



# RefugeUpdate

National Wildlife Refuge System

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



*INSIDE: Just by eating grasses and forbs, spreading seeds via their digestive tracts, and disturbing and aerating the soil, bison are naturally and steadily restoring native prairie habitat at Rocky Mountain Arsenal National Wildlife Refuge in Colorado. See Focus section, beginning on page 8. (© Peter Eades)*

## Fish and Wildlife Service to Fund 17 Species-Recovery Projects on Refuges

By Susan Morse

To speed wildlife recovery and perhaps avert extinctions, the U.S. Fish and Wildlife Service will award \$5.8 million to 17 projects to recover threatened or endangered species on or near national wildlife refuges. Target species include whooping crane, Karner blue butterfly and Attwater's prairie chicken.

The efforts are part of the Service's Cooperative Recovery Initiative, begun in 2013 with \$4.3 million in funding to 10 projects.

One beneficiary of 2013 funding – the Oregon chub – has recovered so well that in February the Service proposed removing the small fish from the list of endangered and threatened wildlife under the Endangered Species Act. If the action is finalized, the chub would be the first fish delisted with the help of this initiative.

As in 2013, funding will draw from several Service programs, including the Refuge System; Endangered Species; Partners for Fish and Wildlife; Fish and Aquatic Conservation; and the Science program. Projects include:

**Alaska:** Yukon Delta National Wildlife Refuge. 1) Expand nest surveys for the spectacled eider, an endangered sea duck, to more reliably gauge population size.

## Plan Completed To Enhance Hunting, Fishing



Hunting and fishing have a rich tradition in the United States – one that will become richer still as the *Conserving the Future* Hunting and

Fishing strategic plan is implemented.

The plan was finalized in late March in response to the *Conserving the Future* Recommendation 17, which called on the U.S. Fish and Wildlife Service and state and fish wildlife agencies to work cooperatively to increase quality hunting and fishing opportunities on national wildlife refuges.

“The best relationships come from investment of time and energy with our partners,” reads the plan.

*continued on pg 18*

*continued on pg 14*

## From the Director Bringing Nature to Cities

I had the privilege to attend the grand opening of the new Desert National Wildlife Refuge Visitor Center in Nevada.



Dan Ashe

It is a spectacular building, built with revenue generated by the sale of excessed Bureau of Land Management land in the Las Vegas area.

The 11,000-square-foot visitor center features exhibits, two classrooms/meeting rooms, offices and a bookstore. It is also loaded with environmentally friendly design elements, and the refuge is applying for the highest certification for sustainability from the U.S. Green Building Council, LEED Platinum.

Desert Refuge is the largest refuge in the lower 48 states, and its visitor center is a short drive for the 600,000 residents of Las Vegas.

In actuality, it isn't that unusual. Nearly half of our 562 national wildlife refuges are within easy traveling distance of small cities, and more than 100 refuges are within 25 miles of cities with 250,000 or more inhabitants. Today, there is at least one wildlife refuge within an hour's drive of most major metropolitan areas. Even in New York's Times Square, you are only a 35-mile drive from Great Swamp National Wildlife Refuge in New Jersey.

Still, we want to do more to reach urban residents and give them better opportunities to experience the wild things and wild places that make our country unique.

*continued on pg 18*

## Chief's Corner Slowly, but Surely, We Restore Habitat

Bill Grabill was the first refuge manager I worked for. Bill told me that the first refuge job you have is the best one you will ever have. He said that you will never spend more time in the field than you do at your first refuge. He was right.

At Mississippi Sandhill Crane National Wildlife Refuge, in the southeast corner of the state near the Alabama border on the Gulf of Mexico, we were focused in the late 1970s on restoring the coastal savanna habitat that was home to the last 40 Mississippi sandhill cranes in the world.



Jim Kurth

Timber companies had tried to drain the land. They planted slash pine, and excluded fire. Most of the area was too wet to produce pulpwood or saw logs profitably. But the trees and brush grew enough to make most of the

area unsuitable for a bird with a six-foot wingspan.

We conducted the first prescribed fires on the refuge. Some of them were pretty unruly. We put in some water control structures. Some of them didn't work very well. We bulldozed pine trees where we could. We sent in chainsaw crews where it was too wet for heavy equipment. Slowly, but surely, we began to restore and manage the crane's habitat.

It was joyful work. To see wiregrass green up and pitcher plants flower after a fire was a remarkable sight. It was rewarding to see and measure progress. Most important, we began to realize that we might be able to win the race and save the cranes from extinction. We all felt like we were working directly on the mission of the U.S. Fish and Wildlife Service.

The effort at Mississippi Sandhill Crane Refuge continues today, with much more

*continued on pg 14*

## Refuge Update

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## Inside

### North Dakota Refuges Turn 75

*In May and June, 29 North Dakota refuges are marking their 75th anniversaries. Page 4*

### Inventory and Monitoring

*I&M plans, which are now required for all refuges, can be useful game changers. Page 6*

### Twins on a Mission

*Twin sisters Karen Hogan and Teresa Noel have a goal: to visit all 460 or so refuges open to the public. Page 7*

### Focus: Habitat Restoration

*From California to the Caribbean and from Missouri and Texas to the Pacific, refuges steadily are restoring habitat. Pages 8-15*

# Midway Atoll Refuge Is Taming Invasive *Verbesina*

By Susan Morse

**F**or the first time in years, an invasive plant is receding from Midway Atoll National Wildlife Refuge, opening critically needed nesting space for rare seabirds like albatross. As cornstalk-high stands of *Verbesina encelioides*, or golden crownbeard, yield to eradication efforts, hope for the birds is rising.

More seabirds nest and more chicks survive in Midway's native grass than in non-native *Verbesina*, so the U.S. Fish and Wildlife Service is conducting the *Verbesina* eradication with a \$1 million National Wildlife Refuge System grant and matching funds from the National Fish and Wildlife Foundation.

Laysan and black-footed albatrosses nested at near-record levels in 2012-2013 at Midway Atoll, though biologists will need three or more years to know if the rise is because of *Verbesina* control. Another potentially promising sign: The January hatching of a short-tailed albatross chick, one of the world's most endangered seabirds. The hatching was only the third documented outside three small islands near Japan; the earlier hatchings also occurred on Midway after plant control efforts began.

In addition to the three albatross species, endangered Laysan duck and 18 other seabird species stand to benefit from *Verbesina* removal.

"The early success of this project is exciting, because the techniques we've developed could help control invasive plants in other island environments and perhaps even on the U.S. mainland," says John Klavitter, Refuge System invasive species coordinator and former deputy refuge manager at Midway Atoll. "Invasive species – non-natives that harm the environment, economy or people – are extremely challenging to manage, let alone remove."

Midway Atoll Refuge, part of the Papahānaumokuākea Marine National Monument, was the site of a pivotal



Midway Atoll National Wildlife Refuge in the Pacific Ocean hosts one of the world's largest albatross colonies. A project to eradicate invasive *Verbesina encelioides* (golden crownbeard) is opening critically needed nesting space for albatross and other rare seabirds. (John Klavitter/USFWS)

World War II battle. The Pacific Ocean atoll, which hosts one of the world's largest albatross colonies, became a refuge in 1988.

*Verbesina* was introduced to Midway, probably in the 1930s, from the southwestern United States and Mexico. By the late 1990s, when eradication efforts began, the plant covered most of Midway Atoll's three islands, reducing seabird nesting density, reproductive success, albatross chick survival and biodiversity. *Verbesina* is an annual plant in the daisy family. It grows rapidly, forming thick stands that reduce albatross nesting and limit air flow to nesting chicks, putting them at risk of death.

For the past two years, crews have hand-sprayed *Verbesina* almost daily with herbicides; year-round seabird nesting precludes the use of tractors or heavy equipment. Midway's remote location, 1,200 miles from Honolulu, is a challenge, too.

"We need to ship all herbicides and equipment from Honolulu, and we only have two to three supply ships a year," says Service bio-technician and project crew leader Greg Schubert.

