



# RefugeUpdate

National Wildlife Refuge System

[www.fws.gov/refuges](http://www.fws.gov/refuges)



*The Inventory and Monitoring Program will inform decisions about all species, including bison at Rocky Mountain Arsenal National Wildlife Refuge, CO. (USFWS)*

## First, We Inventory

By Bill O'Brian

**I**n sports and theater, it's hard to tell the players without a program. At national wildlife refuges, it's hard to make resource management decisions without sufficient scientific data.

The Refuge System's new Inventory and Monitoring (I&M) Program is designed to provide that hard data – in coming years and for generations – particularly in furtherance of the goals of landscape conservation cooperatives (LCCs).

Specifically, the program's strategic plan says, it will be “a nationally coordinated effort to support inventories and monitoring at the refuge, landscape, regional and national scale to inform management and evaluate the effectiveness of strategies to support adaptation to climate change and other major environmental stressors.”

The program, which traces its origins to the 1998 “Fulfilling the Promise” document, is designed to collect understandable, reliable, easily accessible, permanently stored data using common standards and a minimum threshold level of rigor for metadata and, simultaneously, allow refuges and regions flexibility.

“The concept is very easy,” says Mark Chase, the program's recently named manager. “The implementation is much more difficult. What exactly do we do? Where do we put the data? How do we make the data available? Those are really the challenges.”

Chase – who was the Refuge System's chief of law enforcement for the past four years and previously worked at seven refuges over 20 years – is implementing the

*continued on pg 22*

## Chief's Corner The Legacy We Carry On

By Greg Siekaniec

**F**ew events are as shocking as the death of a good man in the prime of his life as he is making a real difference in the world. The passing of U.S. Fish and Wildlife Director Sam Hamilton on February 20 is an incalculable loss for all of us who are committed to the conservation of natural resources. But it is also a time to dedicate ourselves anew to the conservation ideals he lived and embodied. We are headed for new conservation heights because of his leadership and, now, in his honor.

Sam Hamilton lived with a passion for the conservation of wild places. A gifted biologist and an astute leader, Sam seemed to differentiate instinctively between what was urgent and what

*continued on pg 2*

## Chief's Corner — continued from page 1

was really important. And what was important to Sam were employees of the Fish and Wildlife Service, national wildlife refuges and the Friends groups that epitomize the public-private partnerships that he valued.

Sam stood front and center in his advocacy for national wildlife refuges and our employees – especially before the Department of the Interior whenever Secretary Ken Salazar talked about the possibility of an expanded National Wildlife Refuge System. Sam believed great conservation came from employees on the ground. In the next few years, we may well see significant opportunities for acquisition of refuge lands. Sam liked to talk about how refuges are often the heart of conservation in a larger landscape picture.

As part of the Secretary's America's Great Outdoors initiative, much discussion has centered on the importance of refuges in helping to meet the conservation agenda of the 21st Century. Sam was always at the forefront of the discussions and often said he would make a personal commitment that the Service and Refuge System stand ready to push forward as leaders in this time of conservation need. Whether the subject was strategic habitat conservation, landscape conservation cooperatives, refuge acquisition, tackling climate change, or day-to-day operations, Sam believed we would make a difference that future generations will one day look back on and be pleased.

Yes, Sam Hamilton loved national wildlife refuges. Yet, he loved one concept even more – the Refuge Friends movement. Sam never missed a chance to talk with Friends and travel to Friends conferences. He was energized by Friends' commitment and enthusiasm. And so, every time we add new members to a Friends group, or a new organization is set up, we pay homage to Sam. Last year alone, 10 new Refuge Friends groups were formed. More than the idea of Friends, he spoke of how employees interacted and understood the importance of connecting with our



Late U.S. Fish and Wildlife Service Director Sam Hamilton fly fishing in North Carolina. (Cynthia Dohner/USFWS)

supporters, engaging those who do not understand our conservation mission and ensuring we have the next generations of conservation leaders standing at our side.

On a personal level, Sam was fun to be around. He was a terrific storyteller. He had a rapport with people that will be missed. So, every time we help people – and especially kids – connect with the lands that Sam loved, we will feel his presence.

Sam was just hitting his stride when his life ended. His death is a reminder of the fragile existence we all live. It is also a reminder that what we do for natural resources is a joy that will outlive us. I feel privileged to have worked with Sam. Our days together were too few. 🦋

## Refuge Update

*Ken Salazar*  
Secretary  
Department of the  
Interior

*Rowan Gould*  
Acting Director, U.S.  
Fish and Wildlife  
Service

*Greg Siekaniec*  
Assistant Director –  
National Wildlife  
Refuge System

*Martha Nudel*  
Editor in Chief

*Bill O'Brian*  
Managing Editor

*Address editorial  
inquiries to:*  
Refuge Update  
USFWS-NWRS  
4401 North Fairfax Dr.,  
Room 634C  
Arlington, VA  
22203-1610  
Phone: 703-358-1858  
Fax: 703-358-2517  
E-mail:  
RefugeUpdate@fws.gov

This newsletter is  
published on recycled  
paper using soy-based  
ink.



## Inside

### Straight from the Secretary

*When Cooperative Alliance for Refuge Enhancement (CARE) chief executives met with the Interior Secretary, the message was clear: Ken Salazar supports the Refuge System. Page 4*

### FOCUS: Maintenance

*Maintenance on refuges involves more than fixing leaky roofs or crankcases. It means supporting habitat, reducing carbon footprints and building bridges – over water and between people. Pages 8 to 14*

### CMS Is Coming to a Web Site Near You

*The Content Management System (CMS) to be launched this year will help create uniform, easy-to-use templates. Page 18*

### Protecting Wildlife, Producing Energy

*Midway Atoll National Wildlife Refuge has a garbage problem. The Nets to Energy partnership helps to solve it. Page 21*

# A Moving Marketing Message

By Bill O'Brian

The typical refuge visitor center doesn't have wheels. Starting this spring, one at Silvio O. Conte National Fish and Wildlife Refuge in New England will.

"Our primary objective is to take the show on the road," refuge manager Andrew French says of the mobile visitor center that is debuting this year. "There are 390 communities in the Connecticut River watershed, and they all have children. We need to reach out and meet them in their community."

French is doing that because it allows Conte Refuge to strategically engage the 2.3 million people – especially schoolchildren – who live in the 7.2-million-acre, four-state watershed. Mobility is the key, says French, when working a project area that stretches 400 miles from the Canadian border on the north to Long Island Sound on the south. French believes that traveling with a variety of partners from the conservation, education and recreation disciplines will strengthen the refuge's partnerships and increase awareness of the opportunities that national wildlife refuges offer.

The mobile visitor center is a colorful enterprise with swirling nature murals on the sides and a watershed map on the

back. "We think when people drive past us, they're going to say, 'Wow!'" says French. "We'll be a moving marketing message for the Fish and Wildlife Service and the Refuge System."

The mobile center is actually two trailers, one a 28-foot "immersion experience" trailer and the other a 16-footer in which eight portable exhibits will be stored. Each trailer is able to be pulled by a large pickup. With staffing help from Friends and partners, French plans to take the mobile center on the road for as many as 26 weeks a year – to schools, fairs and conferences.

## Nothing to Read

The immersion trailer is a walk-through setting that represents Connecticut River Valley wilderness landscapes. "There's nothing to read. You'll just hear things, look at things, touch things and smell things," says French. The visitor enters the trailer at dusk in a wetland area, moves on past a vernal pool, then to a forest at night (hearing the sounds you'd hear in the woods) and finally to suburbia at dawn. It takes roughly three minutes to go through and is designed to whet one's appetite for eight portable exhibits, which will be set up outside the immersion trailer.

Seven exhibits have four panels each, and the eighth is a tilt table. The table is a replica of the Connecticut River

Valley ("complete with tributaries," French points out). It uses plastic beads to show how the watershed works. The panels introduce the National Wildlife Refuge System; describe the geology and natural history of the watershed and late Massachusetts Congressman Silvio O. Conte's dream to make the Connecticut "cleaned, swimmable and fishable"; offer suggestions on how to shrink one's carbon footprint; and present factoids about wildlife, habitat, bird and fish migration, biodiversity, endangered species, invasive species and the benefit of plants and animals to humans.

All of it is interactive and designed to be fun for kids of all ages. There are touchable oversize 3D models of caddisfly larvae, salmon eggs and dragonfly nymphs. There is a test-your-grip-against-that-of-a-bald-eagle station (humans lose that contest, big-time). It's all sprinkled with slogans like "You are what you drink" and "Do something little and be part of something big."

French recognizes that the mobile center, which cost \$450,000 all told (a fraction of a stationary visitor center), is a little different. "We're going to be refining our strategy on the fly with our partners," he says. But he strongly believes that beyond-the-boundaries outreach like this could be an important and versatile tool for the Refuge System. And he thinks that, in these difficult budgetary

times, schools up and down the Connecticut River Valley will welcome a visit from the mobile visitor center.

"If you're able to bring a quality program to a school, they're going to love you. You'll have a captive audience."



An architectural rendering of the side of the large mobile visitor center trailer, with mural work done by artist and illustrator Evon Zerbetz. (Cambridge Seven Associates Inc.)

# Straight from the Secretary

By Evan Hirsche

Anyone who has not been in the office of the Secretary of the Interior cannot fully appreciate the history that is represented on the walls of what some say is the largest office of any Cabinet officer.

February 3 was another historic day in that office: a meeting with the Secretary and 21 chief executive officers of the 22 non-governmental organizations that make up CARE (Cooperative Alliance for Refuge Enhancement) – a meeting that was unprecedented in the 15 years since CARE’s founding.

