



RefugeUpdate

National Wildlife Refuge System

www.fws.gov/refuges



An eastern meadowlark perches on Buck Island Ranch within the Everglades Headwaters National Wildlife Refuge and Conservation Area in Florida. (Carlton Ward Jr./CarltonWard.com)

Everglades Headwaters Established As Refuge System's 556th Unit

As part of President Obama's America's Great Outdoors initiative, Secretary of the Interior Ken Salazar on Jan. 18 accepted the first donation of land in south-central Florida to establish the Everglades Headwaters National Wildlife Refuge and Conservation Area—conserving one of the last remaining grassland and longleaf pine savanna landscapes in eastern North America.

The new refuge and conservation area—the 556th unit of the National Wildlife Refuge System—is being established with the support of local ranchers, farmers and landowners. They are working cooperatively with the U.S. Fish and Wildlife Service to conserve the wildlife values on their lands while retaining their right to raise livestock or crops, an approach championed by the Obama administration.

If fully realized, the refuge and conservation area will span 150,000 acres north of Lake Okeechobee. Two-thirds of the acreage, or 100,000 acres, will be protected through conservation easements purchased from willing sellers. With easements, private landowners retain ownership of their land, as well as the ability to continue farming or ranching the land. The easements would ensure the land could not be subdivided or developed.

“This is an outstanding example of the 21st century approach to conservation envisioned by President Obama when he unveiled his America's Great Outdoors

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Work Plans Move Vision to Actuality

Finding a celebrity to appear in public service announcements that herald national wildlife refuges. Cataloging “lessons learned” from 15 years of planning. Launching community-based science workshops. Identifying the barriers that keep some urban dwellers from visiting wildlife refuges. Those are just a few products and projects being considered by the nine *Conserving the Future* implementation teams as they work to transform the management vision into on-the-ground achievements.

The implementation teams submitted their work plans to the Refuge System Leadership Team, which includes the chief of the National Wildlife Refuge System and the eight regional refuge chiefs. Those plans, which were discussed by the leadership team at its late-February meeting, outline somewhat detailed approaches and

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From the Director

Looking Closer, Seeing the Big Picture

We've established a powerful vision to guide the future of the National Wildlife Refuge System—a vision that sees the Refuge System as the keystone of successful landscape conservation efforts across the nation. But successful wildlife conservation depends on more than just a vision for the future. It is also grounded in a firm understanding of the present.



Dan Ashe

As any wildlife biologist knows, establishing a baseline is key to understanding how an ecosystem is changing. Yet most of our refuges do not have a comprehensive inventory of the

fish, wildlife and plants within their boundaries. We can't effectively conserve these resources and help them adapt to a rapidly changing environment if we don't know where and when they exist, or don't have easy access to that information.

The Refuge System's Inventory and Monitoring (I&M) initiative will provide the essential answers and data we need to help shape the direction of our conservation efforts and make them more efficient.

During the past century, we've collected a wealth of information on our refuges and in our regions—information that is scattered across multiple databases, reports and repositories. This crucial

initiative will find it, organize it and make it accessible, enabling us to identify data gaps, reduce redundancies and identify opportunities.

How will that help you?

The initiative will give local managers the tools they need to build scientific capacity and provide the science-backed knowledge they need to plan and evaluate the effectiveness of conservation strategies. And with the data in hand, we will also be able to look at wildlife on a broader scale than just one refuge; we will begin to understand how that one refuge fits into the landscape.

Open access to data is key for any science-driven organization. It promotes collaboration within the Service and with our partners.

We need to look closer at all the things that surround us on refuges, not just wildlife, fish and plants, but other natural systems such as soils, air and water. We need to understand how these systems interact.

The Refuge System conserves 21 million acres of wilderness, but we can't be sure how that wilderness is affected by our stewardship.

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Corrections

- An article in the January/February issue incorrectly stated when Refuge System Chief Jim Kurth was manager at Arctic National Wildlife Refuge. He was manager from 1994 to 1998.
- Because incorrect information was provided to *Refuge Update*, Michael Rosenbaum's award-winning photograph of two roseate spoonbills was mislabeled in the January/February issue. The photograph was taken on High Island on the Texas Gulf Coast, not at Arthur R. Marshall Loxahatchee National Wildlife Refuge in Florida.

Both errors have been corrected in the online version of the issue.

RefugeUpdate

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Chief's Corner

Crystal Clear on Implementation

Transparency served us well in building the *Conserving the Future* vision. Now we're using those same avenues of transparency to build nationwide participation for implementing the vision.



Jim Kurth

If you thought building the *Conserving the Future* vision was complex and challenging, then start following the *Conserving the Future* Web site, <http://AmericasWildlife.org>,

as we implement the 24 conceptual recommendations that will guide the National Wildlife Refuge System for the next decade.

The recommendations were written in broad strokes not only because visionary thinking has to be aspirational, but also because we wanted to give implementation teams wide latitude to let imaginations soar as we consider products and approaches in making the vision a reality.

The nine implementation teams have taken up the aspirational challenge. I have joined many of the teams during their first face-to-face meetings this winter, and I can tell you they are thinking big. But are they always thinking big enough?

To answer, you can look at the Web site and evaluate progress yourself. The Refuge System needs input and ideas from employees, Friends groups, the non-governmental community and partners as we substantially fulfill our far-ranging vision in the next five years. As with any large-scale undertaking, no one organization, acting in isolation, can make a difference. You are the linchpins to success.

So, we've put the Executive Implementation Council's implementation plan online. We will

Operation Warfighter




Adam Conger, an Iraq war veteran who was hired as a heavy equipment vehicle maintenance worker at Maryland's Patuxent Research Refuge through Operation Warfighter, shakes hands with President Obama. The President announced his plan to put veterans back to work, including a Veterans Job Corps conservation program, at the Feb. 3 ceremony in Arlington, VA. More information about Operation Warfighter is at <http://www.fws.gov/odiwm/veterans.html>. (Tami A. Heilemann/DOI)

put more information online as the implementation teams flesh out their work plans and the Refuge System's Leadership Team—including refuge chiefs in each of the U.S. Fish and Wildlife Service eight regions—identify gaps and give their guidance.

Implementation team members and Refuge System leadership will blog at America'sWildlife.org, where you can join Facebook and Twitter networks to keep pace. We will focus on Refuge System employees and implementation

teams in an "In the Spotlight" feature online. We have launched an e-mail address—conservingthefuture@fws.gov—where you can send your reactions and ideas about implementation directly to *Conserving the Future* staff.

Thomas Jefferson famously extolled the marketplace of ideas. Today, that marketplace is often online. We welcome you to participate in the *Conserving the Future* marketplace: that is, <http://AmericasWildlife.org>. 

Sediment, Serendipity and Scientific Discovery

By Patrick Walsh

The dictionary definition of serendipity is: *n. 1. Making a fortunate discovery by accident. 2. Good fortune.* Want to hear how serendipity at Togiak National Wildlife Refuge in southwestern Alaska led to new insights in global science? Read on.

Togiak Refuge biologist Mark Lisac and I collaborated with an international team of scientists to detect human-produced nitrogen in remote lakes throughout the Northern Hemisphere—from Alaska to the Rocky Mountains to Norway. In doing so, we helped reveal that the impact of human activities since late-19th-century industrialization is evident in even the most isolated ecosystems on the planet.

The research was published in the international journal *Science* on Dec. 16, 2011, and is available at <http://www.sciencemag.org>.

To a large degree, the findings were serendipitous. They were incidental to a study with very different objectives. Working with colleagues from the University of Washington, Lisac and I were studying prehistoric sockeye salmon runs in order to understand natural variability in modern-day runs. This is important because Togiak Refuge is located in the salmon capital of the world.

Reconstructing ancient salmon runs required our research team to collect sediment from lakes, date sediment layers and analyze the nitrogen isotope ratios found at various dates. All nitrogen sources to lakes are characterized by a mixture of light and heavy isotopes of nitrogen. Nitrogen sources that come from saltwater, especially those represented by migrating salmon, have a relatively high ratio of heavy isotopes to light isotopes compared with nitrogen produced in watersheds and delivered to lakes via freshwater streams. Thus, the relative enrichment of lake nitrogen isotopes can be used to infer quantities of salmon present at various points in history.