Despite logistical challenges, spraying has knocked out most mature *Verbesina*

plants on 335-acre Eastern Island. If all goes well, emergent seedlings will be gone by 2017 on Eastern and Spit islands and by 2018 on bigger Sand Island. Native grasses and plants are being replanted to restore seabird nesting habitat, secure coral sand and build coastal dunes to protect against waves.

To guard against re-infestation, the refuge imposes strict quarantine procedures. All travelers to Eastern Island must pass through shoe-cleaning stations at the boat pier. All equipment is cleaned before transport from Honolulu to Midway and before use on Eastern Island. Travelers from Honolulu to Midway must also clean their shoes and gear before flights and voyages.

Midway Atoll provides habitat for some 3 million seabirds of 21 species, including 1.5 million Laysan albatrosses; this accounts for about 65 percent of the global population, making it the world's largest Laysan albatross colony. Nineteen of 21 albatross species are threatened with extinction, according to the International Union for the Conservation of Nature. 

*Susan Morse is a writer-editor in the Refuge System Branch of Communications.*

# “More Vital Than Ever,” 29 North Dakota Refuges Turn 75

By Susan Morse

In the 1930s the Dust Bowl brought widespread ruin, but in North Dakota the ecological disaster had one good outcome: the establishment of a slew of national wildlife refuges. Without the construction of reservoirs and the restoration of habitat completed under the direction of the U.S. Fish and Wildlife Service, many wildlife species might not have survived.

In May and June of this year, 29 North Dakota refuges mark their 75th anniversaries amid a new crisis: the rapid conversion of surrounding prairie grasslands and wetlands to agriculture, energy development and other uses.

“These refuges were established in recognition of the importance of the landscape as a whole in sustaining

Conservation Campaign (<http://go.usa.gov/Kh4R>) to call attention to the prairie habitat loss.

North Dakota sits in the Prairie Pothole Region, a glaciated landscape of shallow basins covering parts of Montana, the Dakotas, Minnesota and Iowa. Millions of migrating canvasbacks, mallards, pintails, gadwall, teal and other waterfowl flock to seasonal wetland ponds to breed.

Together, North Dakota’s wildlife refuges account for less than 1 percent of the state’s land. But by partnering with farmers, ranchers and other landowners, the Service has been able to restore habitat on a wider scale.

Biologist and early Refuge System manager J. Clark Salyer handpicked many of North Dakota’s Dust Bowl-era

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*In spring 1939, President Franklin Roosevelt signed executive orders establishing 29 new purchases as refuges.*

Canfield Lake, Florence Lake, Hobart Lake, Lake George, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Rock Lake and Shell Lake. The remaining 18 are protected by conservation easements, under which private landowners are paid in return for providing important migratory duck habitat.

Additionally, the Service works with willing landowners to enter into financial agreements not to drain, burn or fill wetlands and not to mow or hay grasslands before July 15. There is no public access to easement refuges or private land easements.

Besides serving as breeding, resting and feeding places for migrating waterfowl, refuge wetlands and grasslands in North Dakota provide benefits for people, helping to prevent floods, reduce erosion, improve water quality, retain soils and provide opportunities for hunting, fishing and wildlife watching.

But for the past decade or so, high corn and soybean prices have fueled a rush to drain and plow Prairie Pothole wildlife habitat. When such wholesale land conversion occurred in the 1920s and '30s, the Dust Bowl followed. Recovery was slow. There is concern that current industrial-scale land practices may be even harder to recover from.

President Obama’s fiscal year 2015 budget requests funding to acquire conservation easements on at least 21,000 acres in North and South Dakota. These easements would create certainty for landowners who seek to ensure land and water is conserved for future generations. 

*Susan Morse is a writer-editor in the Refuge System Branch of Communications.*



*A banded duck is released at Lake Ilo National Wildlife Refuge, one of 29 refuges established in North Dakota during a two-month period in 1939. (Todd Gallion/USFWS)*

waterfowl and other species,” says Will Meeks, assistant regional director for refuges in the Service’s Mountain-Prairie region. “As our native prairie lands vanish, the refuges are becoming more vital than ever as natural oases.”

In March, the Service and conservation partners launched the Prairies

refuges, crisscrossing the drought-parched state in his station wagon to find distressed farmlands and buy those he could. In spring 1939, President Franklin Roosevelt signed executive orders establishing 29 new purchases as refuges.

Of these 29 North Dakota refuges, the Service owns title to 11: Buffalo Lake,



On his own time, Michael Keys, a biologist at Florida's St. Marks National Wildlife Refuge, is experimenting with installing nest cavity boxes in pine trees in Belize for the benefit of yellow-headed parrots. More photos are at <http://bit.ly/1hkLnRE> (© Larkin Keys Photography)

## Climbing Trees in Belize

By Karen Leggett

Could nest cavity boxes that help the red-cockaded woodpecker in the United States also help the yellow-headed parrot in the small Central American nation of Belize? Two years ago, Michael Keys had no idea. Now he knows the answer: Yes.

Keys is a wildlife biologist at St. Marks National Wildlife Refuge in Florida. One of his tasks there is to install artificial nest boxes in tree cavities to promote nesting by endangered red-cockaded woodpeckers. Thanks in part to the boxes, there are now more than 14,000 red-cockaded woodpeckers (RCWs) in the Southeast. Steve Morrison, a forester with The Nature Conservancy, suggested Keys also try installing nest boxes in Belize, where the yellow-headed parrot has similar habitat and nesting requirements. The parrots, which can be taught to talk, are in decline, largely because of the pet trade.

Keys first took his skills and supplies to southern Belize in 2012, installing 10 nest boxes in pine trees across thousands of acres. The work was rugged.

"Getting to the tree is more work than putting in the box," he says. He selects tall pines, climbing like a utility worker and using a chainsaw to cut a hole in

the tree. With each climb, he battles tropical sun, sawdust and mosquitoes. "You have to be conscientious every time. I've climbed thousands of trees and not injured myself."

Each box is about two feet tall, nine inches deep and 10 inches wide. For parrots, cavities are nesting habitat only. Red-cockaded woodpeckers live year-round in cavities, explains Keys, so they choose their nests carefully. "No self-respecting RCW will go into a rotten cavity." Parrots are less picky, taking to the artificial nest boxes quickly. Chicks fledge in May from boxes installed in January.

Keys returned to Belize this year and, building on previous success, selected trees in the more open areas that parrots seem to prefer. Keys' 19-year-old son, Larkin, a photographer, went along.

"We saw parrots actually using the nest box 24 hours after it was installed," says Larkin. "They adapted instantly. Obviously we were doing the right thing."

Keys has trained Belizeans to replace and install boxes. The parrots have not been banded or counted, but cameras will be placed in some boxes to watch nesting and predation remotely. Productivity is only about .5 chicks per nest.

Belize is "at a stage with parrots where we were with RCWs 30 years ago," said Keys, but he believes there is enough success to publish preliminary results. He is seeking research grants to determine if this technique can become standard in recovering more species.

Keys goes to Belize on his own time, funded by conservation organizations and private donations. He returns to St. Marks Refuge with renewed appreciation.

"We have tight budgets, but it's nothing compared to people working on conservation in developing countries," he says. "Their equipment for a 37,000-acre park was two mountain bikes and a 19-foot boat – and we're worrying about gas for a big truck."

Hoping to continue his work in Belize, Keys told the Tampa Tribune that the yellow-headed parrot "is a species that could go extinct, and I have this one specialized skill that can help. I'm not a heart surgeon or anything. So this is my contribution to helping the habitat."



*Karen Leggett is a writer-editor in the Refuge System Branch of Communications.*

# I&M Plans: Useful Game Changers

By Peter Dratch

Last spring, at Little River National Wildlife Refuge headquarters in a strip mall in Broken Bow, OK, eight U.S. Fish and Wildlife Service employees pored over every known survey conducted at the refuge. It's a scene that will be repeated at hundreds of refuges and wetland management districts over the next five years.