The message was clear: Interior Secretary Ken Salazar is hugely supportive of the National Wildlife Refuge System – and what it represents for America’s future. He is passionate about national wildlife refuges, and he is committed to fully funding the Land and Water Conservation Fund so refuges can look forward to hundreds of millions of dollars for badly needed land acquisition over coming years.

And what about the Refuge System’s Fiscal Year 2011 budget, proposed at \$499.5 million – less than the appropriated amount this fiscal year? Assistant Secretary Tom Strickland, who noted during the meeting the “profound progress” the Department has made in the past year, said the Secretary fought for the highest funding possible in a budget season when no program escaped the scalpel.

Yet, neither Secretary Salazar nor Strickland asked us to stand silent on the needs of the Refuge System.

## Bring Them to Refuges

Instead, Strickland charged the U.S. Fish and Wildlife Service and CARE to “think big” about the Refuge System. He urged CARE groups – and our memberships – to speak up about national wildlife refuges as they travel across the country in planned forums on the Great Outdoors America initiative to expand national wildlife refuge lands and other public lands. Get Members of Congress out to national wildlife refuges, Strickland



*In their meeting with Secretary Ken Salazar, CARE chief executives stressed the need to manage the Refuge System to maintain critical biodiversity. (USFWS)*

stressed, and let them see why American taxpayers so love these wild lands.

The Secretary knows how stretched national wildlife refuge staffs are. He spoke about these troubling economic times and the slow erosion of all programs within the Department. The Secretary said he is trying to “stand the Department” back on its feet.

CARE CEOs told both Strickland and Salazar about the problems facing many refuges that are understaffed and unable to offer programs like environmental education. They nodded and told us about being at Bayou Sauvage National Wildlife Refuge in Louisiana, where there is enormous interest in having an environmental education program – but no staff to oversee it.

Yet, this isn’t the first time we’ve faced tough times. During the Dust Bowl, Secretary Salazar recalled, the Refuge System saw growth, and that’s one of his goals.

## Land Acquisition or Operations

Asked about funding for land acquisition versus funding for operations and maintenance, the CARE CEOs talked a lot about connecting people to nature, but they also stressed that the first priority is to ramp up refuges’ ability to manage what’s already in the Refuge

System in order to maintain critical biodiversity. But many of our members spoke – eloquently, I hope – about the cost of NOT buying land, especially important inholdings

The Secretary believes national wildlife refuges must grab more public attention, and he is making a point of visiting refuges as he travels. In expanding the Refuge System, he sees waterways and riparian areas as priorities – even as he knows that the Department of the Interior must work with the Department of Agriculture, for example, to create landscape level conservation among all federal lands.

I can’t fully talk about the February 3 meeting without mentioning Sam Hamilton – an active participant at the meeting just weeks before his tragic death on February 20. We were discussing refuge Friends groups, and Sam said that the Friends movement is the “single best thing he’s ever seen in his career that has benefited the Refuge System.” The man was wise in so many ways – not the least of which in his recognition about what everyday citizens can do on behalf of great ideas. 🦋

*Evan Hirsche is president of the National Wildlife Refuge Association and chairs the Cooperative Alliance for Refuge Enhancement.*

# New Council Will Promote, Preserve Hunting Heritage

**M**anaging more than 300 hunting programs on national wildlife refuges across the country, the U.S. Fish and Wildlife Service is one of five federal agencies poised to appoint members to the new Wildlife and Hunting Heritage Conservation Council, a federal advisory group that will promote and preserve America's hunting heritage for future generations. Interior Secretary Ken Salazar was joined by Department of Agriculture Secretary Tom Vilsack in announcing the council on February 4.

The new group, organized under the Federal Advisory Committee Act, will replace the existing Sporting Conservation Council by expanding membership to include the archery, hunting and shooting sports industries as well as broader representation from the nation's hunting organizations. Along with the Service, the Bureau of Land Management, Forest Service, Natural Resource Conservation Service and Farm Service Agency will appoint council members.

The new council is designed to provide a forum for sports enthusiasts to advise the federal government on policies related to wildlife and habitat conservation that not only benefit recreational hunting and wildlife resources, but also encourage partnerships among the public, the sporting conservation community, the

shooting and hunting sports industry, wildlife conservation organizations, the state, Native American tribes and the federal government.

At least three of the nation's best known sporting organizations – the National Rifle Association, Ducks Unlimited and the Izaak Walton League of America – are members of the Cooperative Alliance for Refuge Enhancement (CARE), a coalition of 22 non-governmental organizations that came together 15 years ago to support the Refuge System.

The Izaak Walton League, formed in 1922 by 54 sportsmen concerned about loss of habitat, was instrumental in the early expansion of the National Elk Refuge in Wyoming and in the 1924 establishment of the Upper Mississippi National Wildlife and Fish Refuge.

“The early efforts of America's hunters and anglers to preserve our nation's wildlife heritage fueled the modern conservation movement and left us the natural bounty we are now entrusted with protecting,” said Secretary Salazar in announcing the new council. “In the spirit of Theodore Roosevelt, we are enlisting the help of hunters and anglers to help us confront the conservation challenges of our times so that our children and grandchildren can have the same opportunities to experience wildlife and the great outdoors that have been passed along, generation to generation.”

## Hunting's History on Refuges

Hunting has a long history on national wildlife refuges. President Roosevelt, who established the Refuge System in 1903, made sure that the early Refuge System provided habitat and management for big game animals that had been depleted on public lands. A co-founder of the Boone and Crockett Club, Roosevelt established the nation's first waterfowl refuge, Lower Klamath, in 1908.

Hunting is one of the six priority recreation uses permitted on national wildlife refuges under the National Wildlife Refuge System Improvement Act. Approximately 3 million hunters annually travel to national wildlife refuges for some of the nation's finest hunting opportunities, while scores of refuges offer programs for youthful hunters, people with disabilities, and those interested in archery hunting. The Refuge System's 37 Wetlands Management Districts – renowned for their waterfowl production areas – are open to hunting, unless specifically closed to the sport. Many refuges partner with other organizations – including, for example, the National Wild Turkey Federation – to host special events for young hunters and people with disabilities.

For a complete guide to hunting on national wildlife refuges, go to the Web at [www.fws.gov/refuges/hunting/](http://www.fws.gov/refuges/hunting/).

Revenue from hunting licenses, Duck Stamps and excise taxes on firearms, ammunition and archery equipment provides billions of dollars to purchase and maintain wildlife habitat. More than 5 million acres of Refuge System lands were purchased with revenues from Duck Stamps, formally known as the Federal Migratory Bird Hunting and Conservation Stamp.

Over the past several years, the Refuge System's Birding Initiative has encouraged birders to purchase Duck Stamps because the very Refuge System habitat that provides hunting opportunities is also the land that is home to more than 700 bird species. 



Hunters at Swanquarter National Wildlife Refuge, NC. (F. Eugene Hester)

# Brown Pelicans: A Soaring Success Story

By Mary Tillotson

**T**he Navy has its Blue Angels. Nature's tight-formation precision flyers come in shades of brown.

Brown pelicans, flying single file, skim the troughs of saltwater waves from Southern California to the Gulf of Mexico and up the Atlantic Coast to Virginia – diving dramatically headfirst into the water when they spot prey below.

“There are few sights in nature like the feeding flight of the brown pelican,” says Charlie Pelizza, refuge manager at Pelican Island National Wildlife Refuge, FL. “They’re *spectacular!*”

And after decades of near-extinction on America’s coasts, they’re back!

In December 2009, the federal government took more brown pelicans – those along the Mississippi, Louisiana and Texas Gulf coasts and in the Caribbean – off the endangered and threatened species list: a testament to science and conservation.

---

*“There are few sights in nature like the feeding flight of the brown pelican.”*

*--Charlie Pelizza, Pelican Island National Wildlife Refuge manager*

“It’s a milestone,” says James Harris, wildlife biologist at Breton National Wildlife Refuge, LA. “Not just at the federal level, but for states and private conservationists, too. We’ve brought a species back from total extirpation to the point where it’s thriving!”

The brown pelican was so closely associated with Louisiana it was on the state seal by the early 1800s and named state bird in 1966. But, by 1966, the bird



(Steve Hillebrand)

had disappeared altogether from the Louisiana coast.

The pelican so tied to Louisiana is also closely linked to the National Wildlife Refuge System.

In the second half of the 19th Century, hunters bagging birds for meat and for plumage for ladies’ hats had slaughtered so many birds that President Theodore Roosevelt established the National Wildlife Refuge System to protect native species. The first refuge, established in 1903, was Pelican Island.

## **The Path to Full Recovery**

With the help of refuges and the Migratory Bird Treaty Act of 1918, native birds began a comeback. Staff at such federally protected areas as Pelican Island and Breton Refuges (established 1904) built sand fences to save and create dunes – habitat for pelicans. Refuges controlled natural predators like raccoons, crows and snakes – which all feast on bird eggs. Refuge staffers banded birds, kept track of nesting. A 1955 survey estimated there were 5,000 adult and fledgling brown pelicans on Louisiana’s East Timbalier Island alone.

Just six years later no nesting pairs were documented anywhere on the Louisiana coast. Clearly a destructive force other than predators was at work. Even before the Endangered Species Act was passed in 1973, the brown pelican was listed as threatened.

By the early 1970s, scientists determined the family of pesticides that includes DDT was the culprit – washing from agricultural fields into streams and rivers and eventually into the watery feeding grounds of brown pelicans and other native birds. Fish ingested the pesticides and passed them along to whatever birds ate the fish. The pesticides thinned the birds’ eggshells, making the eggs fragile, vulnerable to destruction before they hatched. Pelicans could crush their own eggs simply by incubating them.

DDT and its pesticide relatives were banned by the federal government in 1972. Within 13 years, brown pelican populations along the Southern Atlantic and the Florida, Georgia and Alabama Gulf coasts had recovered so well they were taken off the endangered list.