Sediment collection for a salmon study at Togiak National Wildlife Refuge's High Lake led to the discovery that atmospheric nitrogen from industrialization has been being deposited for more than a century in even the most remote ecosystems on Earth. (USFWS)

However, to make that inference it was necessary to collect and analyze sediments from reference lakes that were not accessible to migrating salmon, including High Lake and Nagugun Lake at Togiak Refuge.

At one point, a member of our team, Gordon Holtgrieve of the University of Washington, noticed a subtle-but-distinct change in the heavy-isotope proportion in the most recent 115 years in High and Nagugun Lakes. This led to a review of sediment data from 34 other lakes studied by other researchers throughout the Northern Hemisphere, and the same change was observed elsewhere. This change in isotope composition could not be explained by changes in climate, normal chemical processes, salmon runs or other natural sources of nitrogen.

Other studies have demonstrated that human activities that burn fossil fuels and use agricultural fertilizers can elevate nitrogen levels in the atmosphere and that the nitrogen is then deposited back on Earth through rain and snow. These studies have demonstrated local and regional nitrogen deposition, but not

global deposition—until now. Given the remote location of the Togiak Refuge lakes (on the edge of the Bering Sea 350 miles from the nearest connecting road) and the other study lakes across the Northern Hemisphere, atmospheric deposition was the inescapable conclusion.

Although nitrogen is necessary for life, and often is viewed positively as a fertilizer, at high levels it is considered a pollutant, causing a variety of ecological responses. This study demonstrates an ecologically significant increase in deposition of human-derived nitrogen to even the most remote watersheds of the world. The ecological ramifications of this increase are not known.

What is known is that the insights that emerged from this work would not have occurred without the original salmon study at Togiak Refuge—and that, sometimes with a touch of serendipity, National Wildlife Refuge System science is contributing to global science. 🦅

Patrick Walsh is a supervisory biologist at Togiak National Wildlife Refuge in Alaska.

BioBlitzing by the Bay

By Carmen Minch

A spur-of-the-moment partnership with iNaturalist.org and a feline surprise combined to make the first BioBlitz at Don Edwards San Francisco Bay National Wildlife Refuge a groundbreaking success.

The surprise enlivened the event with a teachable moment. The last-minute partnership added a mobile app and a whole new way to think about BioBlitzes.

First, the surprise.

On day two of the BioBlitz, moments before the schedule had promised a morning mammal release, onlookers surrounded USDA biologist Brian Popper as he stood next to a cage trap with a sheet over it. The people were waiting curiously to see what animal had been caught overnight so they could count it as a species observation. When Popper lifted the sheet to reveal a cat wearing a flea collar, adults' amused expressions were coupled with kids' puzzled looks.

Although the cat in the trap was unintentional, Popper seized the moment to educate the audience about why it is important not to let cats roam freely outdoors, particularly near a wildlife refuge. He explained how cats, acting on instinct, can harm birds and other wildlife.

Now, the partnership.

Over a 24-hour period on a December 2011 weekend, nearly 200 people took part in the BioBlitz. They descended on the refuge's Alviso Unit and documented 195 plant, avian, mammalian, fish and other species, including phytoplankton, insects and mollusks. It was a traditional BioBlitz.

But thanks to the new partnership between the refuge and iNaturalist.org, the results are recorded online; participants had the option of posting their sightings directly to a dedicated Web site; smart-phone users could take photos of observed species and upload them to the site; and a map was (and



Liming Chao looks through the spotting scope with her mother, Sunny, and sister Ping-Ya during a bird walk at the Don Edwards San Francisco Bay National Wildlife Refuge's first BioBlitz—which got some high-tech help from iNaturalist.org. (Alex Baranda)

is) available for everyone to see where species were found.

iNaturalist.org, a Web site where people can share nature observations, was founded in 2008 by University of California at Berkeley graduate students. Scott Loarie, co-director of iNaturalist.org and a climate change researcher at the Carnegie Institution in Stanford, CA, learned of the Don Edwards San Francisco Bay Refuge BioBlitz from former refuge Student Conservation Association intern Toni Caldwell about a week before it was set to take place.

Loarie, a big believer in the cumulative power of citizen science and the Internet, saw an opportunity to “stand on the shoulders of a very traditional BioBlitz” and plant the seed for a new concept: that anyone with a smart-phone camera can have his or her own personal BioBlitz anyplace, anytime. That there can be “an ongoing BioBlitz” at any refuge. That the BioBlitz of the future will be more orientation session than finite event. That an individual who doesn't even know what species he or she is observing can take a photo of it, submit the photo as a “museum specimen” to experts via a site like iNaturalist.org, and thereby add to the body of conservation knowledge. Such photos, Loarie says, “can be a bridge between the citizen community and scientific community.”

So, for the Don Edwards San Francisco Bay Refuge blitz, he volunteered to create a widget for the refuge's Web site where budding citizen scientists at the event could record their sightings using an iNaturalist.org mobile app.

In the end, most participants stayed traditional and turned in their observations to refuge staff members on paper. But:

- Almost a dozen participants did use the app.
- All of the species recorded at the BioBlitz—by any means—are on the iNaturalist.org-facilitated site: http://www.fws.gov/desfbay/species_inventory.htm.
- Photos of many species recorded at the refuge are on <http://www.inaturalist.org/places/3244>.

And a seed for the idea of an ongoing BioBlitz was planted.

“It was just really fun,” says Loarie, “because it was an opportunity to work with the Fish and Wildlife Service and to do something in our backyard as well.”



Carmen Minch is an outdoor recreation planner at San Francisco Bay National Wildlife Refuge Complex.

Crosscurrents at Pocosin Lakes

By Alison Howard

Alternative energy and wildlife conservation are at cross-purposes once again.

A wind-energy project capable of producing 250,000 megawatt hours of electricity annually is in the works in northeastern North Carolina. Unfortunately, it would be built in an Important Bird Area (IBA) and in the path of thousands of tundra swans and other migratory waterfowl that overwinter at Pocosin Lakes National Wildlife Refuge.

Pantego Wind Energy Inc. plans to install 49 wind turbines on a site two miles from Pocosin Lakes Refuge and 15 miles from Mattamuskeet Refuge. The company has applied for a Certificate of Public Convenience and Necessity from the N.C. Utilities Commission, which held hearings late last year, one of a limited number of opportunities for public review/comment.

In a Dec. 6, 2011, letter to the commission, Pocosin Lakes Refuge manager Howard Phillips recommended delaying its decision while the turbines' likely impact on the swans can be studied. An average of 25,000 tundra swans roost at the refuge each winter and fly out to forage in surrounding fields.

Important Bird Area

The Audubon Society has designated about 60 percent of the Pantego site as an IBA, which calls into question its suitability for a wind project, Phillips says. His chief concerns are habitat loss if swans are scared away by the turbines and direct mortality if they aren't.

"If the birds were suddenly to lose that patch of forage, would it have a devastating impact on the bird population? Probably not," Phillips says. "But it would be yet another incremental loss. Death by a thousand cuts is the sort of thing I'm concerned about. At some point, we'll hit a threshold, and the next loss will cause a reduction in the population."



Tundra swans rest on the Pungo Unit of Pocosin Lakes National Wildlife Refuge. The refuge, which encompasses more than 110,000 acres, was established in the 1990s, but the 12,500-acre Pungo Unit was established in the 1960s with a waterfowl mission. (Mike Dunn)

If swans don't avoid the site, "they could be struck," Phillips says. A turbine blade can turn in excess of 100 mph, and tundra swans—which can weigh 23 pounds with 5½-foot wingspans—"are large, not-very-maneuverable birds. If the birds fly in the same airspace as the turbines, especially at night (and we know they do fly at night), there's a good chance of direct mortality."

Whether enough swans would be killed to affect the population isn't clear. The bottom line, Phillips says, is that the research isn't there yet. "There's some evidence that the impact of turbines is species-specific: They have a big impact on some species, not on others. We don't know how tundra swans will react. All we can say is: Knowing what we know about these birds, we think it's likely that this project will have a detrimental impact on the migratory bird resources we're managing at the refuge."

Phillips says the studies should span several years, in part because farmers rotate crops. "If you put a turbine down in a soybean field this year, it may not interfere much with the birds," which prefer corn, winter wheat and other grains. "But next year, when there's corn under that turbine, you'll probably get a different result."