Little River Refuge was one of five refuges in five regions that agreed to pilot the development of individual refuge inventory and monitoring (I&M) plans. The others were Muscatatuck Refuge, IN; Rachel Carson Refuge, ME; Kodiak Refuge, AK; and Anaho Island Refuge, NV. Morris Wetland Management District in Minnesota recently became the first WMD to hold a similar workshop.

They were doing so because Refuge Inventory and Monitoring (I&M) Policy signed in January requires each station to write an I&M plan that identifies surveys to be conducted in the next 10-15 years. The plans will look beyond refuge boundaries to examine landscape-scale conservation potential. The plans also will

enable current and future refuge staff members to understand which surveys were conducted and why.

Survey protocols will be reviewed for scientific rigor, and the policy includes a peer-reviewed handbook, *How to Develop Survey Protocols*.

The policy also adds an important practical aspect to monitoring.

"It's not just the monitoring that we have always done, but monitoring intended to inform and influence management decisions – that's the game changer. To do that, the data must get analyzed, and the results must get written up," said Mark Chase, director of the Natural Resource Program Center in Fort Collins, CO, where the I&M program is based.

The Little River Refuge team spent a day putting each survey through a prioritization tool. The group looked hard at which surveys were critical to refuge operations and which were helpful but not vital. Turkey surveys scored low. Surveys for threatened American burying beetles ranked high because of an Endangered Species Act Section 7 requirement; they were selected for the I&M plan.

Paige Schmidt, an Oklahoma-based I&M zone biologist, described her approach to developing the Little River Refuge plan.

"I prepared by consulting with the policy to find what the requirements were, and then I assembled a team," she said. "We wanted someone from the national office to answer policy questions, the Southwest Region I&M coordinator to help ensure consistency across the region, and other local colleagues who could both lend experience on the subject matter and learn from the experience of Little River."

Bill Pyle, supervisory biologist at Kodiak Refuge, said his refuge's 2007 comprehensive conservation plan and recent science review "provided a framework that really expedited development of the I&M plan. We just modified objectives to consider new factors like climate change."

The Midwest Region starts with habitat monitoring plans and takes I&M plans a step further. "We do a cost-benefit analysis, and ask the refuge staff to estimate the amount of time they have to do surveys," said zone biologist Sean Blomquist. The region develops sets of survey combinations, and the refuge selects the surveys that best meet high-priority information needs and can be accomplished with available staff.

Anaho Island Refuge, with I&M team assistance, used the *Open Standards for the Practice of Conservation* to ensure surveys were aligned with refuge objectives.

Little River Refuge manager David Weaver was pleased with the process, recognizing that it's important to have a clear and concise plan for current and future staff members.

"You have a document that is going to be usable," he said. "I can read through this in an hour or two, and it's easy to follow and understand." 

*Peter Dratch is lead biologist with the Refuge System Inventory and Monitoring program in Fort Collins, CO.*



Eight U.S. Fish and Wildlife Service employees developed an inventory and monitoring (I&M) plan for Little River National Wildlife Refuge in Oklahoma as part of a I&M pilot project. Among the employees were, from left, refuge manager David Weaver, I&M zone biologists Bill Johnson and Paige Schmidt, Southwest Region I&M coordinator Kris Metzger and I&M lead biologist Peter Dratch. (USFWS)

## 2 Sisters, 1 Goal: 460 Refuges

By Susan Morse

Two years ago, twins Karen Hogan and Teresa Noel discovered a new passion: birding on national wildlife refuges. “We went to Shiawassee, then to Muscatatuck,” says Hogan. “We fell in love with the beauty, the nature.” What could beat that? Suddenly, she knew: “We should go see every one of them.”

So the pair plans to bird on all 460 or so refuges open to the public.

Never mind that some, like Guam National Wildlife Refuge, are in the remote Pacific, or, like Arctic Refuge, in northern Alaska. So what if the sisters aren't rich (both manage biomedical research labs, Hogan at the University of North Carolina; Noel at the University of Kentucky) or carefree (Hogan has a husband and grandkids; Noel, single, helps care for her elderly mother). So what if friends and family question their sanity?

“If your dream doesn't scare you, you shouldn't do it, right?” says Hogan, laughing.

By making several frugal, multi-refuge trips a year, they estimate the project will take 10 years and \$40,000.

Already, the two have logged more than 50 refuges — mostly in Florida, North Dakota, Tennessee and North Carolina. Lower New England is on tap for May. They blog about their adventures at [www.birdingwithkarenandteresa.com](http://www.birdingwithkarenandteresa.com).

Ask them highlights of their travels, and they reel off memory after excited memory. “Hearing yellow-headed blackbirds at Arrowwood” Refuge in North Dakota, says Noel. “I'll never forget that. A bunch of them were singing at the same time. I just loved it.”

Adds Hogan: “There were birds flying in every direction, swallows, flycatchers, bobolinks, terns, sandpipers and ducks. I felt like my head was on a swivel. I didn't know which way to look.”



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Noel found Arthur R. Marshall Loxahatchee Refuge in Florida a “magical place. That's where we saw a bobcat,” she says. “It came within 10 feet of us.”

At Pocosin Lakes Refuge, NC, Hogan filmed snow geese in flight. “I can't imagine anyone seeing these amazing birds and not wanting to preserve them for future generations,” she says, her voice breathless with emotion.

The sisters, in their mid-50s, inspire admiration of their own. “They're a couple of amazing women,” says Okefenokee Refuge manager Michael Lusk, who chanced upon them at 7 a.m. New Year's Day at Crystal River Refuge in Florida, where he was then based.

The hour was not usual. Hogan and Noel's basic refuge trip plan: Arrive at dawn. Explore. Snack in car. Move on. Repeat — into the night, if possible.

“You cannot waste a minute to go get food or anything,” says Noel. “We eat tunafish out of a can, crackers, so we're not running into town to get food. Every daylight hour is spent in the refuge to get as much out of it as we can.”

They ply staff and volunteers with questions: Why don't more people know about refuges? If more people visit, is that good? Or will that disturb wildlife? “Very thoughtful, philosophical questions,” Lusk says. They're “very impressive women who really ‘get’ what refuges do.”

Noel says the Florida trip underscored how vital wildlife habitat is — and how fragmented. “I met a Florida scrub jay at Merritt Island.” It perched on her cap, then her hand. “It's kind of sad. There's [practically] no place for them to live.”

But the twin's spirits don't stay down long. “We like to tease each other: Who has the most birds?” says Noel. “We both have life lists. I'm sure she is ahead. She lives on the coast. I live in downtown Lexington. She gets so many more birds than I do.”

Psyched for the next trip? “I can't wait,” Noel says. “I wish I could do it every month.”

*Susan Morse is a writer-editor in the Refuge System Branch of Communications.*



*Land before restoration (top) and after (bottom) at Minnesota's Litchfield Wetland Management District, where the U.S. Fish and Wildlife Service works with private landowners to preserve and enhance habitat for wildlife. There are 38 wetland management districts in the National Wildlife Refuge System. (Steve Erickson/USFWS)*

## Restoration Is Fundamental

**H**abitat restoration is paramount to the National Wildlife Refuge System. It's right there in our mission statement:

"... to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Since 1903, the Refuge System has restored tens of millions of acres of habitat on national wildlife refuges and in wetland management districts – almost always with the help of

governmental partners, non-government partners and private landowners.

But since 2011 alone, lean budgets, insufficient staffing and other limitations have led the Refuge System to defer restoration on an average of 3.6 million acres per year, according to Refuge Annual Performance Plan (RAPP) data.

Still, since 2011, the Refuge System has restored an average of roughly 57,000 upland acres, 34,000 wetland acres and 56 riparian miles per year. It has done so in the face of challenges ranging from urban encroachment, habitat fragmentation and degradation of water quality to climate change and increasing

demands for energy development and extraction. It has restored those acres and miles by planting native species, controlling invasive species, conducting prescribed fires, managing water resources and strategically flooding/draining habitat.

Since 2009, the Refuge System also has restored more than 10,000 open-water acres by removing fishing nets and cleaning up coral reefs.

This Focus section highlights a handful of restoration projects on national wildlife refuges from California to the Caribbean and from Missouri and Texas to the Pacific. 