## Brown Pelicans: A Soaring Success Story — continued from page 6

But the recovery took longer closest to the mouth of the Mississippi River, where runoff from agribusinesses in the upper Midwest washed south to the Gulf of Mexico. Louisiana was especially hard hit.

In the 1970s, while pelican populations along the Texas and Mississippi Gulf coasts limped toward recovery on their own, state conservation agencies transplanted more than 1,200 nestling brown pelicans from Florida to Louisiana. Most survived, and bred.

An estimated 650,000 brown pelicans now live along America's coast – even more than historical levels. Louisiana has its state bird again – in reality, not just in memory.

Individual birds still die. They become ensnared in fishing lines. They tangle with overhead cell phone towers and power lines. Predators raid their nests. But Breton Refuge manager Ken Litzenberger says the single factor that now most threatens the species is loss of habitat – destruction caused by development, hurricanes, tidal surges

and, potentially, rises in sea level because of climate change.

Litzenberger, though, is optimistic the brown pelican will be around for “many, many years” now that the species has been brought back from the brink.



*Mary Tillotson is a career journalist who formerly worked for the Refuge System in its Branch of Communications.*

## Distressed Pelicans Linger on Oregon Coast

When about 1,000 California brown pelicans mysteriously lingered along the Oregon coast last winter rather than complete their southward migration to breeding grounds in Southern California and the Baja Peninsula of Mexico refuge staff led public outreach efforts to save them. At the height of the phenomenon, scores of pelicans washed ashore dead or were transported to rehab centers and hundreds more were left exhausted and scavenging for food.

“One of our employees was crabbing in a boat on Yaquina Bay and told me [in late January] pelicans were landing in his boat, picking at the bait in their crab pots and begging for food,” said Roy Lowe, manager of the Oregon Coast National Wildlife Refuge Complex. “They’d have to be very, very hungry to be doing that kind of thing. Normally, they have a big fear of humans, so begging and approaching people closely is a sign of distress.”

One theory is that high concentrations of bait fish off the Oregon coast enticed the pelicans to stay into December, a month or two later than normal. The late-arriving normal winter downwelling currents pushed the bait fish offshore and down deep in January, Lowe said, leaving



*A severely stressed California brown pelican along the Oregon coast this winter. (Roy W. Lowe/USFWS)*

some of the pelicans starving and too weak to leave.

Because the pelicans are protected under the Migratory Bird Treaty Act and it is illegal to kill, capture or possess them or their carcasses, refuge staff coordinated volunteer rehab and recovery efforts and informed the public not to pet or feed the pelicans – as people had been doing. “We didn’t want

any of the mortality to be the result of human activity,” said Lowe. He could not say the exact number of pelicans that died or how many eventually made it to the southern breeding grounds.



# Focus...Maintenance

## Refuge Maintenance Supports Wildlife Habitat



*Approximately one-third of all refuge maintenance staff hours support habitat management – including mowing invasive cocklebur at Sacramento National Wildlife Refuge, CA. (USFWS)*

*By Robert L. Williams Jr.*

**H**ealthy refuge maintenance operations and healthy wildlife habitats and populations are directly linked.

Some maintenance on national wildlife refuges includes repairing a leaky roof, keeping vehicles and equipment running and fixing potholes. While all of those activities are in the maintenance budget, many other routine wildlife and habitat management operations are also included.

Approximately one-third of all refuge maintenance staff hours support habitat management. For example, maintenance employees mow fields to enhance habitat,

replant trees and grasslands, band birds, assist with prescribed fires, work to control invasive plants, remove unwanted woody vegetation from wetland impoundments, and pay close attention to water control structures and levees.

Water control devices that do not have regular attention can become blocked by beaver dams, for instance, resulting in damage to overall wildlife habitats. When levees or water control structures are not functioning properly, refuge staff find it difficult or impossible to maintain water levels for fish, migrating waterfowl and a host of other wildlife. When invasive plants overtake native vegetation, native wildlife may not be able to find sufficient forage.

The refuge maintenance budget also provides funding for refuges to hire approximately 500 high school students during the summer to work in the Youth Conservation Corps (YCC). These students participate in a variety of wildlife and habitat management activities such as inventory and treatment of invasive plants, wildlife surveys and habitat restoration. For many students, the YCC is their introduction to the natural world and the catalyst that creates a life-long passion for wildlife.

The Refuge System maintenance budget funds the acquisition and maintenance of a large array of vehicles and equipment: more than 5,000 vehicles, nearly 1,500 agricultural implements, almost 1,000 boats and more than 2,700 pieces of heavy equipment. All-terrain vehicles can be used by volunteers for inventory and monitoring activities. Pickup trucks are used to conduct population surveys, while tractors disk fields to control invasive plants.

Taking care of such Refuge System assets is a matter of stewardship, says Refuge System program analyst Vernon Cannon. “Taxpayers put their trust in us to take care of what is theirs.” From maintenance workers on national wildlife refuges to the asset management staff in the Refuge System’s Washington Office, “we need to know what we own, where it is and what condition it’s in.” 🦅

*Robert L. Williams Jr. is in the National Wildlife Refuge System Division of Budget, Performance and Workforce.*

## Getting the Numbers Right

The importance of SAMMS – the Refuge System’s Service Asset Maintenance and Management System – cannot be overestimated as a way to plan multi-year budgets to maintain, improve or build everything from dams and access roads to visitor centers on national wildlife refuges.

SAMMS is a database that not only documents how real property is maintained in the Refuge System, but it also is the way that national wildlife refuges across the country tell the Refuge System’s Washington Office what they need and why it matters, explains Martin Brockman,

branch chief for facility and equipment management.

The information in the database must demonstrate that taxpayer funds are being wisely spent: what is needed to be built or repaired, and who or what will benefit. For example, the restoration of

*continued on pg 14*

## Sustainability: Carbon Footprint Goal for 2020

**G**reenhouse gas emissions from government facilities will be cut by 20 percent by 2020 as compared to 2008. So says the U.S. Fish and Wildlife Service, operating under a White House Executive Order that makes such reductions a federal government priority. So it will come to pass with Refuge System initiatives – from retrofitting existing buildings to a “green,” environmentally-sustainable construction program.

Under the Service’s draft Climate Change Strategic Plan – still being refined – reducing the agency’s carbon footprint and instituting practices to avoid greenhouse gas emissions are key. So are minimizing unavoidable emissions and offsetting remaining emissions.

Fioravante Gaetano, facility management specialist in the Refuge System’s Washington Office, summarizes the objective: “We are in the business of protecting the environment, and that’s what sustainability is all about.” The Refuge System has taken a host of steps.

Under the White House Executive Order, issued in October 2009, all new government facilities must be planned as “zero-net-energy-buildings.” That means, Gaetano explains, that buildings must be



*At Parker River National Wildlife Refuge, on the often-chilly north shore of Massachusetts, buildings have been designed with more windows to take advantage of daylight and lower energy costs. (USFWS)*

designed to generate no net emissions of greenhouse gases.

Service facilities will be governed by a Sustainable Building Implementation Plan, still in draft form but ultimately expected to require completion of a checklist for all buildings larger than 5,000 square feet. Fifteen percent of the Refuge System’s 360 occupied buildings must be sustainable by 2015; two buildings meet the standard now.

The Refuge System is reducing building energy use wherever it can, increasing its use of renewable electricity and cutting

the use of fossil fuels in both buildings and fleet.

### The Principles of Sustainability

The checklist is being crafted around five principles:

1. *Employ integrated assessment, operation and management principles* – Each refuge will have an Environmental Management System team to set goals for energy, water and material use and make plans to meet those goals.

*continued on pg 12*

## Exceptionally Green

Ron Thuma, a maintenance mechanic at Flint Hills National Wildlife Refuge, KS, was honored with a 2009 Department of the Interior Environmental Achievement Award for ensuring that no employee, volunteer or visitor at Flint Hills Refuge is ever very far from a recycling opportunity.

Thuma regularly identifies and implements cost and energy savings as well as waste prevention and carbon reducing projects. He takes inventory of recyclable materials and solid waste leaving the refuge so that more than 80

percent of the solid waste stream at the refuge is recycled.

Thuma doesn’t recycle just paper and glass. As a mechanic, he tests and treats antifreeze rather than replacing it. He uses re-refined oil purchased from the Defense Logistics Agency so that all used oil on the refuge is recycled. He also recycles old vehicle batteries and scrap metal. He even recycles light bulbs and fluorescent tubes (low-mercury tubes) and installs motion sensors on perimeter lighting.

As manager of the Youth Conservation Corps program at Flint Hills Refuge, Thuma has shared his recycling ethic with YCC enrollees, earning a Master Recycler Award from the mayor of Emporia, KS. His DOI Environmental Achievement Award noted that Thuma’s “dedication to duty, the refuge and his personal responsibility to our environment are exceptional examples of what one person can accomplish.” 

# Focus...Maintenance

## The Force That Keeps the Refuge Running

By Karen Leggett

Cal Henry, Joe D'Arrigo and Amy Midgett have more in common than their jobs as maintenance staff on a national wildlife refuge. Mention their names and people tumble over each other offering five-star reviews of their performance.

*"If I can keep making a difference, I will keep doing it."*

Cal Henry

Cal Henry has been a federal employee for half a century. He has been with the Service since 1966 and at Lee Metcalf National Wildlife Refuge, MT, since



Maintenance worker Cal Henry, Lee Metcalf National Wildlife Refuge, MT, has been with the Service since 1966, but still opted to take more training in 2009. (Bob Danley/USFWS)



Maintenance supervisor Joe D'Arrigo takes a personal interest in making sure everyone has a good visit to Lower Rio Grande Valley National Wildlife Refuge, TX. (Mike Carlo/USFWS)

1984. In 2009 – at 72 years old – he came east for a brand new Preservation Skills Workshop, which he called “by far the best training I’ve ever had in my whole 50 years.” He expects to use what he learned to help restore the 1877 Whaley Homestead at Lee Metcalf Refuge.