Voluntary Guidelines

Interior Secretary Ken Salazar strongly supports the development of alternative energy sources, including wind, and the U.S. Fish and Wildlife Service has drafted guidelines to help companies develop them "in the right places," Phillips says. The guidelines say IBAs are inappropriate for wind facilities—but the guidelines are voluntary.

The Service has no enforcement authority under either the guidelines or the Migratory Bird Treaty Act, which "prohibits the 'take' of the birds but doesn't prohibit the construction of a facility where birds are likely to be taken," Phillips says. If birds are killed, however, the treaty allows the Service to investigate and refer any taking for prosecution.

Before it comes to that, though, Phillips recommends more deliberation: "These types of projects, especially in waterfowl concentration areas, are just so new that we simply don't know how extensive the impacts on waterfowl might be." 🦢

Alison Howard is a Virginia-based freelance writer and editor.

Hardy Corn With Deep (Cultural) Roots

By Bill O'Brian

Bosque del Apache National Wildlife Refuge this spring is beginning the second season of a back-to-the-future agricultural experiment that its proponents believe could change the way farming is conducted on refuges.

In an effort to “green” its farming of food for migrating birds, to provide an alternative to genetically modified crops, to foster crop genetic diversity and to engage Native American partners, the New Mexico refuge is growing Aztec corn from heirloom seeds.

“These crop plants have been bred over many generations and therefore are well adapted to the specific regions where they originated,” says Grant Harris, the Southwest Region’s chief biologist.

“Farming has been in this valley for a long time,” says Bosque del Apache Refuge wildlife biologist John Vradenburg. “The Pueblo Indians were a farming people who used these floodplains. Their challenges weren’t different from ours. This caused us to think: If they could do it, it is realistic to try their type of crops and their more holistic way of farming.”

The project’s long-term goal is: To grow enough Aztec corn seed to feed the refuge’s own birds—primarily sandhill cranes. To supply surplus corn to other refuges. To do both with minimal environmental disturbance.

“We need farming to meet the energy needs of sandhill cranes and other birds,” Vradenburg says. “We don’t want ‘farming’ to become a negative word.”

Growing corn for seed is vital because if the refuge doesn’t provide enough food for its cranes in a given year, they stray. That’s bad because it diminishes wildlife observation opportunities for 166,000 annual visitors and it increases depredation on nearby farms. Sandhill cranes can destroy a chili field.



Despite obstacles, Bosque del Apache National Wildlife Refuge is beginning its second season of growing heirloom Aztec corn. Last fall, just before harvest, elk denuded the field, leaving just a few intact ears of corn. (Bill O'Brian/USFWS)

Corn seed is only part of the crane diet. “I call cranes the great white shark of the migratory bird world,” says Vradenburg. “They eat anything”—plant tubers and roots, amphibians, invertebrates, snakes. Corn seed gives cranes quick energy, he says. “It’s like carbo-loading for a track runner to deal with the stress of an upcoming event.” A cold nighttime roost, say.

The Aztec corn experiment is tiny. It is being conducted outside the cooperative agreement under which local

farmers grow 1,200 acres of alfalfa and conventional corn at the refuge.

Last year, the refuge planted the Aztec corn on a 12-acre plot in cooperation with Native Seeds/SEARCH, a Tucson nonprofit seed bank that calls itself “a leader in the heirloom seed movement.”

Native Seeds offers “1,800 varieties of arid-land adapted agricultural crops, many of them rare or endangered. We promote the use of these ancient crops.”

The refuge chose *Mayo Tosabatchi*, a flour corn with big seed. The first season was illuminating. Vradenburg learned that heirloom seed, which is in short supply, is “orders of magnitude more expensive” than conventional corn. He learned that Aztec corn requires patience. Its growing season is May to November, compared with 90 days for some conventional corn. He learned that flooding the plot doesn’t work in New Mexico because weeds can out-compete Aztec corn. He learned that hungry elk can ruin everything. Last fall, with a decent crop ready to harvest, elk came through and denuded the field, leaving just a few intact ears of corn.

“This is an adaptive management process,” says Vradenburg. “We have learned from our first year’s successes and failures and will continue with the project”—planting leftover seeds on 10 acres in furrowed, lightly irrigated rows (not a flooded field) surrounded by a fence to keep out elk.

The Aztec corn’s hardiness impresses Vradenburg. Conventional corn couldn’t have endured the soil-nutrient and

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From Papahānaumokuākea Reefs, Reasons for Hope

By Heather Dewar

Dispatches from the front lines of coral reef science often make for grim reading, chronicling threats to the “rainforests of the sea.” But few scientists have looked at the effectiveness of reef restoration strategies.

Now a study co-authored by John Kittinger of the University of Hawaii looks to the Northwestern Hawaiian Islands—where U.S. Fish and Wildlife Service conservation history stretches back more than 100 years—and finds reason to hope.

The paper, published in October 2011 in the peer-reviewed online journal PLoS ONE, calls the Northwestern Hawaiian Islands (NWHI) an example of damaged reefs that are now healthy because of changes in the way humans treat the ecosystem.

The islands were designated in 2006 as Papahānaumokuākea Marine National Monument, jointly managed by the Service, NOAA and the state of Hawaii. Hawaiian and Pacific Islands Refuge Complex project leader Barry Stieglitz and coral reef ecologist James Maragos (a recent Service retiree) generally agree with the study’s assessment.

“There simply aren’t any ‘pristine’ or ‘completely healthy’ reefs,” Stieglitz says, but “the reefs in the NWHI are indeed in pretty good shape.”

Taking the Long View

The study team drew on ecological, archaeological, historical and fisheries data to reconstruct the relationship between human activities and ecosystem health in the Hawaiian Islands from the 13th century to 2009. They documented two periods when coral reefs recovered from devastating human impacts.

On the main Hawaiian Islands, after early overharvesting, the Native Hawaiian people limited catches of some species. The result was partial reef ecosystem recovery in the 15th century, but only until Western contact in the 1800s. Those reefs are in decline today.

The NWHI recovery dates to the 1980s as managers began to repair the damage from overfishing and military use. This recovery is ongoing, the result of changes in land and resource use, reduced human population and the islands’ remoteness.

Hawaii’s Polynesian settlers considered the NWHI sacred and protected their resources. But other nations exploited the islands’ whales, turtles, monk seals, seabird eggs, feathers and guano.

In 1903, President Theodore Roosevelt sent the U.S. Marines to Midway Atoll to protect seabirds. Midway became a military base, but in 1909 the rest of the NWHI were made a reserve, and later a refuge. Some 14 million seabirds nest in the NWHI today.

Midway was a military hub during World War II with a population peak of 5,000. A ship channel destroyed corals in its lagoon. Air bases stockpiled fuels and other toxic chemicals.

The Navy did some cleanup before transferring Midway to the Service, which established Midway Atoll National Wildlife Refuge in 1988. Pollution persists in unmarked chemical waste



U.S. Fish and Wildlife Service volunteer Kristina Dickson explores a coral reef off Tern Island within Papahānaumokuākea Marine National Monument. (Lindsey Kramer)

dumps. Lead paint remediation work is underway, but it will take years.

Commercial fishing was phased out from 2006 to 2011. The Hawaiian green turtle is doing well, but three keystone species have not rebounded: pearl oysters, lobsters and endangered Hawaiian monk seals.

Maragos says monk seal pups probably once depended on lobster. Commercial fishers wiped out the lobsters in the late 1970s. “It was like gold fever,” he says.

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Promising Signs of Post-Rat Recovery at Palmyra Atoll

By K.C. Summers

It's a bit early to declare Palmyra Atoll National Wildlife Refuge's intensive, month-long rat eradication program a success. True, no one's seen hide or hair of a rodent on the remote Pacific island chain since the \$2.7 million project was completed last summer. But the infestation was severe—the non-native rats had no natural predators, foraged for food in broad daylight and looked humans calmly in the eye. And in a tropical climate, it's accepted that you must be rodent-free for at least a year before proclaiming victory.

"It's an all-or-nothing thing," says refuge manager Amanda Meyer. "There's no 'we almost eradicated rats.' You eradicate them or you fail."

Still, you can hear her excitement as she talks about changes that have been observed on the refuge since the eradication.