# Service and Corps “Work Hand in Glove” at Big Muddy Refuge

By Bill O'Brian

As you cross the Missouri River on Interstate 70 about 15 miles west of Columbia, MO, what looks to the untrained eye like centuries-old floodplain habitat unfolds before you. On both sides of the highway as far as you can see is wet prairie, bottomland forest and flood-strewn woody debris.

But it's not habitat from Lewis and Clark's days. It's restored habitat. Just 20 years ago, it was row upon row of planted corn and soybeans. Now, it's the Overton Bottoms north and south units of Big Muddy National Fish and Wildlife Refuge.

The Missouri is the nation's longest river. Big Muddy Refuge is 17,600 acres in 11 units along the river's final 367-mile stretch across its namesake state. The refuge's long-term goal, as funding and circumstance permit, is to manage 60,000 acres – 7 percent of the 820,000-acre floodplain in Missouri.

“We're trying to restore a small percentage of the Missouri River floodplain between Kansas City and St. Louis to near historic conditions,” says Tom Bell, a Missouri native who has been Big Muddy Refuge manager since 1999. “The objectives of the refuge are really pretty straightforward – to re-create the habitat that's been beneficial to floodplain-dependent fish and wildlife.”

Historically, “the Missouri River was an unruly giant. It meandered all over that floodplain,” Bell says. For almost a century, though, the U.S. Army Corps of Engineers has channelized the river for navigation, flood control, irrigation and other purposes. The Corps' work is “really one of the engineering marvels of the modern world,” Bell says, but it has affected fish and wildlife negatively.

To mitigate for that, the Corps has been helping the U.S. Fish and Wildlife Service restore habitat since Big Muddy Refuge's establishment in 1994.



Side channels like these at Big Muddy National Fish and Wildlife Refuge – usually constructed by the U.S. Army Corps of Engineers – provide shallow, slow-water habitat that is vital to large-river fish, birds and terrestrial wildlife along the Missouri River. The Jameson Island Unit of the refuge is in the foreground; the Lisbon Bottom Unit is in the background. (USFWS)

The Corps does the heavy lifting (its specialty) and often purchases land. The Service manages the land and provides biological guidance on restoration projects. “We work hand in glove,” says Bell.

Three examples:

- At Overton Bottoms, the Corps purchased roughly half the land in the north unit and 95 percent of the land in the south unit. It also repositioned levees, built two side channels and routinely supports restoration efforts as the river's hydrology returns the floodplain to a natural state.
- At Cora Island, one of Big Muddy Refuge's newer units near St. Louis, the Corps purchased the land, transferred management to the Service and, as part of a \$6 million project, will be constructing side channels.

- At Jameson Island, a unit between Columbia and Kansas City, the Service purchased the land, but the Corps is funding ongoing restoration.

All told, Bell says, the Corps purchased roughly one-third of the land in the refuge. The Service purchased the rest, often with help from The Nature Conservancy, The Conservation Fund, Ducks Unlimited and the National Wild Turkey Federation.

“We feel that by having these little habitat islands, so to speak, interspersed on the river we can maintain native fish and wildlife populations,” says Bell. “The idea is not to have anything else need to be listed as endangered or threatened.”

The primary beneficiaries of the restoration are large-river fish, notably the endangered pallid sturgeon but also blue suckers, sicklefin chubs and dozens of species in decline. A braided riparian

continued on pg 14

## The Challenges and Rewards of Managing Bison

By Bill O'Brian

**M**anaging a herd of bison in a major metropolitan area on a national wildlife refuge that 70 years ago was a military munitions site is complicated. And rewarding.

Just ask David Lucas, project leader at Colorado's Rocky Mountain Arsenal National Wildlife Refuge.

It's complicated, Lucas says, because herd size must be limited to accommodate refuge land available, and Environmental Protection Agency Superfund encumbrances confound doing that.

It's rewarding, Lucas says, because the bison are: thriving; restoring native prairie habitat; and "an awesome tool for connecting people with nature."

Last year, an estimated 300,000 visitors came to the refuge, which is a 20-minute drive east of downtown Denver. "The bison are our current superstars," Lucas says, especially since the refuge's nine-mile auto tour route opened in 2012.

"They are the most iconic western species," Lucas says. "Their size and their enormity are truly amazing. Some of those bulls weigh more than 2,000 pounds. I will never truly understand how an animal that eats nothing but grass can get that big. You're sitting in your car looking at an animal that's bigger than your car."

Yes, bison eat vegetation – 19 to 31 pounds of dry forage daily. So, for the sake of the habitat and other herbivores, such as prairie dogs, deer and grassland-dependent birds, the refuge must control bison numbers. To date, the refuge has restored about 8,500 acres of native grassland to provide wildlife habitat. But those acres are not yet flourishing enough to sustain heavy grazing, so the refuge's 71 bison will be kept off those restored acres for the next few years.



*An estimated 300,000 visitors came to Rocky Mountain Arsenal National Wildlife Refuge east of Denver last year. "The bison are our current superstars," says project leader David Lucas. In addition, the bison are restoring native prairie habitat. (© Rich Keen)*

Rocky Mountain Arsenal Refuge is one of seven National Wildlife Refuge System units that manage bison. Individually and collectively, herd sizes are managed to maintain genetic diversity and refuge carrying capacity (ability to support bison).

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***To date, the refuge has restored about 8,500 acres of native grassland to provide wildlife habitat.***

The other six units may reduce their herds by transferring individual bison to other refuges, conservation agencies, tribes or private ranchers. However, because of Rocky Mountain Arsenal Refuge's past as a World War II chemical weapons site, it is not permitted to manage its herd as the other six do, pending further evaluation. EPA Superfund restrictions currently prohibit the consumption of game taken from the refuge's land. So, for now, the refuge cannot transfer bison to tribes or ranchers – even if those people have no immediate plans to consume them.

"We need to remove the [Superfund] encumbrance so we can manage our herd like every other refuge bison herd," says Lucas. "We pretty much know they are safe for consumption, but we have to prove it scientifically."

Rocky Mountain Arsenal Refuge's long-term goal is to expand the bison grazing range from the current 2,300 acres to 12,165 acres by 2018, with an eventual population of 110 to 209 bison.

"The bison are thriving here. They are doing extremely well. They are doing exactly what we want," says Lucas. He points to how the bison's cycle of eating grasses and forbs, spreading seeds via their digestive tracts and disturbing/aerating the soil is naturally restoring native prairie. And he is proud of Rocky Mountain Arsenal Refuge's role in the larger Refuge System effort to conserve bison.

"Bison are a signature species," Lucas says. "They were almost hunted to extinction. They are at the top of the pyramid in the Plains ecosystem. If we are living true to our goals as a country, wild bison must be a part of the ecosystem." 



## Steadily Connecting the Dots Along the Rio Grande

By Bill O'Brien

**L**ower Rio Grande Valley National Wildlife Refuge in Texas is remarkably biodiverse, remarkably fragmented and, against formidable odds, steadily restoring native habitat connectivity for endangered ocelots and other wildlife.

The corridor refuge encompasses 93,000 acres on 130 units along 275 river miles. It is home to 1,200 documented plant species, 300 butterflies and 700 vertebrates (520 of them birds).

But in the past century, 95 percent of valley vegetation was cleared for development or agriculture – and since the refuge's 1979 establishment, valley population has tripled to 1.3 million.

“What was kind of a remote refuge 30 years ago is becoming surrounded by development,” says Bryan Winton, refuge manager since 2006. “It's a very biological diverse area because the Central and Mississippi Flyways converge. It's just so important that we try to keep the native habitat types on the landscape here.”

The native habitat is spiny shrubs, trees, grasses and succulents collectively known as Tamaulipan thornscrub. “It's really easy to understand why the local residents cleared all the land,” says Winton. The native habitat “is just inhospitable” to humans and cattle. However, it is vital to ocelots and other native wildlife.

To restore agricultural land to native habitat, the refuge works with plant growers and cooperative farmers. “You can't just quit farming, like you can in many parts of the country, because you'll get a monoculture of one to three plants,” Winton says.