With some college training as an engineer but no degree, Henry worked for the Army Corps of Engineers before coming to the Service. At one point, he had a choice to work at a desk in Denver or outside in Montana. “Guess what I took?” He’s been outside ever since.

“I still get excited about going to work,” says Henry, and “80 percent of what I do is for the resource.” He has worked as a deputy federal warden, trained wildlife officers and heavy equipment operators, flown elk and swan surveys and done collateral duty in visitor services and environmental education. He loves the kids’ fascination with the little things – ant piles and the softness of painted turtle eggs. “No one even mentioned the

mountain lion tracks.”

Jim Hamilton, vice president of the Friends of the Lee Metcalf National Wildlife Refuge, says Henry has been a true asset to the Friends with such projects as the refuge environmental education shelter, the Kenai walking trail and the wetland restoration project. Henry is even a silversmith whose blue goose silver lapel pins are sold in the refuge nature store – at a profit for the Friends.

*"I have such a feeling of pride – it's like it's my own property."*

Joe D'Arrigo

Joe D'Arrigo came to the Lower Rio Grande Valley National Wildlife Refuge, TX, in 1993. He stayed until this year, when he will be taking the place of

another maintenance legend, Edwin Drummond, at Wichita Mountains Wildlife Refuge, OK.

He takes particular pride in the 45-foot treetop observation tower built at Santa Ana National Wildlife Refuge, TX, on his watch. He wrote about this unusual tower in *Refuge Update* March/April 2007. D'Arrigo and Henry were both on the pilot team that initiated a wage-grade training program, and D'Arrigo singles out facilities management specialist Liz Fritsch for taking the "toughest, crabbiest, quietest maintenance workers like myself through the training and transforming them into the most highly dedicated maintenance people the Department of the Interior has ever seen."

D'Arrigo was an official guest at the Refuge System Centennial celebrations on Pelican Island in 2003, where he wondered if anyone would be bothered by his ponytail, earrings and plentiful tattoos. Nobody was, but D'Arrigo seems

to relish the disconnect between his biker look and his outdoor career.

"He was the best ambassador in the Refuge System," says former colleague Mike Carlo, now in the Division of Visitor Services in Washington, DC. "He bridges barriers like no one else, always taking a personal interest in making sure everyone has a good visit."

Credited for the leadership and continuity he brings to the refuge, D'Arrigo went from a temporary backhoe operator to maintenance supervisor. "He can be in the dirt with the guys getting the job done or talking to the regional office and making something happen," says Lower Rio Grande Valley Refuge manager Bryan Winton. Carlo adds that D'Arrigo is a gifted supervisor, setting high standards but helping everyone get there.

"There's a big world out there," D'Arrigo says to his wage-grade colleagues. "Step out of the box."

---

*"The bigger the equipment, the more fun."*

*Amy Midgett*

In 1991, Amy Midgett came to Alligator River National Wildlife Refuge, NC, looking for a job. The only opening was on the fire crew. Even though she had no relevant experience, she decided to give it a try. Soon she was training on bigger and bigger equipment and liking it better and better.

Midgett has been a forestry technician, an engineering equipment operator, a fire engine boss and a tractor operator. She went to chainsaw school and is learning welding "to put things back together that we tear up in the field." Midgett made the cover of *Newsweek* magazine fighting wildfires in Florida in 1998 but is equally at home with prescribed burns on the rugged terrain of Alligator River Refuge. "We cross ditches, pull cables, pick a path through the woods. It's physically and mentally challenging."

Midgett talks about her dramatic work with students at the school attended by her seven- and nine-year-old daughters. While she gets some surprised reactions from visitors, she says colleagues have never questioned her capabilities. "She doesn't hold back one bit in jumping into any job situation and doing comparable work to any male equipment operator out there," says visitor services manager Bonnie Strawser. "She has such a can-do attitude. Her role here is irreplaceable. She's everybody's favorite!" 🦋



*Amy Midgett is known for her can-do attitude at Alligator River National Wildlife Refuge, NC. (Donnie Harris/USFWS)*

## Recovery Act Funds Decrease Fuel Consumption

By *Scotty Martin*

The U.S. Fish and Wildlife Service's motor vehicle fleet, now just under 7,000 vehicles (about 72 percent in the Refuge System), supports a broad mission in widely distributed and varying locales.

Using funding from the American Recovery and Reinvestment Act, the Service has replaced 525 vehicles – 80 percent of them in the Refuge System – with more fuel efficient vehicles. Combined with normal vehicle acquisitions, the Service replaced 10.3 percent of its fleet. The total acquisitions for 2009 represented the largest single vehicle acquisition and replacement year ever for the Service. Petroleum fuel use is expected to decrease by 185,000 gallons

in 2010. In addition, the Service will more than double its number of hybrids, while other alternative fuel vehicles (AFVs) increased by 36 percent over 2008.

---

*Service petroleum fuel use is expected to decrease by 185,000 gallons in 2010.*

Federal mandates require all federal agencies to reduce petroleum fuel use by two percent per year through 2020 as compared to their levels in 2005. For the Service, this means reducing petroleum fuel by almost 30 percent. More than any other mandate, this will drive fleet management practices through 2020. The

petroleum fuel goal was met in 2009 for the third year in a row.

New Service policy urges each region to actively manage fleet size. Dispensing with a “one-for-one” vehicle replacement policy will enable refuges to actively manage fleet size to meet their missions, plan for replacements and dispose of unused vehicles. Future reductions in fuel use will rely more than ever on the Service's ability to manage the size of its fleet and ensure that it has the proper number of vehicles to meet mission demands. 

*Scotty Martin is national motor vehicle fleet coordinator for the U.S. Fish and Wildlife Service.*

---

## Sustainability: Carbon Footprint Goal for 2020 — *continued from page 9*

- 2. Optimize energy performance* – Energy audits will use such benchmarking tools as Energy Star ratings; a building must reduce measured energy use by 20 percent as compared to 2003.
- 3. Protect and conserve water* – Buildings must show a 20 percent reduction in potable water use as compared to 2003 (or whenever a meter is installed). Refuges also are expected to cut in half the amount of potable water used for irrigation.
- 4. Enhance indoor environmental quality* – Each building must have a plan to control moisture and mold. To reach the goal, buildings should have automated or occupant-controlled lighting, use natural daylight as much as possible, minimizing the use of pesticides and maximizing use of “green” cleaning and maintenance materials.
- 5. Reduce environmental impact of materials* – Environmentally preferred products should be used for building modifications and

maintenance. A list of such products is available at [www.earth911.org](http://www.earth911.org).

Federal buildings certified to meet Leadership in Energy and Environmental Design (LEED) standards as of Oct. 1, 2008, are considered sustainable, but the Service has no buildings that were LEED certified before 2008. Gaetano says that many of the new sustainability requirements are stricter than LEED standards. That means a building LEED certified now does not guarantee that it will meet all requirements of the checklist of Guiding Principles for High Performance sustainable buildings.

### Retrofit to Green

It's one thing to design a new “green” building. It's quite another to upgrade and retrofit one.

Rob Miller, Great Lakes regional division chief for facilities management and budget, has been overseeing energy-related improvements at Minnesota Valley National Wildlife Refuge visitor center as well as administrative offices at Morris Wetland Management District

(WMD). Even in cold Minnesota, solar power is effective.

Passive solar panels are being installed at Minnesota Valley Refuge to heat water and provide extra heating capacity. At Morris WMD, a photovoltaic system contributes to a net-zero heating system. “On the coldest days,” says Miller, “we will draw from the regional power grid. On weekends, we will sell power back to the utility.”

Geothermal heating systems were installed at both Minnesota Valley Refuge and Morris WMD. At Minnesota Valley Refuge, this required digging more than 20 deep wells containing vertical tubes that carry water to warm or cool the above-ground facility.

The extent of work required for a retrofit can feel overwhelming, so Miller advises refuges to “do the smaller things first. Get an energy audit by the local power company and share the results with everyone. Just increasing awareness of our energy consuming habits is a good way to ease into better energy conservation.” 

# Maintenance Action Teams: Cutting Costs, Creating Camaraderie

The McFaddin Bridge Project is a stellar example of what a Maintenance Action Team (MAT) can accomplish.

The bridge, complete with public fishing piers, was replaced at McFaddin National Wildlife Refuge, TX, by a MAT in 2007. And, even though the bridge was washed out completely by Hurricane Ike one year later and has since been rebuilt by a private contractor, Southwest Region heavy equipment coordinator Ed Bass still uses the 2007 project as the centerpiece of his PowerPoint presentation on successful MAT work.

Bass is one of eight regional heavy equipment coordinators who schedule safety training; facilitate efficient and cost-effective acquisition, rental and maintenance of heavy equipment; and organize MATs. These teams of three to 20 maintenance workers from multiple regions are deployed to work on specific projects, each person typically working a two-week detail until a project is completed. Teams have restored dikes, installed water control structures, converted houses to offices and constructed new buildings.

“With the multi-skilled resources found in the wage-grade professional force,” says Bass, “there are few projects that can’t be completed from within the Service.”

The original assignment at McFaddin Refuge was to refurbish the Ten-Mile Cut Bridge. It took a month, with 20 people from eight refuges, each working 14 days straight. There was a delay in delivering materials, so the crew took on other projects.

The crew built a kiosk and repaired equipment at McFaddin Refuge, poured concrete for a storage building at Anahuac National Wildlife Refuge and cleared trails at Trinity River National Wildlife Refuge. “No time was wasted,” says Bass, “and the men were eager to show their stuff.”