Purple fiddler crabs wandering beaches in record numbers. Green pisonia seedlings carpeting the ground. "Population explosions" of dragonflies and crickets. Thousands of sooty tern fledglings, compared with a couple of hundred in previous years.

Restoring Palmyra Atoll to its natural state has been a priority for the refuge since its 2005 establishment. The refuge co-manages the atoll with The Nature Conservancy. Another nonprofit, Island Conservation, spearheads invasive species research.

Palmyra Atoll is a U.S. territory between Hawaii and American Samoa. It's a critical stopover point for migratory shorebirds and seabirds and is home to many rare, threatened and endangered species, including bristle-thigh curlew, green and hawksbill sea turtles, and the world's largest land invertebrate, the coconut crab. With more than 175 inches of rain a year, it supports one of the Pacific's last remaining tropical coastal strand forests. Its miles of coral reefs are among the most diverse on Earth.

But what makes Palmyra especially valuable is that it has never been permanently inhabited by humans. As the only undeveloped forested atoll remaining in the U.S. tropical Pacific, it is "an endangered ecotype," says Alex Wegmann, who directed the rat eradication project for Island Conservation. "It's the only wet tropical island in that region that has a natural future ahead of it."

When it's not being besieged by rodents, that is. The rats, likely introduced by American troops in World War II, had the run of the islands for 70 years, reproducing rapidly in the warm climate. "It was a rat's paradise," says refuge supervisory biologist Beth Flint. "You'd see them in the forest, leaping about, unconcerned with humans. They had beautiful weather, lots of food. They'd eat the seabirds' eggs as fast as the birds could lay them."

"There's no 'we almost eradicated rats.' You eradicate them or you fail."

Scientists have made great strides in recent years in ridding tropical islands of rodents, Flint says, but Palmyra's moist, dense environment presented particular challenges: What kind of bait would work when wet? How do you place the bait in overhanging palm trees without contaminating the water below? How do you keep shorebirds from ingesting the bait?



During an intensive June 2011 rat eradication project at Palmyra Atoll National Wildlife Refuge, the moist and dense environment presented particular challenges. (Robert Shallenberger)

After seven years of study and some test runs, the rat team settled on the toxicant (brodifacoum), the amount of bait (four times as much as is common on arid, temperate islands, because of the complex ecosystem) and a multi-pronged approach to dispersing it, including aerial broadcast via helicopter, hand placement at meticulously plotted GPS points, and slingshotting it into 4,000 trees.

To minimize the incidental take of shorebirds, the team timed the project for boreal summer, when the birds return to the Arctic to breed. Of the remaining birds, an effort was made to capture, care for and release them back into the wild.

The Palmyra Atoll project is in the monitoring phase, with all signs indicating that the rats are truly gone. Meanwhile, the fight goes on. Rat eradication, also funded through the Refuge System's invasive species program, is scheduled this year at Puerto Rico's Desecho National Wildlife Refuge. If the Caribbean island refuge needs any tips, there's an atoll in the central Pacific with some good stories to share. 🦋

K.C. Summers is a Virginia-based freelance writer and editor.

Focus . . . All Things That Fly

Conserving the Future

Last year, hundreds of U.S. Fish and Wildlife Service employees and partners worked to forge the *Conserving the Future: Wildlife Refuges and the Next Generation* vision for the National Wildlife Refuge System. This year, we collectively are beginning to implement that vision.

In 2012, *Refuge Update* is presenting a series of Focus sections devoted to the implementation. The sections emphasize and parallel the realms of various *Conserving the Future* implementation teams.

This Focus section centers on the work of the Planning and Strategic Growth teams as it pertains to “all things that fly.”

The Planning team’s mandate involves recommendation 1 in the vision:

Recommendation 1: Incorporate the lessons learned from our first round of CCPs [comprehensive conservative plans] and HMPs [habitat management plans] into

the next generation of conservation plans, and ensure these new plans view refuges in a landscape context and describe actions to project conservation benefits beyond refuge boundaries.

The Strategic Growth team is concerned with recommendations 3, 4 and 5:


Recommendation 3: Undertake a rapid top-to-bottom assessment of the status of all Refuge System land protection projects and complete a report that will inform development of a plan for the strategic, future growth of the Refuge System.

Recommendation 4: Ensure future land protection efforts are based on clear priorities, rigorous biological planning and conservation design that support achieving quantifiable conservation and population objectives that are developed in cooperation with state fish and wildlife agencies.

Recommendation 5: Use all of the Service’s conservation tools, especially Partners for Fish and Wildlife, to work nationwide to project conservation benefits beyond refuge boundaries, leveraging resources through partnerships with other



governmental agencies, conservation groups and private landowners and achieving mutually shared and scientifically sound restoration and protection goals around refuges.

The Focus section includes articles about tools for acquiring, monitoring and managing habitat for migratory birds and waterfowl; the evolution of the flyway system; the importance of engaging the public in the CCP process; and more. 

Work Plans Move Vision to Actuality — continued from page 1

timelines to take the 24 *Conserving the Future* recommendations from broad concepts to measurable actions. The approved work plans, which are on the AmericasWildlife.org Web site, identify a variety of needs for sub-teams, surveys and collaboration.

The nine teams are working on strategic growth; an urban wildlife refuge initiative; leadership development; planning; scientific excellence; community partnerships; communications; hunting, fishing and outdoor recreation; and interpretation and education. Many of the teams must complete draft recommendations by the end of June. *Conserving the Future* is to be significantly implemented in five years.

One element has been consistent for every team: an interest in working with partners—including state wildlife

agencies and non-governmental organizations—to bring landscape-level conservation and broad communications, training, interpretative and educational services to the nation’s conservation work.


The Refuge System has made it easy for state partners, Friends and the public to ask questions and make comments about implementation by talking directly to the *Conserving the Future* and Washington Office staffs via a new e-mail address: conservingthefuture@fws.gov.

The individual work plans highlight the following themes:

- All implementation teams say they need to work with the Urban Refuge Initiative implementation team. Making national wildlife refuges relevant to a diverse swath

of Americans is a cornerstone of *Conserving the Future*.

- All teams recognize the importance of communications. The Communications team is charged with writing a strategic communications plan for the whole Refuge System.
- Coordination among teams that focus on wildlife conservation—such as the Planning, Strategic Growth and Scientific Excellence teams—is important. So is similar coordination among teams that work on issues with a human dimension—such as the Community Partnerships and Hunting, Fishing and Outdoor Recreation teams.

The AmericasWildlife.org Web site regularly will be updated with implementation news. 

A Waterbird Initiative Takes Flight

By Jennifer Casey

On a cool September morning, a national wildlife refuge manager looks out over a wetland. That summer, staff members had managed water levels to encourage the growth of plant foods that ducks need for their journey south. Did they get it right? Will the birds come?

Months earlier, on an April afternoon, in a windowless meeting room, upper management is boisterously discussing the year's budget. There is disagreement about funding distribution. What is the cost-benefit ratio of wetland management on refuges in the region? Are we managing for waterfowl, shorebirds and wading birds in the right places?

On a cold January evening, over dinner after a presentation-filled day, several biologists are debating the effectiveness of waterbird habitat conservation within the flyway. Can we identify the most important stopover sites for waterfowl and shorebirds as they migrate? Is there enough food at each site to refuel the birds for their next long-distance flight?

These are questions we ask as conservation biologists. They appear to be separate when we contemplate them, but actually they are interdependent. It is difficult to know the answer to one without the answer to another. In 2007—as a small group of biologists in the Mississippi and Atlantic Flyways sought methods to inform decisions about managing local wetlands, allocating regional resources and ensuring strategic habitat conservation at the flyway scale—it became apparent that answering such questions would require an integrated approach. From this, the Integrated Waterbird Management and Monitoring (IWMM) initiative was conceived.

During the past two years, waterbird (waterfowl, shorebird and wading bird) use and habitat conditions have been monitored on almost 400 refuge, state and private wetlands. The data will be



A mixed flock of ducks lifts off at Chincoteague National Wildlife Refuge in Virginia, which is taking part in the Integrated Waterbird Management and Monitoring initiative. (Steve Hillebrand)

used in a multi-scaled adaptive management framework to inform models designed to provide decision support to local, regional and flyway managers. While the models, protocols and partnerships are in early development, the IWMM initiative is progressing to become operational by 2013.