Eight contracted growers and the U.S. Fish and Wildlife Service produce about 200,000 native woody plant/tree seedlings annually. Fourteen cooperative farmers are permitted to grow various chemical-lite commercial crops (not sugar cane or cotton) on 8,000 refuge acres in exchange



*More than 3.2 million native seedlings have been planted on 9,600 acres at Lower Rio Grande Valley National Wildlife Refuge for the benefit of endangered ocelots and other native wildlife. (Dora Martinez)*

for buying seedlings and providing in-kind contributions to restoration.

The refuge has two primary restoration objectives.

The first is to build riparian connectivity among a series of tracts – “to connect the dots along the Rio Grande,” Winton says – and foster a habitat corridor within a mile of the river. The corridor benefits terrestrial animals – including ocelots, Texas tortoises and indigo snakes – Winton says. “Birds, for the most part, can tolerate a fragmented landscape” because they are more mobile.

Barriers to connectivity are the dozen bridges across the Rio Grande to Mexico – including two new ones adjacent to refuge tracts – and “pinch points” where bends leave little land between the river and a road. Another challenge is that, while the refuge is trying to create an east-west wildlife corridor along the Rio Grande, most land is surveyed north-south, meaning that land ownership is perpendicular to the river and acquiring a mile of riverfront land can require negotiating with several landowners.

The good news, Winton says, is that, because animals tend to travel along canals and ditches, restoring narrow habitat strips even far from the river can be useful for wildlife.

The second primary objective is connectivity between Lower Rio Grande Valley Refuge riparian habitat and habitat at and north of Laguna Atascosa National Wildlife Refuge where the majority of endangered ocelots live in isolation. To that end, the cooperative farmers help the refuges with native plant nursery work, field prep and seedling planting on the southern reaches of Laguna Atascosa Refuge to expand ocelot habitat southward toward Lower Rio Grande Valley Refuge riparian habitat.

“For genetic reasons, that connectivity is important to the ocelots,” says Winton. “These cats need to be able to breed with cats coming up from Mexico.”

Lower Rio Grande Valley Refuge faces challenges ranging from human population growth to the U.S.-Mexico border wall/fence to a proposed SpaceX launch facility abutting the refuge's Boca Chica unit on the Gulf of Mexico, but restoration proceeds apace. Since 1995, more than 3.2 million native seedlings have been planted on 9,600 acres.

“Even if we are not totally successful in saving the ocelot,” says Winton, “it's important that we restore native habitat for the benefit of all the other resident and migratory species.” 

## Removing Shipwrecks, Restoring Coral Reefs

By Megan Nagel

In the far reaches of the Pacific Ocean lie some of America's most ecologically complex national wildlife refuges. Habitat restoration is a vital part of managing them.

Located in the Pacific Remote Islands Marine National Monument, 1,000 miles south of Honolulu, Palmyra Atoll and Kingman Reef National Wildlife Refuges recently removed nearly one million pounds of shipwreck material – the first step in one of the Refuge System's largest habitat restoration projects.

The shipwrecks' iron was fueling the growth of invasive organisms – corallimorph at Palmyra Atoll Refuge and filamentous green algae at Kingman Reef Refuge – that smothered once-healthy, diverse coral. This shift is known as black reef – a phenomenon in which a reef with high coral diversity transforms into a brown or black reef dominated by one invasive species. With the shipwreck material removed, the next steps are to halt the progression of black reef and remove the corallimorph and filamentous algae at the former wreck sites.

“In the coral reef community we often hear about the devastating effects of a phase shift away from a diverse ecosystem to one dominated by a single species. This restoration effort has the chance to document a ‘reverse phase shift,’ where a degraded reef is transformed back into an area of high species diversity, and a thriving and healthy ecosystem,” says Palmyra Atoll and Kingman Reef Refuges manager Amanda Pollock.

The corallimorph and filamentous green algae removal is expected to take several years. The invasive species spread



AMANDA POLLOCK/USFWS



KYDD POLLOCK

*Palmyra Atoll and Kingman Reef National Wildlife Refuges removed nearly one million pounds of shipwreck material as the first step in restoring healthy coral.*

outward from the shipwrecks, creating central areas of high population density and nearby population hotspots on the reef. Removal efforts will focus on controlling or eliminating these high-density areas, as well as the leading edge of the infestation, to reduce expansion of the existing population.

Once the invasive species are removed, the nearby healthy corals, algae and benthic organisms can repopulate and reclaim the former black reef site. Palmyra Atoll Refuge studies have shown this repopulation can begin as soon as three weeks after invasive species removal.

“By removing the shipwrecks, refuge managers have taken habitat restoration efforts to the next level by turning science into action to protect and restore these beautiful coral reefs,” says Susan White, monument superintendent and refuge project leader.

Before the wrecks' removal, scientists from the U.S. Fish and Wildlife Service, Scripps Institution of Oceanography, U.S. Geological Survey, University of Hawaii, the Coral Reef Ecosystem Division of the National Oceanic and Atmospheric Administration (NOAA) and elsewhere surveyed the shipwreck areas to obtain a baseline status of the reef. The reefs will continue to be monitored for recovery and the repopulation of key coral and algae species.

The complicated shipwreck removal project required the marine salvage expertise of Global Diving and Salvage of Seattle and Curtin Maritime of Long Beach, CA. It also required help from the Advisory Council on Historic Preservation, U.S. Army Corps of Engineers, Coast Guard,

Environmental Protection Agency, NOAA and The Nature Conservancy. The Nature Conservancy owns the largest island at Palmyra and, with the Service, operates a research station and the Palmyra Atoll Research Consortium.

“These atolls, islands and coral reefs face a mounting list of threats, including a warming ocean, ocean acidification, illegal fishing and marine debris,” says Pollock. “By focusing on habitat restoration and removing the wrecks and invasive species, the Service is giving these reefs the best chance to recover to a healthy state where they can continue to adapt to future global climate and oceanographic changes.”

*Megan Nagel is a public affairs officer in the Pacific Region office in Portland.*



## Prescribed Burn Helps Restore Historic Lagoon in Puerto Rico



The U.S. Fish and Wildlife Service, the Puerto Rico Department of Natural and Environmental Resources, the Puerto Rico Fire Department and several other partners conducted a prescribed fire last summer near this lagoon at Laguna Cartagena National Wildlife Refuge. In addition to restoring habitat for migrating waterfowl, the fire increased public safety by reducing overgrowth that could fuel a wildfire or exacerbate flooding in the nearby city of Maguayo. Right: A Puerto Rico Fire Department crew is instructed on operating an ignition device. (Cass Palmer/USFWS)



By Cass Palmer

Last summer, for the first time at a national wildlife refuge in the Caribbean islands, firefighters used prescribed fire to clear invasive weeds that have choked off an important freshwater lagoon and created fuel for wildfires.

The lagoon at the heart of Laguna Cartagena National Wildlife Refuge in western Puerto Rico is a stopover for waterfowl migrating between North America and South America, including blue-winged teal, ring-necked duck, lesser scaup and American widgeon.

Cattails and guinea grass encroached on 90 percent of the 415-acre lagoon, leaving only a remnant of the expansive open water habitat within the forested refuge, which has hosted half of the 300 bird species observed in Puerto Rico. Sugar cane farming in the past and current cattle grazing and other agricultural practices in the surrounding area generate nutrient-rich runoff into drainage canals, feeding the thick plant growth filling in the lagoon.

The prescribed burn benefits the 1,000 residents in the adjacent city of Maguayo by reducing the overgrowth that could fuel a wildfire or exacerbate flooding that occurs during heavy rains.

Because commonwealth law in Puerto Rico allows prescribed fire only for agriculture and firefighter training, Laguna Cartagena Refuge was restricted to using expensive mechanical and herbicide treatments to reduce vegetation, which has fueled 37 wildfires in the lagoon in the last decade. So, when the local fire department wanted to plan a training burn last August, the refuge offered to host it.