## Can You Give Me a Hand?

MAT projects also build camaraderie among workers – a benefit that can rank as high as cost savings, according to Jason Wilson, manager of Great River National Wildlife Refuge, MO: “By working together, employees get a chance to work away from their home station, see different refuges and look at the bigger picture. Many employees who work on these projects have specialized skills. By working together, all of the employees benefit from the experience. In the end, the knowledge pool for each station is increased.”

Wilson saw that camaraderie develop when a MAT crew renovated and expanded the 35-year-old headquarters building at Clarence Cannon and Great River National Wildlife Refuges in 2007. They added a geothermal heat pump, high-efficiency windows and heavier insulation in the attic. The project saved \$500,000 in construction costs by using MAT instead of outside contractors. Besides, says Wilson, “Employees who

worked together keep in touch and call each other for advice. In short, the benefits from these projects are much more than the cost savings.”

MAT projects can also build relationships with the community. While the crew worked on the McFaddin Refuge Bridge, fishing piers remained open to the public, helping to maintain good relations with local crabbers and anglers. Even more significantly, Bass says, a new MAT project at Las Vegas National Wildlife Refuge, NM, involves working with the local government. San Miguel County is providing materials to refurbish an unpaved road, part of which is on the refuge’s auto tour loop. The work will be a training project for at least 10 maintenance workers in the Southwest Region.

Overall, says Bass, “These projects are just a sampling of our people showing the ability, professionalism and, most of all, the pride they have in doing their job.”



*A Maintenance Action Team renovated and expanded the headquarters building at Clarence Cannon and Great River National Wildlife Refuges, MO. (USFWS)*

# Focus...Maintenance

## Managing Water for Wildlife

When deferred maintenance funds became available to mow 110 miles of V-ditch on three farming units at Alligator River National Wildlife Refuge, NC, deputy manager Scott Lanier jumped at the chance to manage the refuge's water levels, even though it meant mowing in areas that would not normally have been cut during the December 2009 rotation. But Lanier knew that to better manage water levels on the refuge's farm fields, he had to take the opportunity when it was offered.

"In an ideal world," says Lanier, "most major management work on the farm fields would be done in a rotation, leaving patches of different levels of

plant growth and producing a variety of habitat types. We did what was necessary to accomplish the project. The contractors had to have access to the ditches. Ideally, this would have been done in stages, so all of the ditches would not have been mowed at once."

Clearing the drainage ditches will enable the refuge to increase habitat quality and quantity on more than 4,600 acres.

Another water management tool is clearing trees and stumps from dikes. Again, the integrity of the water management system must be maintained. When trees are allowed to grow on a dike, the system can be compromised by

a tree being blown over or dying. Dikes must be maintained at an early successional plant level (low-growing non-woody plants), so that large, heavy roots do not infiltrate the dike itself.

Alligator River Refuge is in the process of cutting the trees, removing stumps and repairing leaks on a dike

that had not been maintained for many years. "Rehabilitating the dikes will restore the integrity of the water management system, which allows us to create excellent migratory bird habitat on the moist soil, cropland, and permanent water within the farming area," explains Lanier.

### Rotational Cultivation

With assistance from the U.S. Department of Agriculture's Farm Service Agency, the Natural Resource Conservation Service and cooperating farmers, the refuge is also implementing a new conservation practice that will require farmers to disk, or cultivate, the filter strips on a rotational basis. Filter strips on either side of the V-ditch act as barriers and filters to help control surface water runoff. They prevent soil erosion and chemical contamination of the waterways. They also provide nesting areas and food for small mammals and upland game. This practice is expected to provide better habitat than maintaining the 75-foot filter strips with native warm season grasses, because it will provide more varieties of plant species in more diverse growth stages.

"It's good to see the fruits of all our deferred maintenance labor," said Bill Lanahan, chief of the branch of facility management for the Southeast Region.



Clearing drainage ditches at Alligator River National Wildlife Refuge, NC, will help improve wildlife habitat on more than 4,600 acres. (Bruce Creef)

## Getting the Numbers Right — continued from page 8

a World War II hangar on Midway Atoll National Wildlife Refuge preserves a historic asset. Equally important, the building will store equipment used to manage nesting habitat for 2 million birds, including the endangered Laysan albatross.

The accuracy of SAMMS data and the dependability of the system are critical. The asset management staff ensures that the database information is clear,

consistent and correct. Liz Fritsch, facility operations specialist, makes sure there are no anomalies: When a building is listed as "active," she double-checks that operating or maintenance costs are also listed.

Information systems specialist John Dyer works to keep SAMMS online and functioning smoothly, especially at the end of the fiscal year when everyone needs the information it provides right now.

Quoting from *Leadership Secrets of Attila the Hun*, Brockman says, "It is unfortunate that important decisions are made by chieftains headquartered miles away from the front where they can only guess at conditions known only to the captain on the battlefield." Refuge staff are on the front lines of the conservation battle. SAMMS brings the front line to the decision makers. 

# Revitalizing a Marsh

By Karen Leggett

As soon as the bulldozer broke through a levee on Tubbs Marsh in San Pablo Bay in northern California, in December 2009, dowitchers and other shorebirds launched a feeding frenzy in the newly exposed mud. It took several years of planning and effort by San Pablo Bay National Wildlife Refuge, its partners and volunteers to free the marsh of the levees, some of which are a century old, and make it once again a healthy habitat for wildlife.

Levees and berms were originally constructed to control the flow of water, which often sat for extended periods of time, especially after high tide or heavy rains. The standing water killed vegetation, harmed habitat and promoted mosquitoes. The Marin-Sonoma Mosquito and Vector Control District treated the marshes with approved chemicals, but, by accessing the marshes for mosquito management and surveillance, also disturbed wildlife and plant populations and degraded habitat.

“We had conflicting missions,” says Giselle Block, wildlife biologist at San Pablo Bay Refuge, “but we came to realize that by improving tidal hydrology and returning the marsh to a more natural state, we could benefit both our missions.”

The 65-acre Tubbs Marsh enhancement project restored the natural hydrology to an area of tidal marsh that had impaired tidal flows. The project cost \$339,000, with funds and in-kind contributions from the Service (a Challenge Cost Share grant), ConocoPhillips, the San Francisco Foundation, the Marin-Sonoma Mosquito and Vector Control District and Audubon California, which had a longstanding interest in San Pablo Bay as a specially designated Important Bird Area. The project created nine new channels, widened or deepened eight breached levees at six locations and lowered two levees to marsh elevation. The physical work took three weeks. Planning, raising money and obtaining permits took more than two years.

Volunteers contributed 500 hours of baseline monitoring on Tubbs Marsh, providing an inventory of birds, vegetation, water quality, sediment, mosquitoes and small mammals – including two endangered species: the California clapper rail and the salt marsh harvest mouse. The inventory will be maintained for at least the next five years.

## Come Back in Two Years

As each levee was breached, “the shorebirds responded immediately,” says Block, “but we don’t expect California clapper rails for two years because their habitat takes longer to develop.” The remaining levees will erode naturally now that the original flow of water has been restored. They are being planted with native upland cover like California sagebrush, mudwort and monkey flower. This cover can provide refuge habitat for marsh-dependent species during extreme high tides. Some believe the levee remnants could be a buffer against erosion during extreme tidal events.

The success of the Tubbs Marsh levee breaches is just the beginning, Block says. The refuge is now collecting baseline data on 500 acres of marsh on Sonoma Creek where, once again, past human action has led to poor hydrology. Permitting and fundraising are underway with actual work expected to begin in about three years.

“This was an example of different agencies coming together with different missions and finding common ground,” says Block, with obvious enthusiasm. “The Mosquito Control District is addressing mosquitoes, the refuge improves habitat for endangered species and migratory birds and Audubon California improved an Important Bird Area. Plus, it was an incredible way for people to engage with the environment.”

An Audubon California video about the project can be seen at [www.audublog.org/?p=3129](http://www.audublog.org/?p=3129). 🦋



Tubbs Marsh in San Pablo Bay National Wildlife Refuge, CA, is once again a healthy habitat for shorebirds and other wildlife. (Angela Sanan/USFWS)

# Around the Refuge System

## Washington

At one point last winter, Solo, the lone trumpeter swan who has made his spring and summer home at Turnbull National Wildlife Refuge for more than 25 years, was feared dead. By late January, he had returned – with a mate and three cygnets.

Solo, who fathered his first brood in more than two decades last spring, may be one of the original cygnets reintroduced to Turnbull Refuge in the 1960s. His longtime mate was killed by a coyote in 1988. But Solo kept returning to the refuge each spring – alone – until last year when he found a new mate. Four cygnets were born on Father's Day weekend in 2009. One cygnet went missing shortly before the swan family left in the fall.

Solo's winter whereabouts are not known. Refuge biologist Mike Rule is reluctant to band Solo because the swan is roughly 33 to 46 years old, and "I don't want to be the biologist who gives him a heart attack." Trumpeter swans normally live 20 to 30 years. Solo's Jan. 25 return ended speculation that he might have been the trumpeter swan shot on Dec. 28, 2009, on the Colville River. "We're all pretty happy that Solo and family returned in good shape," said Rule.

## Florida

An American crocodile that had been a fixture on Sanibel Island since the



*This female American crocodile was a fixture for three decades at J.N. "Ding" Darling National Wildlife Refuge. (USFWS)*

1980s died in winter 2009-10. The female reptile, which was almost 12 feet long and weighed about 325 pounds, was found dead on conservation land adjoining J.N. "Ding" Darling National Wildlife Refuge.

The crocodile, estimated to have been at least 40, is believed to have died of stress related to a severe cold snap in January, according to Refuge manager Paul Tritaik. People on Sanibel "developed a reverence for her," Tritaik said. "Many people felt fondly about her, even though she was about the most menacing-looking animal you can imagine."