These are questions we ask as conservation biologists. They appear to be separate when we contemplate them, but actually they are interdependent.

What we, as wetland managers, do for one waterbird group generally affects another waterbird group. We need to integrate our management for waterbirds. The IWMM regional model will help managers evaluate a field station's contribution toward flyway objectives and adjust management for emerging threats such as climate change.

Data from a wetland will inform local habitat management decisions *and* provide input to broader models. Regional analyses will assess the contribution of wetlands and identify waterbird priorities at that scale. Flyway information will assess species priorities and identify conservation needs within a region or landscape conservation cooperative.

Effective monitoring and management of waterbirds requires collaboration by partners. The Refuge System and the Migratory Bird Program have worked to incorporate flyway councils, joint ventures and nonprofits such as Ducks Unlimited. U.S. Geological Survey personnel and contractors have contributed modeling expertise. Last fall, temporary biological technicians in the Northeast, Midwest and Southeast Regions worked with state biologists to identify important wetlands and assist with data collection in seven locales.

As a young biologist collecting waterfowl and shorebird data at Chincoteague National Wildlife Refuge in Virginia, I asked the senior biologist about sharing

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Focus . . . All Things That Fly

On the Landscape Level, a Tool to Weigh Land Acquisition

By Bill O'Brian

The Prairie Pothole Region of the northern Great Plains has been called North America's duck factory. Most conservation there starts with ducks. So, it makes sense that the region's landscape-level habitat assessment tools known as thunderstorm maps start with ducks, too. But those maps don't end with ducks.

The Prairie Pothole Region produces roughly half of all ducks on our continent. However, the region also is vital to some 175 species of non-game birds: grassland birds, wetland birds, raptors and shorebirds. And the ongoing conversion of native grasslands and wetlands to agricultural fields threatens habitat for all avian species. That's where the thunderstorm maps come in.

The maps link bird survey data and land-cover characteristics developed from satellite imagery to show the population density and distribution of a given bird species over a wide geographical area. The maps have nothing to do with weather. They are so named because their colorful display resembles a Doppler radar image of a thunderstorm. These t-storm maps are an ever more important science-based tool for U.S. Fish and Wildlife Service use in making regional land acquisition decisions.

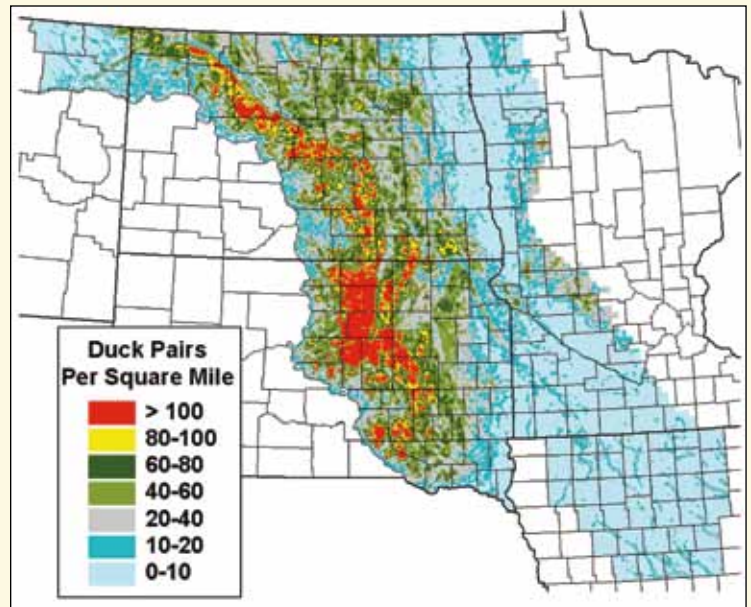
"Over the years, field staff have done an excellent job of identifying parcels for land acquisition," says Neal Niemuth, an integrated bird conservation scientist at the Service's Habitat and Population Evaluation Team (HAPET) office in Bismarck, ND. "However, models and maps give a broader regional perspective than any one person can acquire, and they help inform decisions about which areas give the best return on investment and which areas should be targeted for individual species."

The t-storm maps, produced by HAPET offices in Bismarck and in Fergus Falls, MN, are part of the evaluation process

for acquisition of wetland and grassland easements. The maps' models could be "an excellent starting point" for various Service landscape conservation efforts, Niemuth says. HAPET satellite offices in Kansas and Montana are already developing t-storm maps for the Flint Hills Legacy Conservation Area in Kansas, the watershed surrounding Bear River Migratory Bird Refuge, UT, and elsewhere.

Waterfowl t-storm maps have existed for two decades. They use Refuge System Four-Square-Mile Survey data as their basis and focus primarily on ducks. Non-game bird t-storm maps are newer. They use North American Breeding Bird Survey or HAPET Shorebird Survey data as their basis, and they pertain to grassland species such as bobolink, chestnut-collared longspur, northern harrier, upland sandpiper and grasshopper sparrow; wetland species such as American bittern, black tern and sora; and shorebirds such as marbled godwit, willet and Wilson's phalarope.

Niemuth and his colleagues use non-game bird t-storm maps, waterfowl t-storm maps and "decision trees" to help the Service determine where to buy easements from private landowners. Whether the parcel in question is a grassland easement or a wetland easement, the process starts with ducks—more specifically, the density of breeding duck pairs per square mile.



This map, produced by U.S. Fish and Wildlife Service's Habitat and Population Evaluation Team (HAPET) offices, shows which land units across the U.S. portion of the Prairie Pothole Region would be accessible to different densities of nesting hens and, thus, where grassland conservation efforts would provide the greatest benefits.

If the duck pair density is less than 25, the parcel is disqualified "absent extraordinary justification." If the duck pair density is greater than 25, the parcel remains in consideration and other factors—such as risk of agricultural conversion, endangered species priority and wetland- or grassland-dependent migratory bird priority—help shape the parcel's overall acquisition priority.

This modeling gives regional decision makers a sense of the parcel's conservation value to the Service and its non-game bird trust resources. The process uses science to help demonstrate and predict biological outcomes, Niemuth says. Spatial modeling also adheres to the tenets of strategic habitat conservation (SHC), the Service concept that directs land managers to do business in a way that sets biological goals for priority species populations.

"These are great tools for SHC," Niemuth says of the maps. "Everyone says they are doing SHC, but these efforts really embody the SHC framework." 🦋

On the Field Level, a Tool to Set Management Priorities

By Bill O'Brian

Managing anything with 246 parts is a challenge. Imagine being the parent of 246 children, the direct boss of 246 people, or the manager of 246 waterfowl production areas. In all cases, you need all the help you can get.

The land managers at Morris Wetland Management District, which comprises 246 waterfowl production areas (WPAs) in western Minnesota, have found such help—a new device they call the management prioritization tool.

As its name implies, the tool is designed to help managers give priority to the most important conservation needs in the district. It is based in large part on the Habitat and Population Evaluation Team (HAPET) regional models described on the opposite page.

“We’ve always prioritized,” says wildlife biologist Sara Vacek, “but it’s been sort of vague and in the manager’s head. This tool takes that mental model that our managers had and gets it down on paper,” and applies it evenly to all units in the district.

“The HMP tells us how to manage. The tool helps us decide where to manage.”

Vacek, who has spent her entire 11-year U.S. Fish and Wildlife Service career at Morris WMD, worked with former district manager Steve Delehanty, Midwest Regional biologists, HAPET staff, state agencies and the U.S. Geological Survey to develop the tool in recent years.

“She basically sold me on what the project could do,” says current district manager Bruce Freske. “She kept it going.”

In essence, the tool ranks the district’s WPAs based on a range of factors and gives each WPA a score.

“These scores tell us how important a WPA is to us and help us decide where we will direct our limited resources,” says Freske. “We have a good idea what are our top 10 or bottom 10 WPAs, but ... this means there are still 226 WPAs which we struggle as a staff on how to direct our management efforts. Now we have a tool that helps us to do this.”

Among the factors the tool weighs in ranking the WPAs and their surrounding landscapes are: duck pairs per square mile; percentage that is grass or upland habitat; diversity of wetlands present; percentage of natural wetlands present; size; effective conservation area; amount of native prairie; proximity to human development; grassland bird suitability; and presence of state and federal endangered species.