About 30 fire management staff members from the U.S. Fish and Wildlife Service, U.S. Forest Service and National Park Service in the Caribbean worked with the Puerto Rico Department of Natural and Environmental Resources and the National Weather Service to plan the burn and provide training to firefighters from the Puerto Rico Fire Department.

“Prescribed burning is a relatively inexpensive, safe and efficient method to control invasive cattails and increase open water areas for the benefit of

resident and migratory waterfowl,” said Susan Silander, project leader for the Caribbean Islands National Wildlife Refuge Complex, which includes six refuges in Puerto Rico, two in the Virgin Islands and Navassa National Wildlife Refuge west of Haiti.

The one-day burn was carefully timed during the dry season, just before the tropical storm season. The fire burned off 250 acres and 12 to 24 inches of organic soil to open up about half of the overgrown area for use by aquatic birds and resident species such as the West Indian whistling duck, masked duck, ruddy duck, white-cheeked pintail and glossy ibis. Storm water filling the lagoon then prevented grasses from re-sprouting and dampened smoldering from the fire.

Laguna Cartagena Refuge hopes to host future burns to further reduce the risk of wildfire, improve wildlife habitat, increase public safety and train local firefighters. 

*Cass Palmer is the district fire management officer for the Service’s South Florida and Caribbean Fire District based at Florida Panther National Wildlife Refuge.*

## Service and Corps “Work Hand in Glove” at Big Muddy Refuge — *continued from page 9*

corridor is also important to migratory birds, waterfowl, deer, turkey and, occasionally, mountain lions.

Restored habitat enhances hiking, hunting and fishing, too. “There are opportunities to catch huge catfish,” says Bell. “Ninety-pound blue cats and 60-pound flatheads are out there. I’ve seen ‘em.”

It all starts with the Corps engineering chutes off the main channel.

“It’s really gratifying to watch it happen, to see those side channels develop,” says Bell. “When they’re first created, they look like a ditch. But after a few high-water events, they look like a natural channel. They get all sinuous, and you see sandbars, and they’re beautiful.” 🦋



*Twenty years ago, the Overton Bottoms North Unit of Big Muddy National Fish and Wildlife Refuge was row crop agriculture in the Missouri River floodplain. Now, it is early succession bottomland forest and wet prairie habitat. (Bill O'Brian/USFWS)*

## Plan Completed to Enhance Hunting, Fishing

— *continued from page 1*

Among the plan’s dozen action items are:

- Creation of outdoor skills centers across the Refuge System, including at least one in each of the Service’s eight regions, to recruit new outdoor enthusiasts.
- Continuance of established fish stocking programs on refuges and consideration of new stocking programs where possible and safe.
- Emphasis on developing new or improved opportunities for hunting and fishing whenever refuge comprehensive conservation plans are updated.
- Enhanced use of Web and social media to give refuge visitors easy access to information about recreation opportunities.

Additionally, the plan calls for the Service to review by year’s end the process for opening or expanding hunting and fishing on refuges.

The 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation found that more than 90 million Americans 16 or older – 38 percent of the U.S. population – participated in outdoor recreation. Hunters and anglers spent about \$90 billion in 2011 in pursuit of their sports.

Completing the hunting and fishing strategy is not the end of *Conserving the Future* emphasis on outdoor recreation. A new Recommendation 18 team has been formed to write a strategic plan to help expand other appropriate outdoor recreation. 🦋

*The complete hunting and fishing strategy is at <http://1.usa.gov/1g5geNS>.*

## Chief’s Corner

— *continued from page 2*

skilled and sophisticated techniques. Just this past winter the refuge’s staff released into the wild 22 juvenile cranes that had been hatched at New Orleans’ Audubon Nature Institute.

No one is better at habitat restoration than the U.S. Fish and Wildlife Service. We pioneered restoration work on national wildlife refuges. We now use those techniques in myriad programs throughout the Service.

This *Refuge Update* showcases some of our habitat restoration work. I hope you enjoy learning about the steady progress our colleagues are making. 🦋



# Wildlife Take to New Guadalupe-Nipomo Dunes Ponds



A mammal exclusion fence protects new plantings at Myrtle Pond, above right. It is one of two new ponds created at Guadalupe-Nipomo Dunes National Wildlife Refuge for the benefit of the federally threatened California red-legged frog and three federally endangered plants: marsh sandwort, Gambel's watercress and, above left, La Graciosa thistle. (Glenn M. Greenwald/USFWS)

By Glenn M. Greenwald

After more than three years of planning, design, field analysis, permit preparation and coordinating with neighbors, two wildlife ponds were created last year at Guadalupe-Nipomo Dunes National Wildlife Refuge, CA.

The two ponds were created as part of the Wildlife Ponds Project, an effort to provide high-quality, long-term habitat for the federally threatened California red-legged frog and three federally endangered plants: marsh sandwort, Gambel's watercress and La Graciosa thistle.

The 2,553-acre refuge is located in the heart of an 18-mile-long dune landscape on the central California coast.

Creating ponds in a coastal dunes environment proved to be difficult. The primary hurdles were 1) finding groundwater close to the surface, and 2) finding such locations that were not near the dozens of cultural resource sites on the refuge, particularly Chumash Indian shell middens.

Fifteen sites with groundwater close to the surface were identified. Groundwater ranged from about 18 inches to five feet below the surface. The two sites with the lowest probability of being near cultural or historic resources were selected.

The first site, now known as Colorado Pond, is about 2½ miles inland from

the Pacific Ocean. The second site, now known as Myrtle Pond, is about 300 yards inland. Both sites were upland areas near wetlands. Using heavy equipment, uplands were converted into wetlands.

Each pond covers about 6,000 square feet, with an average depth of about four feet. The deepest water is about seven feet. They were constructed with an irregular shape to blend into the existing natural landscape.

To diversify habitat, small peninsulas and small coves were incorporated along the ponds' shorelines. Large woody debris such as tree trunks, branches, stumps and root wads were laid across or partially buried into the ponds' banks to add cover and basking habitat for wildlife.

Wildlife discovered the new ponds rapidly.

At both ponds, mule deer and coyote tracks were found at the water's edge on the morning after the ponds' creation. Within a few days, the areas around the ponds reverberated with evening choruses of dozens of Sierran tree frogs. Within two weeks, northern raccoon, red-tailed hawk, great blue heron, mallard, mourning dove, red-winged blackbird, hooded oriole and other wildlife species were observed or detected by their tracks.

About three weeks after Myrtle Pond was created, three pairs of California toad

were observed breeding, and within six weeks several thousand California toad tadpoles were present.

Ten weeks after Myrtle Pond was created, an invasion of toadlets was in full effect. California toadlet congregations were observed near the pond's shoreline in numbers too large to count. The toadlets resembled swarms of miniature locusts. Later, osprey, Wilson's snipe and bufflehead, species not previously reported to occur on the refuge, showed up.

Ten weeks after Colorado Pond was created, thousands of Sierran tree frog tadpoles and froglets were observed.

Vegetation at both ponds remains light, but apparently the local frogs and toads like their new homes.

Last August, biologists from the Hopper Mountain Refuge Complex, the Ventura Fish and Wildlife Office, California State Parks and California Polytechnic State University San Luis Obispo planted propagules of marsh sandwort and Gambel's watercress at the ponds. The next phase is to plant La Graciosa thistle seeds and seed heads. Hopefully, these three endangered plant species will adapt to their new homes as fast as the frogs and toads have adapted. 🦎

*Glenn M. Greenwald is the refuge manager at Guadalupe-Nipomo Dunes National Wildlife Refuge in California.*

# Around the Refuge System

## Vermont

Missisquoi National Wildlife Refuge and three state wildlife management areas together have been named the United States' 36th Wetland of International Importance under the Ramsar Convention. There are more than 2,000 such sites worldwide. The Ramsar Convention is an international treaty signed in Iran in 1971 to encourage voluntary protection of wetlands. The new Ramsar site, Vermont's first, encompasses 7,665 acres. It provides habitat for approximately 20,000 waterfowl during migration; for the largest great blue heron rookery in Vermont; and for rare birds, freshwater mussels, turtles and fish. It is also important spawning and nursery habitat for numerous aquatic species in Lake Champlain and the Missisquoi River.