The crocodile will continue to educate visitors at the refuge, which plans to mount her skeleton in a memorial display at its visitor center as part of an exhibit about crocodiles and their role in the ecosystem.

## Minnesota

A light-rail line that connects the Mall of America, the Minneapolis-St. Paul International Airport, downtown and, via bus lines, low-income urban neighborhoods in the Twin Cities has opened its final station just a short walk from the Minnesota Valley National Wildlife Refuge visitor center in Bloomington.

Metro Transit's America Boulevard Station at 34th Avenue opened in December 2009. The refuge visitor center, which has been closed for renovation, is scheduled to reopen with new high energy-efficient heating, cooling and lighting systems in early April. Refuge manager Charlie Blair expects an uptick in visitor traffic at the refuge with the new rail station less than a quarter-mile away. The 12-mile

light-rail line had a ridership total of 9.9 million in 2009.



*A light-rail stop is now within walking distance of Minnesota Valley National Wildlife Refuge. (Minneapolis-St. Paul Metro Transit)*

## North Dakota and DC

Members of the Refuge System Birders Team engaged youngsters in January bird counts in locales as diverse as the frigid prairie of North Dakota and an urban neighborhood in Washington, DC.

At Arrowwood National Wildlife Refuge in central North Dakota, 47 birders – including 30 elementary and secondary students and a teacher from Kensal Public School – counted 1,577 birds in 31 species. Held annually since 2000, the Arrowwood Christmas Bird Count for kids was done with help from staff at Chase Lake National Wildlife Refuge and Valley City Wetlands Management District. Said Paulette Scherr, a wildlife biologist at Arrowwood Refuge, "Not only does the survey allow Service personnel to interact with the students, but it also encourages our non-biological staff to get involved and do a little birding."

At Brent Elementary Public School, just blocks from the U.S. Capitol, about 60 children and 40 parents took part in a New Year's Bird Count for Kids on a snowy day in the District of Columbia. "We really reached people on a number of different levels with the message that birds are everywhere, anytime,



*A snowy owl on Arrowwood National Wildlife Refuge, ND, which held a bird count for kids in January. (Rick Bohn)*

and that they are beautiful and worth caring about,” said Mike Mangiaracina, a science teacher at Brent Elementary, who organized the count with U.S. Fish and Wildlife Service and Refuge System staff. “On a broader level, children and adults alike left knowing that their world is a little more interesting than they had thought.”

For more information about setting up a bird count for kids, contact Refuge System Birders Team coordinator Mike Carlo at michael\_carlo@fws.gov or 703-358-1938.

## Louisiana

Under a program designed to offset carbon emissions and return more than 800 acres to bottomland hardwood forest, about 245,000 trees have been planted at Grand Cote and Lake Ophelia National Wildlife Refuges. The tree-planting, paid for by The Conservation Fund’s Go Zero program, brought back water oak, willow oak, bitter pecan, sweet gum and sycamore trees to land that had been farmed for decades before the refuges were established in the late 1980s. The

reforestation will improve the habitat for ducks, songbirds and the Louisiana black bear.

Go Zero invested about \$350,000 to buy and plant the trees, and will spend approximately \$150,000 more to audit the carbon offsets and other related work, according to Go Zero director Jena Meredith.

## Maryland

Brad Knudsen, project leader at Patuxent Research Refuge, received a special recognition

award from the National Conservation Training Center. He was honored for his contributions to the U.S. Fish and Wildlife Service’s Refuge Management Academy, the intensive, twice-a-year training session for those working in the Refuge System. Knudsen, a graduate of the refuge academy, was cited for his work as an academy instructor and for employing his 12,800-acre refuge as a training site for academy attendees.



*A zookeeper attends to an endangered Key Largo wood rat bred at Lowry Park Zoo in Tampa, FL. (Lowry Park Zoo)*

## Florida and Arizona

Two refuges, on opposite ends of the country, recently took steps to establish new populations of endangered animals. In Florida, wildlife biologists released 14 captive-bred Key Largo wood rats into Crocodile Lake National Wildlife Refuge in February. The wood rats, which were bred as part of a program operated by U.S. Fish and Wildlife Service, Tampa’s Lowry Park Zoo and Disney’s Animal Kingdom, have been fitted with small radio collars for tracking. If they survive among such predators as feral cats and Burmese pythons, the hope is that they will breed in the wild.

The Service started the breeding program eight years ago because biologists feared extinction of the wood rat in its only known habitat, the hardwood hammocks of Key Largo. They also wanted to see if the wood rat would reproduce in captivity. The estimated population in the wild is now 500.

In Arizona, a plan is afoot to establish a Sonoran pronghorn breeding enclosure on Kofa National Wildlife Refuge. The plan is to move 11 breeding-age pronghorn (one buck and 10 does) to the enclosure next winter and, as early as 2012-13, annually release up to 20 offspring into suitable adjacent habitat.

Sonoran pronghorn – speedy, skittish, antelope-like animals – originally ranged widely throughout the Sonoran Desert in southwestern Arizona and northern Mexico. There are an estimated 68 animals in the wild in the United States, at Barry M. Goldwater Range, Cabeza Prieta National Wildlife Refuge (where a breeding program has been operating for some years) and Organ Pipe Cactus National Monument. There are roughly 400 in the wild in Mexico. 🦋

# CMS Is Coming to a Web Site Near You

By Sandra Hodala and Chip Kimball

**S**implify, simplify, simplify. That is one goal of the Content Management System (CMS), which will also help create uniform and easy-to-use templates that all national wildlife refuges can use for their Web pages.

For more than two years, the Refuge System's CMS Design Team has been working on a software application that will create a new design for refuges' Web pages and make it easy for non-technical users to add, edit and manage Web site content.

Once the CMS is in place later this year, Refuge System Web contributors won't have to use Dreamweaver, the editing software package that requires technical knowledge of HTML (hypertext markup language) coding. They won't have to use templates designed by the U.S. Fish and Wildlife Service Web Council to create individual pages for each site. They won't need extensive knowledge of Service standards, software usage, design principles and media integration.

Instead, the CMS will allow Web contributors to add information to predetermined content blocks, which the system will then transform into a properly formatted series of pages. These content blocks will enhance the look and usability of the Refuge System's Web presence for all of our visitors and other Web users. Virtually as easy as entering data into a form, the process should cut down on the need for training and on time expended on site management. In short, the CMS will allow employees to create and update Web content with ease.

## Flexible Template

The CMS Design Team has been committed to creating a design that is flexible enough to meet the needs of refuges and wetland management districts and at the same time provides a consistent look and feel across the Refuge System. The team is composed of 30 Refuge System employees, including two from each of the eight



The new Content Management System will create consistency for Refuge System sites across the country. (USFWS)

regions (one from the field and one from the regional office). Working with the Ektron CMS400.NET system and the design firm Threespot, the team has gone to considerable lengths to ensure that the CMS will not sterilize the Refuge System's online presence, will not limit refuge-specific content and will not restrict the creativity of individual Web developers. The team has identified numerous "what if" scenarios and worked to resolve them in a manner compatible with the system as a whole. In the end, the team expects site contributors to be pleased with the versatility, cohesiveness and beauty of the new Refuge System Web presence.

This is important because untold millions of people visit the Web sites of the 588 individual refuge and wetland

management districts. Unlike traditional refuge visitors looking for in-the-flesh connections with the natural world, virtual visitors expect the refuge sites to provide simulation of the natural world in a technologically advanced environment. Today's Web users expect high-quality presentation and vast quantities of information delivered quickly, cleanly and in intriguing formats.

The CMS will help us to do that. 

Sandra Hodala, the Refuge System's Web manager, is CMS Team project leader. Chip Kimball, wildlife biologist at Wichita Mountains Wildlife Refuge, OK, is the field representative for Region 2 on the CMS Team.

# Studying Yesterday for Climate Change Lessons

By Bill O'Brian

**K**enneth Sassaman, an associate professor of anthropology at the University of Florida, thinks that 21st Century humans might be able to learn an abstract lesson or two about adapting to modern-day climate change from Indians who lived on northern Florida's Gulf Coast thousands of years ago.

Sassaman, working with the Refuge System and the university, is conducting what he hopes will become a long-standing archaeological investigation at Lower Suwannee and Cedar Keys National Wildlife Refuges, about 50 miles southwest of Gainesville.

"Our big research agenda is to study the long-term relationship between humans and their changing environment, particularly sea-level rise," says Sassaman. The two refuges are ideal for the project, he says, because they are rich in archaeological material that has been largely undisturbed by modern development. "There are archaeological deposits in these refuges from end to end on nearly every piece of land that was inhabitable," he says. "I am blown away by how many there are and how dense they are."

Under provisions of the Archaeological Resources Protection Act (ARPA), Sassaman and his graduate students last year began carefully recovering ancient artifacts and soil samples from exposed sites on the shoreline and tiny islands in the delta at Lower Suwannee Refuge.

It's tricky business in a shallow estuary in which unpredictable winds often render tide tables irrelevant. "You can't necessarily get from point A to point B in time A," Sassaman says. More than one project johnboat has gotten stuck in the mud flats. Still, it is worth it to him.

The soil samples – which can be carbon-dated to an accuracy of plus or minus 30 years – contain scientifically valid data about the climate of a given time period. From the stable isotope of oxygen in a sample, Sassaman says, an archaeologist can even tell the season in which a clam or oyster shell was collected.



*University of Florida anthropology professor Kenneth Sassaman takes soil samples from an archaeological excavation at Lower Suwannee Refuge. (Laboratory of Southeastern Archaeology, University of Florida)*

The sherds of pottery, stone tools, shell tools and animal bone recovered by Sassaman's team and other collectors indicate that Indians lived in the region from at least 4,000 years ago until European settlers arrived about 500 years ago.