The district uses the tool “basically all the time” it considers WPA management actions, says Freske. “We now find it easier to agree as a staff on which areas to target for prescribed fire or grazing and which areas will receive less management effort or perhaps a management tool such as haying, which we consider less desirable than grazing



An upland sandpiper alights on a post at Schultz Waterfowl Protection Area, one of 246 WPAs that make up Morris Wetland Management District in Minnesota. The district is using a new modeling device to help manage its WPAs. (J.B. Bright/USFWS)

or burning but is acceptable on a lower-priority WPA.”

The tool has surprised Morris WMD managers on occasion. The Krantz Lake WPA—which for various reasons had not received any habitat management for more than 10 years—ranked 12th last year. “At first, we thought there was a problem with the tool. However, closer review showed that the site is over 1,000 acres, has a lot of other protected lands nearby, has a good interspersion of wetlands and grasslands, contains over 400 acres of native prairie, and has sandhill cranes nesting on it,” Freske says. “As a result of the priority tool, we are now once again directing attention to this important WPA.”

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Focus . . . All Things That Fly

It Is All About Relationships

By Tim Bodeen

More than a decade ago Malheur National Wildlife Refuge leadership recognized that the success of the southeastern Oregon refuge depended on addressing biological issues and establishing working relationships with, and among, diverse stakeholders. To establish these relationships, the refuge has spent years encouraging open and honest discussions that have been fundamental to establishing trust.

The refuge and community members realized that, for the relationships to have lasting benefits, innovative engagement processes had to be developed. So, the refuge helped create the High Desert Partnership.

The partnership is a nonprofit organization whose goal is “protecting the rural lifestyle and associated natural resources of Southeast Oregon for present and future generations through open communication and cooperation.” The partnership fosters collaborative forums, which balance ecological, economic and community needs—and allow people to discuss controversial issues and arrive at points of agreement.

“Working together enables all parties to recognize that communities, wildlife and the environment thrive when there is balance,” says local landowner/rancher Gary Marshall.

Oregon Consensus, a Portland State University-affiliated state agency that helps Oregonians reach agreement on environmental, social, cultural and policy issues through conflict assessment and mediation, also was brought in to provide neutral facilitation.

The relationship-building efforts have benefited the comprehensive conservation plan (CCP) for Malheur Refuge, which provides important habitat for migratory birds along the Pacific Flyway. (More than 320 avian

species have been documented at the 187,000-acre refuge.) The CCP has been under development since summer 2009 and is due to be completed this year. Interested parties and assorted stakeholders have been included in all phases of the CCP process.

While this level of inclusion does take more time and coordination—to make contacts, schedule meetings and review draft products—the investment has long-term benefits. Once a level of trust has been established and common objectives have been identified, the group works together to figure out how best to achieve those objectives.

For instance, the group bridged significant differences over the refuge’s haying and grazing program by ensuring that, for the life of the CCP, the community will be able to participate in inventory and monitoring activities and adaptive management discussions pertaining to refuge meadow habitats. The group also agreed to take landscape-level measures to improve poor aquatic health in the Blitzen River, which had been caused by non-native carp in the watershed. In general, the CCP collaborators came to understand more fully the refuge’s mission, focal species and role in the Pacific Flyway.

“The beauty of this process was, instead of rigidly staking out positions, all sides—ranchers, environmentalists and agencies—came together early in the process to collectively lay their cards on




Tundra swans are one of 320 bird species to be documented at Oregon’s Malheur National Wildlife Refuge. The refuge has taken a proactively collaborative approach to involving the public in the development of its comprehensive conservation plan (CCP). (Barbara Wheeler/USFWS volunteer)

the table and develop solutions that took all sides into account,” says U.S. Fish and Wildlife Service Pacific Region planning chief Scott McCarthy. “The outcome is a superior product with broad support.”

Now, after a 2½-year effort by dozens of stakeholders working closely with refuge staff and experts, there is wide agreement on a CCP to restore the refuge’s aquatic health, enhance wildlife habitat, generate sustainable local and regional economic benefits, and revitalize relationships with the community.

This collaborative effort has been highly successful in developing a CCP that benefits fish and wildlife, instills collaborators’ support for implementation, relies on inclusive inventory and monitoring activities that enable adaptive management, and provides continued stakeholder engagement and outreach from the refuge.

Creating such trust-based relationships is critical to long-term sustainable and thriving landscape conservation. 

Tim Bodeen is project leader at Malheur National Wildlife Refuge.

Four Flyways—What a Concept

By Ben Ikenson

While the concept of four primary North American migratory bird flyways is taken for granted today, it didn't always exist. To understand the concept's importance, one need look no further than the dramatic saga of the whooping crane.

In 1941, the whooping crane was reduced to 15 individuals. Demand for feathers by the ladies' hat industry and agricultural drainage of nesting grounds had taken such a toll on North America's tallest bird that Aldo Leopold wrote it off as a goner. Fortunately, recovery efforts have fostered a steady turnaround.

The fact that the majestic whooping crane did not follow the passenger pigeon into extinction owes to developments that preceded recovery efforts. Bird banding, for one, helped produce a better understanding of migration that led to improved management strategies.

Bird banding is traceable to Ancient Rome. Modern records, however, credit naturalist John James Audubon with conducting the first banding study in North America when, in 1803, he attached silver wires to the legs of a brood of phoebes and noted the return of two the following year. While observers had long been aware of waterfowl migrations, leg banding in the 1900s hastened the rate at which science made practical use of the information, eventually spawning the flyway concept.

Ornithologist Frederick Lincoln spearheaded bird migration studies for the U.S. Fish and Wildlife Service's predecessor, the Bureau of Biological Survey.

"Recovery of banded ducks and geese accumulated so rapidly," Lincoln wrote, "that by 1930 it was possible to map out the four waterfowl flyways' great geographical regions, each with breeding and wintering grounds connected by a complicated series of migration routes."



The idea of four migratory bird flyways—Pacific, Central, Mississippi and Atlantic—is universal now, but it wasn't always so. (North Dakota Game and Fish Department)

Until then, most federal lands set aside for natural resources, including those within the National Wildlife Refuge System, had been established as independent oases. Lincoln helped oversee an era of managing these lands so that important habitat would be available to waterfowl throughout their arduous journeys.

"When refuges were finally managed along flyways in the 1930s, they began functioning as a system; the parts became greater than the whole," says Service historian Mark Madison.

Lincoln went further, raising the science of collecting bird data to a new level,

literally. As an aviator and a biologist, Lincoln knew the advantage that flight would bestow in tracking waterfowl populations, even if his predecessors had been unconvinced.

"Before Lincoln, the agency just didn't have much faith in combining biology with aviation," says Madison. "The idea of making like the birds in order to study them seemed like an extravagance."

But the pilot-biologist idea ultimately did take off, so to speak, and the aerial survey program has been instrumental in waterfowl management ever since.

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Focus . . . All Things That Fly

Kodiak Refuge Keeps Eye on Secretive Seabird

By James Lawonn

Like a secret agent in a paperback thriller, the Kittlitz's murrelet, one of the rarest and most enigmatic seabirds in the North Pacific, had successfully eluded Kodiak National Wildlife Refuge biologists for years.

Since the refuge's establishment in 1941, biologists had suspected but never documented the species' clandestine breeding activities on the refuge. Occasionally, the furtive birds were spotted feeding on the ocean among the more common marbled murrelets. But their nesting habits were not known.

It's not surprising why.

Unlike 98 percent of seabirds, Kittlitz's murrelets don't nest colonially. They nest in rugged mountains near glaciers or in previously glaciated areas up to 45 miles inland. And they're small—just 10 inches long.

Kittlitz's murrelets are so rare and so well adapted to remaining undetected on their breeding grounds that as of 2006 only 25 nests had been discovered within the bird's range in coastal Alaska and Russia.

Now, after four years of dedicated research on Kodiak Island, 53 nests have been added to the total, and a large measure of the species' secret life is coming into focus.

As we learn more about the breeding ecology of Kittlitz's murrelets, it is easy to see how they eluded biologists for so long.

Adults are cryptically colored, blending in perfectly with their preferred rocky nesting habitat. They piece together inconspicuous, stony ground nests on steep, scree-covered slopes near mountaintops—difficult terrain to access on foot. They often fly low to the ground when near their nesting habitat, making them hard to detect, especially because those flights often occur in the faint light of early morning or late evening.