## Oregon

The Refuge System now has 562 refuges. A unit of Tualatin River National Wildlife Refuge has been redesignated and renamed as Wapato Lake National Wildlife Refuge. The newly renamed 4,310-acre refuge conserves imperiled habitats supporting regionally and nationally important wildlife species, including waterfowl, shorebirds, marshbirds, raptors and breeding species of neo-tropical migratory birds. Wapato Lake Refuge will be managed as a part of the Tualatin River National Wildlife Refuge Complex.



*An endangered Columbian white-tailed deer is released at Ridgefield National Wildlife Refuge, WA, as part of a translocation program to aid species recovery. (Tim Jewett)*

## Washington

After moving 37 endangered Columbian white-tailed deer from Julia Butler Hansen Refuge for the Columbian White-tailed Deer to Ridgefield National Wildlife Refuge under emergency conditions last year, the U.S. Fish and Wildlife Service is planning to relocate up to 55 more deer this year and next to aid recovery of the species. The deer were moved last year because a dike at Hansen Refuge was in danger of failing, putting the deer at risk. Construction of a setback dike since has minimized the risk. The deer scheduled to be moved to Ridgefield Refuge this year and next will come from private lands on Puget Island in the Columbia River. Ridgefield Refuge is developing a sub-population of the endangered deer, which are unique to southwest Washington and western Oregon. The area surrounding Ridgefield Refuge – roughly 60 miles upstream from Julia Butler Hansen Refuge and Puget Island – is within historic Columbian white-tailed deer range. Jackie Ferrier, project leader at Willapa National Refuge Complex, which includes Hansen Refuge, says the goal is to create three stable and secure populations. Two such populations already exist at Julia Butler Hansen Refuge.

## Texas

The 2013-2014 winter whooping crane survey estimated that 304 whooping cranes wintered at and near Aransas National Wildlife Refuge. That included

an estimated 39 juveniles. A continued upward trend in whooping crane numbers over the last three years was observed, and is consistent with the long-term growth trend. This population is the only remaining wild flock of endangered whooping cranes. The birds nest at Wood Buffalo National Park in northern Canada and migrate 2,500 miles to winter on the Texas coast at and near Aransas Refuge. All whooping cranes alive today, both wild and captive, are descendants of the last 15 remaining cranes found wintering at Aransas Refuge in 1941. An article about the method for surveying whooping cranes appeared in March/April 2013 *Refuge Update*: <http://go.usa.gov/KE6H>

## Oregon

Culminating a 20-year partnership with the Oregon Department of Fish and Wildlife, the U.S. Army Corps of Engineers and private landowners, the U.S. Fish and Wildlife Service has proposed that the Oregon chub be removed from the endangered and threatened list under the Endangered Species Act. If finalized, the chub would be the first fish delisted because of recovery.

Oregon chub populations exist on William L. Finley and Ankeny National Wildlife Refuges, with Ankeny Refuge supporting the largest known population (about 80,000 in 2012).

The Oregon chub, a minnow found only in Willamette River Basin floodplain habitats with little or no water flow, was listed as endangered in 1993 and reclassified as threatened in 2010. The primary factors that threatened Oregon chub were loss of habitat and predation by non-native fishes. These threats have been lessened over two decades through partnerships that restored and acquired habitat, promoted natural water flows, conducted outreach to local landowners/residents, and reintroduced chub into historical habitat.

Just eight populations with fewer than 1,000 fish were known to exist in 1993. Today, the population is more than



A record 300-plus trumpeter swans wintered at Seedskaadee National Wildlife Refuge, on the Green River in southwestern Wyoming. (Tom Koerner/USFWS)

150,000 fish at 80 locations in diverse habitats. Many of the privately owned introduction sites were created or restored under the Service's Partners for Fish and Wildlife Program, which was involved with at least 15 chub habitat projects.

### Florida

Remote cameras have recorded pet cats in Crocodile Lake National Wildlife Refuge, a habitat set aside for endangered species. And the refuge is considering fining cat owners. The cameras, set up by a North Carolina State University doctoral student, have documented cats on nests of endangered Key Largo woodrats and cotton mice at the refuge. "The cats are doing the things that cats do when they hunt," said refuge manager Jeremy Dixon. "It's not the fault of the cats. It's the fault of owners who allow their cats to trespass into the refuge, or people who dump cats on North Key Largo." To protect the woodrat and cotton mouse, refuge staff might issue fines. "The first time we capture a [pet] cat, we'll give the owner the benefit of the doubt with a warning," Dixon said. "The second time could mean a fine of \$175, and could include a mandatory appearance in federal court."

### Wyoming

A record 300-plus trumpeter swans wintered at Seedskaadee National Wildlife Refuge, according to aerial counts by the Wyoming Game and Fish Department. The trumpeter swan is the largest of North American waterfowl. The species was once abundant in the Lower 48 states but was hunted to near extinction by the early 20th century. However, the trumpeter swan has rebounded since then – due in large part to conservation efforts at Red Rock Lakes Refuge in Montana, beginning in 1935, and later at other Upper Midwest refuges. From 1992 to 2002, Wyoming state biologists translocated swans to Seedskaadee Refuge with limited success before the birds finally began to nest and breed there. Refuge manager Tom Koerner, who worked at Seedskaadee Refuge in the 1990s and returned in 2012, has followed the swans' recovery. "A lot of people put a lot of energy into bringing trumpeter swans back in Wyoming, and it has been rewarding to watch that happen," Koerner says. "They are an iconic species. They represent something wild and free and worth conserving. You don't have to convince people to like trumpeter swans. They are cool birds,

and most people can instantly recognize them and know them." Because harsh Wyoming winters can kill trumpeter swans, Koerner says, it is important the birds find a variety habitat sites around the state, including Seedskaadee Refuge.

### Maine

The U.S. Fish and Wildlife Service and Maine Coast Heritage Trust have partnered to acquire five-acre Spectacle Island in Eastport. The parcel is a priority seabird island with a diverse assemblage of seabirds that breed there, including double-crested cormorants, herring gulls and black-backed gulls. A census in 2008 found that the island supports the fourth-largest cormorant and the sixth-largest great black-backed gull nesting colonies in the state. This acquisition will help further the refuge's mission of protecting colonial nesting seabirds and is one of 87 islands mentioned in the 15-year comprehensive conservation plan. Maine Coastal Islands National Wildlife Refuge encompasses five individual refuges and contains more than 55 offshore islands and four coastal parcels, totaling more than 8,200 acres.



## Fish and Wildlife Service to Fund 17 Species-Recovery Projects on Refuges — continued from page 1

2) Prepare to reintroduce Steller's eider to the Yukon-Kuskokwim Delta to establish a viable breeding population.

**Arizona and New Mexico:** San Bernardino and Leslie Canyon Refuges – Improve habitat for five fish (Yaqui chub, Yaqui top minnow, Huachuca water umbel, beautiful shiner and Yaqui catfish), one amphibian (Chiricahua leopard frog) and one invertebrate (San Bernardino springtail).

**Colorado:** Arapaho Refuge – Improve the status of the Wyoming toad, one of North America's four most endangered amphibian species. Tactics include treating a chytrid fungus known as *Bd* that is killing wild toads.

**Florida:** Everglades Headwaters Refuge and Conservation Area – Encourage ranchers to manage lands to prevent extinction of the endangered Florida grasshopper sparrow.

**Guam:** Guam Refuge – Collect, propagate and plant seeds of the rare native tree *Serianthes nelsonii*. Only one adult tree survives in Guam; fewer than 50 survive on nearby Rota Island.

**Iowa:** Driftless Area Refuge and nearby sites – Establish and document six new colonies of endangered red Iowa Pleistocene snail.

**Montana and Colorado:** UL Bend and Rocky Mountain Arsenal Refuges – Reintroduce endangered black-footed ferrets to Rocky Mountain Arsenal Refuge and control outbreaks of plague

in its primary prey, the prairie dog.