The project, which will help the refuges manage their cultural resources at little cost, is in its early stages, and Sassaman is hesitant to draw firm conclusions. However, already the soil samples and the artifacts allow him to make educated guesses about the Indians' existence. From pottery styles, he deduces that the Suwannee River was a long-term tribal boundary. From burial mounds, he surmises when religion became particularly important to the Indians. From shells themselves, he sees that their diet changed from predominantly oysters to predominantly clams at one point. He expects to find similar patterns regarding the viability of marsh grasses and certain fish.

As climate change unfolds in the future, to give a very basic example, "we might find that we need to shift our preferences for the kind of fish that we eat. I think that's what the Indians did," Sassaman says. "They were more flexible, and we might have to be, too."

## Facing Need to Change

He wants to learn from the investigation when Indian cultures living on lands that are now part of the refuges were entrenched and when they faced periods of constant change. He hypothesizes that those cultures that didn't need to change often could not change when necessary – and thus became unsustainable. He hypothesizes that Indian cultures subjected to constant environmental change adapted better because experience taught them how to deal with droughts, flood, hurricanes, and oysters and fish coming and going.

He thinks that such lessons might apply, abstractly at least, to wider social, political, legal and local zoning questions far beyond the Refuge System that modern coastal communities may face in the near future.

The overarching lesson Sassaman supposes he'll confirm on the Lower Suwannee and Cedar Keys Refuges is that widespread adaptability is vital to survival. For now, though, he and his students have some adapting of their own to do. They must master the fickle tides of the wind-driven estuary. 🦋

# Measuring Mussel Movement

By Jennifer Anderson

Creating conditions that allow for commercial navigation on the Mississippi River while also protecting natural resources – especially marine life – poses challenges for federal agencies. Recent studies may help scientists balance those two goals.

Although not anticipated, the challenges began with the construction of a lock-and-dam system in the 1930s. The resulting high water levels vastly improved navigation but over the years destroyed much of the vegetation along the banks of the river.

In recent summers, the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service and partner agencies have brought down water levels in two sections of the river to mimic historical conditions when levels were generally high in spring and low in summer. It all worked beautifully: Once the water levels went down, vegetation returned, benefiting numerous species that need plants for food, shade and shelter.

But as biologists and other representatives of the partner agencies on the Water Level Management Task Force consider additional drawdowns along the 261-mile stretch of the river within the Upper Mississippi River National Wildlife and Fish Refuge, they are weighing the potential casualties to marine life. Of particular concern are the native freshwater mussels that live in the river bottom.

Because drawdowns seem to provide benefits to the rest of the ecosystem, biologists from the partner agencies would like to proceed. But they also want to know more about the impact on mussels.

## Drop of 40 Percent in Decades

Even though freshwater rivers and lakes in North America support the richest diversity of mussels in the world, scientists are concerned about the mussels' survival. Several species have disappeared already, and nearly half of the 300 or so remaining are in danger of extinction. In the Mississippi River



Intern Ashley Hunt calculates the whereabouts of mussels in the Mississippi River. (Courtesy of U.S. Geological Survey)

alone, only about 35 species remain – a drop of nearly 40 percent in the past 30 to 40 years, Newton said.

No one knows why the mussels are disappearing, although pollution and habitat alterations are likely causes, according to Teresa Newton, a fisheries biologist with the U.S. Geological Survey. Invasive species such as the zebra mussel are impacting the native mussels, but, as Newton noted, the disappearance began before the invasives arrived.

“As the river was drawn down, scientists noticed that a lot of mussels got stranded in the sandy, flat areas on the river bank,” explained Newton. “Some mussels seemed to have a hard time moving out into deeper water, especially in areas where the slope of the river bottom was relatively low.”

## 240 Mussels Tagged

Now, a study at the Upper Mississippi Refuge may shed light on the question of what happens to mussels – or how they can be protected – during river drawdowns.

A drawdown planned for last summer for a section of the river known as Pool 6 had to be canceled because water levels were

too low. Still, the planning provided an opportunity to launch a study.

Ashley Hunt, an intern with the Service, working with Newton and refuge biologist Lisa Reid, used Super Glue to attach microchips to the shells of 240 mussels from two species that they believe have different movement behaviors. “We had all the mussels marked and ready to go,” Newton said. “Although we couldn’t look at the effects of a drawdown, we could look at the movements of mussels in a large river and determine whether our methodology works.”

Thus, on June 15, 2009, the mussels were placed in the river near Winona, MN, in water that was no deeper than a foot. Weekly through November 2009, Hunt donned chest waders and waved an electronic wand resembling a metal detector over the bottom of the river to monitor the mussels’ movements. Each tagged mussel was assigned an 11-digit number, which enabled the scientists to determine where it moved, and into what depth, from the starting point.

Although the data have not yet been analyzed, the scientists observed that most mussels moved approximately two to three yards offshore within a few weeks. There was little further movement during the summer, but in late fall the mussels appeared to move into deeper water.

In a drawdown, mussels may have to move much farther to reach deeper water, and scientists are not sure whether most mussels or just a few could make the journey, Newton said. If the Corps of Engineers proceeds with a drawdown this summer, she said, a repeat of the experiment should provide data on mussel movement patterns.

Since drawdowns benefit the larger ecosystem, Newton said, the impact on mussels would have to be weighed against the short- and long-term effects on other parts of the river. 

*Jennifer Anderson is a professional journalist and a frequent contributor to Refuge Update.*

# Protecting Wildlife, Producing Energy

By Bill O'Brian

**M**idway Atoll National Wildlife Refuge has a garbage problem. More than 20 tons of marine debris a year, swept by Pacific Ocean currents from as far away as California and Asia, foul its waters and reefs. Some of it is big: computer monitors, even bowling balls. Some is small: syringes, lighters, bits of plastic. Most of it – particularly derelict nets and lines from commercial fishing vessels – is dangerous to endangered Hawaiian monk seals and threatened Hawaiian green sea turtles.

That's where a federal, state, municipal and private partnership called Nets to Energy comes in. Since its inception in 2001, Nets to Energy has created enough energy to power 245 homes for a year – some of it from the debris transported by other federal agencies.

Because Midway Atoll Refuge, three islands with a total acreage of 1,500 and a population of 75, is 1,200 miles northwest of Honolulu on the far end of the Hawaiian Island archipelago, disposing of the debris is not easy. The refuge staff has focused on the deadly nets.

“The rest of the material is unsightly,” says deputy refuge manager John Klavitter. “But it's triage, so we try to pick up the things that are most harmful first.”

Volunteers – many on three-month stints – and staff do the land work. They collect beached debris.

National Oceanic and Atmospheric Administration divers do most of the water work. They remove nets snagged on the fringing reef – by hand, to protect the fragile coral. On hard-to-reach nets, scuba divers are brought in. On easier-to-reach nets, free divers use knives to cut away netting entangled in the live coral. “It's hard work,” says Elizabeth Keenan, a NOAA research specialist based at Papahānaumokuākea Marine National Monument. “You are free-diving down and holding your breath over and over ... And it's a really gentle process because you don't want to damage the reef. It's a precise operation.”



*Hawaiian monk seals become entangled in derelict commercial fishing nets at Midway Atoll National Wildlife Refuge. (John Klavitter/USFWS)*

## There Is No Trash Pickup

Then volunteers and staff separate, catalog and weigh as much of the debris as possible as part of the Midway Atoll Marine Debris Coastal Monitoring Project, a public-private partnership.

Space on Midway is extremely limited, and, says Klavitter, “we're not like any town in the United States.” There is no trash pickup. “The only thing we could do here is burn it in an open pit or a small incinerator, but there is too much to burn, and doing so would not be environmentally friendly.”

So, once the debris is divided into massive piles of glass, plastic, netting, etc., it must be transported to Honolulu for recycling or incineration. Because the refuge has no budget to ship debris, and hiring a garbage-hauling cargo vessel is prohibitively expensive (\$175,000 per round trip, Klavitter estimates), Midway Atoll Refuge relies heavily on NOAA and the Coast Guard to take the trash to Honolulu.

There, Schnitzer Steel Hawaii Corp. uses hydraulic shears to cut the nets into foot-long pieces and delivers the chopped-up nets to HPower, the City of Honolulu's waste-to-energy facility. All told, Schnitzer sends 100 tons of nets

to HPower each year, enough to fuel 42 homes with electricity.

“NOAA has really been the lead federal agency,” says Klavitter. “They are really specialized in this marine debris-to-energy work.”

Even so, while Nets to Energy provides a mechanism to remove dangerous fishing gear from reefs, and thus protects seals, turtles and coral, it is only a small solution to an overwhelming marine pollution problem for the Refuge System, which includes about 30,000 coastal miles. And, even though discarded fishing gear represents just half of the debris that engulfs Midway Atoll, Nets to Energy serves a vital purpose.

“It's a monumental effort” by partners that heightens public awareness of marine debris issues, says Midway Atoll Refuge manager Matt D. Brown. And “if the nets were not being burned for energy, they'd be doing no good at all.”

# Foerster Named Refuge Manager of the Year

The National Wildlife Refuge Association and the National Fish and Wildlife Foundation have honored two employees, one volunteer and one Friends group with 2010 national awards.



**Kevin Foerster** was named Paul Kroegel Refuge Manager of the Year for his work at Sacramento National Wildlife Refuge

Complex in California. Foerster, a 23-year veteran of the Refuge System,

was cited for overseeing the growth and restoration of some of the most important wintering waterfowl habitat on the West Coast; for implementing a sophisticated inventory and monitoring system that has been used as a model throughout the Refuge System; for forging partnerships with private landowners to restore the landscape of the Sacramento Valley; and for his involvement with youth activities on the refuge, including a Junior Firefighter program.