Further, their nests appear to be spread widely across a landscape, making the discovery of one nest unlikely to lead to the immediate discovery of another. In many ways, the Kittlitz's murrelets at Kodiak Refuge have perfected the art of concealment.

Naturally, study of a bird that is as cagey as a spy requires vigilance, not to mention high-tech gadgetry.

During each breeding season, from late May to late August, in 2008 to 2011, a team of three Kodiak Refuge researchers backpacked and camped for periods of up to 92 days in remote southwestern areas of the 1.9 million-acre refuge, which provides nesting habitat for more than 100 bird species.

By maintaining a continuous, careful watch over potential nesting habitat, the team was able to monitor the progression of nesting activities. The researchers systematically searched scree slopes for the birds' single-egg nests and placed camouflaged motion-triggered cameras near them when discovered. These remote cameras helped the team observe feeding, fledging and predation during the 54-to-60-day nest period. Some of the more interesting findings are the unexpectedly rapid growth of chicks, the delivery of only very nutritious food fish by adults to the nest, and the potential importance of nest depredation by foxes.

The global population of the Kittlitz's murrelets is estimated at a few tens of thousands, but it is believed to have



A well-camouflaged, 15-day-old Kittlitz's murrelet chick on a nest at Kodiak National Wildlife Refuge waits for its next meal to be delivered by a parent. (James Lawonn/USFWS)

undergone steep declines in several of its core areas in Alaska. Reasons for the declines have not been determined conclusively, but the U.S. Fish and Wildlife Service has identified at least two sources of human-caused mortality—gill-net fisheries and oil spills—and several other threats, including glacial retreat and disturbance by marine tours and flightseeing operations. Since 2004, the Kittlitz's murrelet has been a candidate for protection under the Endangered Species Act.

What researchers at Kodiak Refuge have learned will be used to help in the conservation of the secretive seabird—on the refuge and across its global range. With foresight, there always will be a place in Alaskan skies for Kittlitz's murrelets, even though you may need counterintelligence gear to spot them.



James Lawonn, a seasonal wildlife technician at Kodiak National Wildlife Refuge, is pursuing his master's degree in wildlife biology at Oregon State University

At Hopper Mountain, Progress on Condor Recovery

By Kendall Slee

In 1982, the U.S. Fish and Wildlife Service made a controversial decision to capture the remaining 22 California condors in the wild as a last-ditch effort to manage the species' gene pool for recovery. With an intensive captive breeding program and gradual releases, 209 are now reestablished in the wild, and 182 remain in captive breeding programs. The numbers are promising, but a long road remains for recovery.

Rescuing the California condor from near-extinction has been a labor-intensive effort and a case study in adaptive management. Hopper Mountain National Wildlife Refuge Complex, headquarters of the California Condor Recovery Program, continues to play a key role in that effort.

Interns and volunteers spend 10,000 hours annually at Hopper Mountain Refuge, studying, monitoring and occasionally rescuing the condors that nest and roost there.

While the refuge's 2,471 acres of rugged canyons and mountains 60 miles northwest of Los Angeles are formidable for humans, condors can traverse them in minutes with their nine-and-a-half-foot wingspan. Like many refuges that protect far-ranging birds, Hopper Mountain is just a small piece of condors' required habitat.

The recovery program is an extensive network of partners, including zoos, nonprofit organizations and government agencies. Over decades, it has evolved and adapted with changes in technology, science and experience. For example, after newly released condors died from power-line collisions, mock power poles were placed in the pens of birds being prepared for release. The poles emit mild shocks, conditioning the condors to avoid perching on them, which helps prevent collisions after the birds are released.

Transmitter advances since the 1980s have helped scientists track condors ever

more effectively than they did using bird counts. First came radio transmitters attached to birds to track individual condors in real time. Since 2004, GPS transmitters have complemented that technology by relaying location data and showing patterns of condor travel and congregation. VHF transmitters relay a particular signal pattern when a bird shows no movement for 12 hours, helping scientists rescue distressed birds or identify a cause of death.

Analyzing condor deaths helped scientists trace the leading cause of California condor mortality to lead in ammunition. Since the recovery program began, 36 percent of known free-flying condor deaths have been attributed to lead poisoning. Lead poisoning occurs when condors scavenge carcasses with lead bullet wounds, or eat lead-laced innards of a field-dressed animal. Since 2008, the state's California Condor Preservation Act has required all hunting ammunition in condor territory to be certified non-lead, but other lead sources still may be problematic.

Further challenges lie ahead. For California condors to be down-listed from endangered to threatened status, there must be two distinct populations of 150 self-sufficient individuals in the wild, each with 15 breeding pairs. Now, there are 14 breeding pairs in California and five in Arizona. The self-sufficiency requirement may prove difficult because, to keep wild-hatched chicks alive, staff or volunteers make monthly visits to cliff- or tree-top nests to remove bits



A California condor soars above Hopper Mountain National Wildlife Refuge with the San Gabriel Mountains on the horizon. (Kim Valverde/USFWS)

of glass, metal and plastic that parents feed chicks. Scientists suspect condors misidentify such trash as calcium, like bits of bone. Chicks can eat and regurgitate small amounts, but if trash builds up in nests, it blocks the chicks' digestive tracts. Cleaning greatly increases a chick's survivability.

As the condors' population grows, the birds are expected to spread across a 5,000-square-mile range. That has conservationists and wind industry officials worried that condors will collide with wind turbines in central California and elsewhere. Industry officials recently approached the refuge seeking to study solutions to prevent collisions. "We're really at the infancy of this research," says refuge manager Michael Brady.

With more condors to track, the Service increasingly will rely on remote telemetry stations and GPS transmitters, says refuge biologist Joseph Brandt: "We will manage them more as a population, less as individuals." 🦅

Kendall Slee is a Colorado-based freelance writer.

Focus . . . All Things That Fly

On the Field Level, a Tool to Set Management Priorities — *continued from page 13*

The tool is useful in tandem with the district's habitat management plan (HMP), says Vacek. "The HMP tells us *how* to manage. The tool helps us decide *where* to manage."

The initial reaction to the Morris WMD tool among other land managers often is that they already know their areas, Freske says. "But they might not—especially when, like us, you have 246 areas over eight counties. I haven't even stepped foot on many of those areas. How am I supposed to make informed decisions about them without a tool like this?"

That said, Freske is quick to point out that the tool *guides* decisions; it doesn't *dictate* them. 🦋



A great egret wades in a marsh at Pomme De Terre River Waterfowl Production Area, a part of Morris Wetland Management District in western Minnesota. The district is using a new tool to rank its WPAs' habitat. (Ron Rosen)

Four Flyways—What a Concept — *continued from page 15*

Every year, pilot-biologists mimic bird migrations in the Atlantic, Pacific, Central and Mississippi Flyways. They're responsible for most waterfowl banding on the continent. And they conduct aerial surveys with increasingly advanced technology, such as cutting-edge navigational equipment and computers that capture survey data with latitudinal and longitudinal precision.

The aerial survey program has advanced considerably since whooping cranes were first spotted wintering at Texas's Aransas National Wildlife Refuge in

1941, 13 years before their nesting grounds were discovered at Wood Buffalo National Park in Canada.

"The aerial survey program has been invaluable to whooping crane conservation," says Service endangered species recovery coordinator Wendy Brown. "The program has been critical in monitoring nesting and wintering grounds and the migration route of the remaining birds so that these areas could be protected ... for them and, thankfully, for their descendants."

Certainly, the whooping cranes' future looks less daunting than it did 70 years ago. With two primary wild populations totaling about 430 birds and another 160 in captivity as of last fall, the species now numbers almost 600.

It's hard to imagine such progress if the flyway concept hadn't evolved as it has.



Ben Ikenson is a New Mexico-based freelance writer.

A Waterbird Initiative Takes Flight — *continued from page 11*

our waterbird data with others who were collecting similar data. I wanted a landscape context to waterbird habitat management at our refuge. I thought my information would be much more meaningful if I could compare it with that from other wetlands—not only nearby wetlands but within the larger flyway. The senior biologist chuckled at my naïve daydreaming. Standardized protocols, centralized storage of data from multiple

sites, geographic information systems (GIS) and decision models were not commonplace then.