**Nevada:** Desert Refuge Complex – 1) Establish and manage two populations of endangered Devil's pupfish at the Ash Meadows Fish Conservation Facility. 2) Remove barriers facing Moapa dace.

**New Hampshire:** Great Bay Refuge – Restore early successional habitat to benefit the rare Karner blue butterfly. The New England cottontail may also benefit.

**Oregon:** Baskett Slough, William L. Finley and Ankeny Refuges – Recover golden paintbrush, a rare flowering plant.

**Puerto Rico:** Cabo Rojo and Laguna Cartagena Refuges – Recover six endangered plant species, including Woodbury's stopper and Cobana negra.

**Texas:** Attwater Prairie Chicken Refuge – Step up control of invasive fire ants to improve survival of endangered Attwater's prairie chicken hatchlings; Houston toad may also benefit.

**Utah:** Ouray Refuge – Improve and expand habitat for an endangered razorback sucker.



Among the 17 projects funded in 2014 under the Cooperative Recovery Initiative is one in which UL Bend National Wildlife Refuge in Montana and Rocky Mountain Arsenal Refuge in Colorado will join forces for the benefit of the endangered black-footed ferret. (Ryan Hagerty/USFWS)

**Washington:** Willapa Refuge – Establish two new populations of Columbian white-tailed deer.

**Wisconsin:** Necedah Refuge – Boost the hatching and fledgling rates of endangered whooping cranes by encouraging the birds to re-nest at a time when black flies won't prompt nest abandonment. 🦋

*Susan Morse is a writer-editor in the Refuge System Branch of Communications.*

## From the Director — continued from page 2

America is urbanizing. Americans are increasingly disconnected from the outdoors. It is hard to get city folk out to refuges, so we're bringing refuges to them. Think parks, front yards, vacant lots, trails, all kinds of areas that offer stepping stones to the enjoyment of nature. And we're engaging them with the help of their friends and neighbors.

We're working with urban conservation partners who bring to us their community expertise, knowledge and relationships.

They'll help us learn and appreciate the diverse perspectives and values of urban communities and adapt our approach accordingly. Hopefully, we'll help make wild life conservation relevant for those communities.

Last year we set up urban refuge partnerships in Chicago; Houston; Los Angeles; Albuquerque; Baltimore; Seattle; New Haven, CT; and Providence, RI.

We have a long way to go, but what is happening in those eight cities and outside Las Vegas at Desert Refuge gives us an excellent foundation. 🦋

*To learn more about urban wildlife refuge partnerships, go to <http://go.usa.gov/ka4R>*

# Blending Fluff and Substance on Facebook

By Aaron Mize

**B**osque del Apache National Wildlife Refuge's Facebook page has grown rapidly. On the way to almost 6,000 fans, we natural resource types have learned a few things.

As at most refuges, Bosque del Apache's Facebook page is managed by conservationists with no new-media background. This was daunting until we realized that a concept natural resource people do know – adaptive management – is valid in new media. By experimenting, measuring and adapting, any refuge can have social media success.

Admittedly, our New Mexico refuge has an advantage. It is fortunate to be visited each winter by thousands of accomplished photographers, many of them proud to have their images displayed on our page. But one thing we've learned is that refuge staff members who take photos or videos with smartphones while performing regular job duties also can do wonders. In fact, the most popular post in Bosque del Apache Facebook history was staff-generated.

We've also learned that we need to show a sense of humor and post a lot of what we affectionately call "fluff." Fluff – pop culture references, young wildlife or sayings like "There is no wi-fi out here, but we promise you a better connection" – increases the reach of our page and conservation message. It builds awareness of, and possibly direct support for, the refuge.

We've learned that sharing interesting Facebook posts of other refuges, U.S. Fish and Wildlife Service regions and outside entities enlivens our page, increases reach, and results in return shares. This works with chamber of commerce, state tourism, eco-tourism and non-governmental organization pages, too.

We've learned that a great photo paired with an engaging caption or fitting quote from Aldo Leopold or Rachel Carson can



*As at most refuges, the Bosque del Apache National Wildlife Refuge Facebook page is managed by conservationists with no new-media background. To see how they do it, go to <http://on.fb.me/NuJPch> and check out posts over the past year. To see the U.S. Fish and Wildlife Service social media guidance, go to <http://go.usa.gov/BRT9>*

result in hundreds of "likes," shares, new followers and wide discussion.

Interestingly, we've learned that a similar photo paired with specific information that we call "substance" (a guided tour, closure or land management practice) generally receives fewer likes. But visitors tell us that the substance enhances their refuge visit. To us, enhancing an actual visit is worth a thousand virtual likes.

We've learned to post provocative questions, try new memes and be current.

We've learned to know our audience. Hunting updates and photos, for instance, don't work for Bosque del Apache's Facebook base, who are largely non-consumptive users.

We've heeded the advice of Ryan Moehring, a Service colleague who does have social media experience. "We should always share our substantive and scientific information. But we also need to be realistic about the expectations of online users, who have been conditioned to digest increasingly 'fluffy' content like photos of baby animals," he says. "Post that scientific journal article, but attach a stunning photo to it."

A classic case occurred last summer when a Rufus-necked wood-rail made its first North American appearance at Bosque del Apache Refuge. The refuge was inundated with phone calls – "When was the rail last seen?" "Where can I see it?"

As part of our traditional media outreach, we did everything possible to make sure all news stories directed readers and viewers to like our Facebook page and use it as the source for real-time wood-rail information. We posted multiple times daily about recent sightings and best viewing times. The page's likes grew by a thousand in a week.

One Iowa birder flew to Denver, rented a car and drove seven hours to the refuge hoping to see the bird. When he didn't see it, he drove back to Denver. Waiting to board his return flight, he saw on the refuge Facebook page that the bird was spotted again. So he re-rented a car, drove back down to Bosque del Apache Refuge and finally did see the bird.

That's the power of a robust Facebook page. 🦋

*Aaron Mize is deputy manager at Bosque del Apache National Wildlife Refuge in New Mexico.*



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## A Look Back ... Ernest Greenwalt

**E**rnest Greenwalt's nickname was "Smiles" and he got along famously with people, recalls his son Lynn, former director of the U.S. Fish and Wildlife Service. He also stood his ground on issues he deemed important. The senior Greenwalt, long-time manager of Wichita Mountains Wildlife Refuge in Oklahoma, hosted barbecues on the refuge for military personnel but so vigorously opposed handing over refuge land to Fort Sill that his wife had to shop in a different town.

Ernest Greenwalt started out as a newspaperman in Nevada. After writing about the decline of the American antelope for the Boone and Crockett Club, he left journalism and "did conservation with vigor the rest of his life," Lynn Greenwalt says.

He started as one of the first employees at Sheldon National Wildlife Refuge in Nevada, but a few years after Lynn was born in 1931, the family moved to Oklahoma where the schools were better. Lynn grew up on Wichita Mountains Refuge and even helped his dad collect 2,000 tons of scrap metal

during World War II. The senior Greenwalt became a master at finding military surplus equipment for the refuge, especially drab olive tractors.

Greenwalt was also a master at soil and moisture conservation, figuring out solutions for whatever problem surfaced – such as spreading truckloads of small rocks to slow a stream and force the water out over the land. He continued the policies initiated by his predecessor, George Mushbach, of eliminating leases for grazing and using the land for wildlife conservation – especially big wildlife. The buffalo herd at Wichita Mountains Refuge grew from 150 to 1,100 during Greenwalt's two decades as manager. There were dramatic increases in longhorn cattle and elk as well.

The local newspaper gave Greenwalt high praise when he departed for Wyoming's National Elk Refuge in 1956: "The life of



*Ernest Greenwalt using a portable radio to contact headquarters from the field at Wichita Mountains Wildlife Refuge in Oklahoma in 1948. (USFWS)*

a refuge manager is not an easy one ... he must be a policeman and a diplomat and at the same time try to carry out the policies fixed by the higher echelons of the Fish and Wildlife Service."

He received a Department of the Interior Distinguished Service Award for field staff but did not come to Washington to accept it because he didn't like the attention. 

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