“I am very honored and humbled by the award,” said Foerster. “I view this as recognition of the quality of the staff at the Sacramento complex – I just

happened to be the leader. The way that we made things happen was with our partners.”

At the Sacramento complex, which encompasses eight refuges, Foerster is most proud of the effort he spearheaded to restore thousands of acres riparian and wetland habitat on what had been flood-prone agricultural land. “It’s a pretty important component of the Pacific Flyway. We were just doing our part,” said Foerster, who estimated that 3.5 million ducks and 750,000 geese pass through the valley annually.

Last November, Foerster became refuge manager at Upper Mississippi National Wildlife and Fish Refuge as well as

## First, We Inventory — *continued from page 1*

I&M Program in phases, in accordance with the Operational Blueprint produced by a nationwide team.

Phase 1 (fiscal years 2010 and 2011) is devoted to starting baseline inventories on abiotic resources, biological diversity, vegetation and priority species; developing methods to inventory and monitor invasive species; starting assessments and inventories of water quality and quantity; assessing impacts of climate change on fire regimes; completing initial sea level rise modeling for coastal refuges; expanding support of adaptive management at various scales; building systems to manage and share data; and devising a comprehensive approach to data management.

Chase’s administrative priorities this spring and summer are:

### Establishing the Home Office –

The I&M Program will be based in the Refuge System’s new Natural Resources Program Center in Fort Collins, CO, a city where the National Park Service (NPS) and the U.S. Geological Survey (USGS) already have similar I&M programs. Chase hopes to integrate the refuge office for efficiency with those agencies.

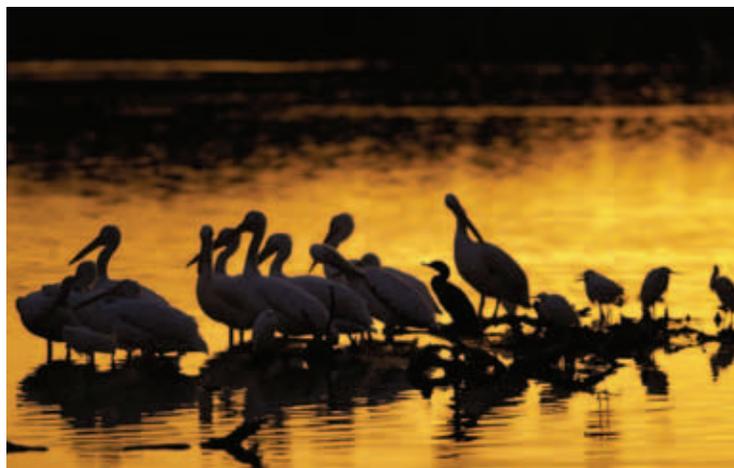
“We can achieve an economy of scale if we do things across bureaus. We can jointly gather information and reduce expenses. It’s good for us and good for the taxpayer,” he says.

**Meeting With Partners** – Chase is conferring with NPS, USGS and other partners, inside and outside the Interior

Department, to “figure out what’s been done and learn from others’ mistakes and not reinvent the wheel.”

**Filling New Positions** – Some 56 positions have been approved for the I&M Program, 16 in Fort Collins and 40 in the regions. In addition to Chase, there will be 13 I&M program specialists and an office assistant in Fort Collins.

Each region will have one interdisciplinary I&M coordinator to work with the LCC; one I&M data



*The I&M Program will compile data regarding coastal refuges and climate change. (USFWS)*

manager for the LCC to ensure data quality and storage consistency; and three wildlife biologists who will be deployed at field stations. The biologists will report to the refuge manager and help with adaptive management monitoring and strategic habitat conservation on the refuge. They also “will be expected to support the I&M Program, collect field data, oversee some coordination and some consistency,” says Chase, whose goal is to hire “the absolute best people to help kick off a new exciting time in the Refuge System.”

refuge supervisor for six related refuges in five states, Minnesota, Wisconsin, Iowa, Illinois and Missouri.

### Byrd, de Wilde, Friends Honored



**Vernon Byrd**, a wildlife biologist at Alaska Maritime National Wildlife Refuge was named Employee of the Year. Byrd was

honored for “demonstrating dedication and vision protecting marine species of coastal Alaska such as auklets, puffins, storm-petrels and other seabirds.”



**Zeeger de Wilde** was named Volunteer of the Year for his commitment to the Chesapeake Marshlands National Wildlife Refuge Complex

in Maryland and Virginia. He was cited for having volunteered more than 12,000 hours on the refuges over the past 20 years and helping to create butterfly gardens that showcase native plants. An avid birder, he also leads bird walks, or “eagle prowls,” that are popular among visitors.

**The Friends of Alaska National Wildlife Refuges** received the Friends Group of the Year award for “protecting and raising awareness for more than 75 million acres of lands in Alaska’s 16 national wildlife refuges.” The Friends have undertaken projects to remove invasive plants, reduce invasive horse populations, and educate local communities and national decision makers on the importance of Alaska’s refuges. 🦋

**Starting Pilot Projects** – The I&M leadership and the regional refuge chiefs are working to identify two or three national-scope pilot projects to demonstrate significant progress this year. Refuge leadership is considering the cross-cutting needs (such as digital elevation models) and key resources that link the Refuge System (such as water and migratory birds) in order to establish some early successes.

The long-term aim, says Chase, is to assemble a repository of data that will “outlive all of us and all of our kids and all of our grandkids.”

The program “won’t be one size fits all. It never is. Our organization doesn’t work that way – and it shouldn’t,” says Andy Loranger, who has been involved with the development of the program since 2008. “But there certainly are species, for example, that are represented fairly commonly throughout the Refuge System, and it makes sense to collect such data consistently.”

Loranger, a 26-year veteran of the Refuge System, who became refuge manager at Kenai National Wildlife Refuge this spring after three years as national chief of natural resources

and conservation planning, says the data management component is vital. The program must ensure that the information collected is “in a format that can be synthesized to answer a variety of questions at whatever scale you want” – be it the scale of the refuge, the region, the LCC or the nation.

For the LCCs – the national network of applied conservation science centers being created by the U.S. Fish and Wildlife Service in partnership with a host of federal agencies, states, universities and other entities – Loranger says, I&M data ultimately will provide a snapshot of how species distribution, vegetation, water and other resources are changing over a broad geographic scale, especially in the face of climate change.

For refuge managers, Loranger says, the I&M data eventually will provide answers to questions like: How does my refuge fit into the broader geographic scale? How can I maximize the contribution of my refuge to serve the needs of migratory birds in this flyway? What are the priority resources in the LCC? How can I maximize my refuge’s contribution to the priority resources?

### Story Being Told

As a whole, Loranger says, the I&M data will allow the Refuge System to “more effectively tell a story about the great work that is being done on refuges.”

As the I&M Program rolls out, Chase encourages refuge staff to consider the next generation of wildlife biologists and refuge managers and how useful it would have been if somebody had implemented such a program decades ago. He wants refuge staff to imagine how useful an easily accessible collection of scientifically credible data will be when making decisions about land use, permits, development, land acquisition and more.

“I want to plant the seed that people should be thinking about their peers 30 years from now,” says Chase. “What decisions are they going to face? What issues will they be wrestling with? And what are the data sets they will need? What are the gifts that we can give them?” 🦋



# RefugeUpdate

USFWS-NWRS  
4401 North Fairfax Dr.  
Room 634C  
Arlington, VA 22203-1610  
www.fws.gov/refuges

STANDARD PRESORT  
POSTAGE AND FEES  
**PAID**  
U.S. DEPARTMENT OF THE  
INTERIOR  
PERMIT G-77

## A Look Back – Civilian Conservation Corps

### Monuments to Hard Work

Okefenokee. Squaw Creek. White River. Deer Flat. Malheur. From sea to shining sea, national wildlife refuges were improved and developed by the Civilian Conservation Corps (CCC) during the depths of the Great Depression.

On April 5, 1933, President Franklin D. Roosevelt signed an Executive Order creating the Emergency Conservation Work program to generate jobs that would not interfere with normal employment and would help conserve natural resources. The War Department administered the camps, training, transportation and camp construction while the Departments of Agriculture and Interior identified work projects. Only 37 days after Roosevelt signed the Executive Order, the first enrollee was signed on; within four months, 250,000 young men ages 18 to 25 were enrolled.

A CCC enrollee was paid \$30 a month, of which \$25 was sent to his family or placed in a savings account. The money sent home was often the sole source of income for families.

From 1935 to 1942, CCC crew number 2506 was stationed at Deer Flat National Wildlife Refuge, ID. More than 750

men came from back east to work in the Treasure Valley. The enrollees dug and cleared ditches, raised fences, and waged a war against invasive weeds. But their primary mission was to reface the upper and lower embankments with lava rock. After years of wave action, some spots in the dams had eroded almost 15 feet from their initial point. The crew laid 2,438,000 pounds of rock, 26,760 cubic yards of rip-rap, and 28,200 cubic yards of gravel to ensure the integrity of the two embankments.

The CCC put buildings, dams or bridges on nearly 50 refuges and restored thousands of acres of land. Crews built fences at Okefenokee National Wildlife Refuge, GA. At Squaw Creek National Wildlife Refuge, MO, the CCC built fish shelters, nesting islands and major spillways, while crushing stone in local quarries to build walkways up Lookout Mountain. When severe winter weather set in, they cleared local roads and earned the respect of the citizens of Mound City.



*CCC logging crews helped build White River National Wildlife Refuge, AR, and added facilities to at least 50 other refuges around the country (USFWS)*

All camps were closed by June 1942, but the CCC would become the model for state agencies and team-based national service youth conservation programs including the Student Conservation Association. 

*Service historian/archaeologist LouAnn Speulda-Drews, Boise State University applied historical researcher Marc Frisk and refuge volunteer Anthony Breda contributed to this article.*

#### Send Us Your Comments

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