Rocky Flats would become a national wildlife refuge following cleanup and closure of the site; “the Flats” is scheduled to join the roll of refuges early next year.

Once established, Rocky Flats will be the only unit of the Refuge System to support the threatened preble’s meadow jumping mouse. The future refuge will also conserve rare botanical communities that occur in a narrow tension zone at the very edge of Colorado’s Rocky Mountains and the western boundary of the Great Plains. Most of those lands have been developed for residential purposes, but hundreds of acres of remnant xeric tallgrass prairie are preserved at Rocky Flats.

Rocky Flats will be managed as a satellite refuge from Rocky Mountain Arsenal Refuge. The legislation

creating Rocky Flats Refuge contained an unusual requirement for the Service to finalize a Comprehensive Conservation Plan (CCP) for the future refuge, even before it was established. The CCP was completed with DOE funding in 2004.

Although budget constraints may well delay implementation of the Rocky Flats CCP, the refuge will connect wildlife and people with over 50,000 acres of other public lands between the cities of Boulder and Golden along Colorado’s scenic Front Range. ♦

Dean Rundle is refuge manager of Rocky Mountain Arsenal National Wildlife Refuge.

Fourteen years after Congress established Rocky Mountain Arsenal as a national wildlife refuge, a \$2.2 billion cleanup is on schedule and on budget. (USFWS)



tools, we found numerous fragments of bird and mammal bone and remnants of meals eaten long ago. By extracting tiny fragments of organic carbon from the bones we were able to get radiocarbon dates to establish the site's age.

The U.S. Fish and Wildlife Service, the National Park Service and the University of Alaska in Fairbanks have continued a cooperative investigation of the site.

In an area larger than Texas and California combined, there are fewer than 15 sites reliably dated to earlier than 12,500 years ago. From that perspective alone, finding any site dated to the end of the ice age is important. But the Nogahabara site is important for other reasons.

Tools to Go

The Nogahabara site demonstrates that early Alaskans carried a lot of unfinished tools, and for good reason. By waiting to work a stone into a finished tool only when they knew exactly what they would need

it for, they maintained a very flexible technology.

The discovered tools also have a lot of wear and tear from rattling together as they were carried in skin containers. The scratches and wear patterns were caused by the tools rubbing and banging against each other. Interestingly, stone flakes that ordinarily are associated with simple cutting tasks and then discarded also show wear and tear, which means that these people were carrying, rather than discarding, items that we normally think of as waste. In this sense, they were the original "leave no trace" campers.

This ultra-conservative use of resources has implications for what we should expect from the archaeological record of the earliest inhabitants. Until people learned where they could obtain good stone for making tools, their use of raw materials was probably so frugal that the evidence of their presence is very ephemeral. In other words, people may

have been present in North America for hundreds or even thousands of years before they became archaeologically visible.

In August, Service Archaeologist Debra Corbett and I will visit Nogahabara Dunes again. In addition to preparing articles for scholarly publications, we will work with local high school students in Hughes, Huslia and Allakaket to prepare village displays using museum-quality replicas of the Nogahabara material to provide information about the earliest part of their cultural heritage.

A larger display, also using replicas, is planned for the refuge headquarters in Galena. The original artifacts will be curated at the University of Alaska Museum in Fairbanks. ♦

Daniel Odess is curator of archaeology at the University of Alaska Museum.

Fulfilling the Promise – from pg 4

prescribed burns to control cattails, notorious for choking off wetlands.

To prepare for the study, biologists are becoming certified in fire management while refuge fire staff is learning about the biology of cattails.

A second project focuses on improved management of impoundments for shorebirds and waterfowl. Twenty-three refuges are participating, including John Heinz at Tinicum National Wildlife Refuge in Pennsylvania.

"We've been counting birds for decades," says BMT Leader Hal Laskowski, "but we don't know enough about why a population is going up or down or how it responds to different management actions. It often would take 10-15 years of research on a single refuge to accumulate enough data to recommend specific habitat management practices. Now we have 23 refuges testing the same management practice, so we'll know in one

to two years whether a management practice is appropriate to meet refuge objectives."

In 2005, water was drawn down in one impoundment at Tinicum Refuge in the spring and filled again in the fall. The opposite actions were taken at nearby Supawna Meadows National Wildlife Refuge. This year and next, the two refuges will reverse the timing of their draw-downs. "What we saw last year at Tinicum," said Refuge Biologist Brendalee Phillips, "was a dramatic increase in shorebird and wading bird use. We had 300 great egrets, and for us that's a huge number."

Phillips says it is too soon to reach conclusions on the impact of these water management techniques on vegetation, especially on such invasives as purple loosestrife. But she says any refuge or stopover within a flyway will ultimately benefit from the results of this research.

Science Advisor Ashe is encouraging about ways that others could use the BMT work. "The benefits of common databases, common data standards and universal access to information about refuge management will empower an entire new generation of innovation and success."

Resources

Science Excellence and Landscape Conservation – Biological Monitoring Team:

https://intranet.fws.gov/Region3/ScienceExcellenceandLandscapeconservation/bio_monitoring.html

For additional information, questions or suggestions contact:

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Chief's Corner – from pg 2

position management costs for each region. Rather than spread staff thin across national wildlife refuges, we must move to focus positions in ways that best conserve wildlife and best provide quality wildlife-dependent recreation.

As we move through our analysis, we will be able to better see how one region's position management model can be adjusted and improved for all the regions to adapt and adopt. It will also help us determine how workforce planning can help us better structure our organization to best meet our mission.

Whatever the outcome of our efforts, we can assure Refuge Friends that their relationship with national wildlife refuges will remain strong and vital. So will our communications with them.

We will maintain our national wildlife refuges for the conservation and enhancement of wildlife and wildlife habitat, in fulfillment of the National Wildlife Refuge System Improvement Act and our mission. We will continue to keep our employees, Friends and supporters informed. Ultimately, the Refuge System will be better served and the resources for which we are responsible will be better protected because we take control of our management, rather than passively wait for future budgets to dictate our path.



Hartwig Retires after 29 Years with Interior Department

Refuge System Chief Bill Hartwig retired from the U.S. Fish and Wildlife Service June 3, having started his career with the Department of the Interior in 1977. Michigan Congressman John Dingell paid tribute to Hartwig on the floor of the House of Representatives, thanking him for his invaluable help in creating the Detroit River International Wildlife Refuge when he was Midwest regional director. Congressman Dingell noted that Hartwig's career touched an "incredible

variety of issues from land management to migratory bird conservation." In 1988, Hartwig, who also had served as chief of Realty for a number of years, received a Meritorious Service Award from the Interior Department. Service Director H. Dale Hall, pictured on left, was among scores of well wishers who joined in celebrating Hartwig's career. Geoffrey L. Haskett is serving as acting chief of the Refuge System. ♦

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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