Now, two decades later, I am excited to be working on the IWMM initiative with other daydreaming biologists. Young people just beginning their wildlife careers and seasoned biologists alike are striving to develop an integrated approach to link data with the decisions made at the local, regional and flyway

levels within an adaptive management framework for waterfowl and shorebirds. 🦋

Jennifer Casey is an assistant regional biologist for the Northeast Region. More information about the Integrated Waterbird Management and Monitoring (IWMM) initiative is available at <http://iwmmprogram.ning.com>.

Refuge System Helps Gather Mourning Dove Data

By Adrianna Araya

Wildlife biologist Mark Fisher has operated a mourning dove banding station at Devils Lake Wetland Management District for two years. In doing so, he has learned valuable lessons.

“It is wise to trap near a small-sized town, as many doves use the trees as their night roosts,” he says. “Weedy field edges are normally good locations for setting traps, as well as along railroad grades,” perhaps because of mineral resources, such as calcium carbonate and quartz grains, found there.

Baiting is important, too. The critical factor, Fisher says, “is that we bait each site every day to keep doves interested.” Also, keep the bait pile small and “inside the traps and away from the edges to prevent the doves from picking away ‘free’ grain.”

Devils Lake WMD manages more than 51,400 acres on 217 waterfowl production areas in northeastern North Dakota. In addition to providing nesting habitat for waterfowl, it is an important migratory bird stopover. And it is one of two dozen National Wildlife Refuge System units—from the Great Plains to Texas and Nevada, and from South Carolina to New Jersey to Maine—that are helping the U.S. Fish and Wildlife Service’s Division of Migratory Bird Management collect mourning dove data by banding the popular game bird.

“Mourning doves are one of the first migratory birds to return to Devils Lake, arriving the first week of May,” says Fisher. Breeding begins early in June and the breeding population is typically banded for six weeks starting July 1. Most of the doves leave by late September and tend to migrate due south, as band recoveries from Oklahoma, Texas and Mexico indicate.

Commonly seen at backyard bird feeders and recognized by their familiar *coo-oo, oo, oo, oo*, mourning doves are

one of the nation’s most abundant bird species, according to call-count and North American Breeding Bird Survey data. Their estimated U.S. population is 350 million.

Given those numbers, it may seem unusual that wildlife managers have spent more than a decade developing a National Strategic Harvest Management Plan. However, it is important to monitor consumptive use and evaluate the regulations that manage it to ensure the sustainability of mourning doves, whose hunting harvest in 2010 was more than 17 million. Along with traditional count and survey data, harvest strategies include band recovery data that can help provide information about dove vital rates—reproduction, survival, age composition and harvest—to assist in developing predictive models.

Meeting the banding goals that have been established for the 48 contiguous states has proved challenging because of insufficient funding and lack of trained personnel.


“Refuges are vital to the dove banding effort because, without them, there are many states and areas of the country where we have no way of meeting our banding quotas,” says Mark Seamans, who, as the Service’s western webless coordinator, specializes in doves, cranes and other game birds.



Two dozen National Wildlife Refuge System units—from the Great Plains to Texas and Nevada, and from South Carolina to New Jersey to Maine—are helping the U.S. Fish and Wildlife Service’s Division of Migratory Bird Management collect mourning dove data by banding the popular game bird. (Thomas G. Barnes)

“We need their participation to make this program successful.”

While some refuges are uniquely positioned to assist with long-term monitoring, they need proper tools to contribute quality data. To help in training, Mountain-Prairie Region migratory bird specialists and partners have developed an instructional DVD. The take-home message is: Dove banding is not labor-intensive, expensive or time-consuming; it is an important and enjoyable effort that contributes to the conservation of one of our shared trust species.

As an added bonus, says Fisher, dove banding provides hands-on outreach at Devils Lake WMD and “has helped get children excited about wildlife.” 

Adrianna Araya is a Mountain-Prairie Region migratory bird specialist.

Around the Refuge System

Midway Atoll

For the second time in recorded history, a short-tailed albatross has hatched outside of two islands off Japan. The chick hatched in January at Midway National Wildlife Refuge, yards away from the nest where the chick's parents hatched and fledged a chick last year. The parents met four years ago; the female is nine years old and the male 25. They amazed the scientific community last year by fledging the first chick despite two major storms and the Japanese tsunami that washed the young bird almost 100 feet from its nest. If all goes well, the two parents will spend this spring and early summer bringing food to their new chick every three to six days. They will log tens of thousands of miles, soaring between Midway Atoll and the nutrient-rich waters far to the northwest, foraging on squid and flying fish eggs that they will regurgitate to the chick once back at the refuge.

“We are excited and guardedly optimistic that this chick will grow

strong and healthy enough to fledge,” said refuge manager Sue Schulmeister. “The short-tailed albatross chick raised last year thrived and fledged, so we know it has good, experienced parents. Adequate food and weather permitting, this chick will fledge and join its sibling at sea.” The chick will be monitored via remote camera by staff at the refuge, which is part of Papahānaumokuākea Marine National Monument. Short-tailed albatross were one of the most abundant albatross species in the North Pacific before being hunted for their feathers and driven close to extinction by 1949. They are now a federally endangered species whose global population is estimated to be 2,200.

New Jersey

A stakeout at Edwin B. Forsythe National Wildlife Refuge has uncovered a previously unknown brand of wetland avian thievery. To learn more about the habitat needs of American black ducks and Atlantic brant, two University of Delaware graduate students watched

waterfowl day and night at the refuge over the past two winters. They collected new information about nocturnal behavior—and witnessed brazen daylight robberies. On the highest tides of the month, they saw black ducks catch fiddler crabs, only to be confronted head-on by herring gulls, which chased them up to 300 yards. When the ducks dropped their catches, the gulls swooped in and ate the crabs. This “kleptoparasitism” is a new observation,

according to a December 2011 *Journal of Fish and Wildlife Management* article co-authored by one of the students, Orrin Jones; his professor, Chris Williams; and state Division of Fish and Wildlife research scientist Paul Castelli (now a wildlife biologist at Forsythe Refuge).

Wyoming

The National Elk Refuge collaborated with St. John's Medical Center to offer an innovative activity that combined an interpretive talk with a hospital program encouraging wellness. The medical center borders the refuge. Outdoor recreation planner Lori Iverson saw an advertisement in December for the medical center's Walk and Talk Wellness Series, twice-weekly outings that combine a noontime half-hour walk with discussions led by hospital staff. Speakers on the tours have used the opportunity to discuss their areas of specialty, including hearing, diabetes and nutrition. Iverson and medical center official Julia Heemstra arranged to have one outing be about refuge management. “Lori is the only outside speaker we've had so far, and we got really positive feedback on that particular walk,” said Heemstra. The refuge and the medical center are planning more walks this spring.

Texas

Taking advantage of a flood's aftermath, Santa Ana Refuge on the U.S.-Mexico border partnered with the Texas Parks & Wildlife Department in December 2011 to remove a couple hundred alligator gar, thereby improving refuge habitat and aiding state research. In July 2010, flooding had submerged the refuge, and, as waters receded, alligator gar had become trapped in many of its wetlands. Concentrations of the predatory fish posed a threat to migratory birds and state threatened or endangered species such as the black-spotted newt and the Rio Grande lesser siren. So, late last year, a partnership opportunity presented itself when the wetlands were drawn down, a management tool used by the refuge to mimic the historic flooding of the Rio Grande. The small, shallow pools full of alligator gar made it easy



A short-tailed albatross sits with her fuzzy black chick (foreground) at Midway Atoll National Wildlife Refuge. (Pete Leary/USFWS)

for refuge staff and state biologists to net more than 200 of the fish. Of those, 100 were taken by state biologists for research; alligator gar are prone to overharvest in Texas. The rest were released into the Rio Grande away from refuge wetlands.

New Refuge Officer Badge

The Service's Division of Refuge Law Enforcement has updated its regular-duty badge for the first time in three decades. The new badge will be issued to all refuge officers this spring at their annual in-service training. It is the first regular-duty badge in Service history (excepting the centennial year) to identify the National Wildlife Refuge System specifically. The badge also displays the year 1903, a reference to the establishment of Pelican Island National Wildlife Refuge and the appointment of the nation's first refuge manager/refuge officer, Paul Kroegel. "Our current badge design dates back to the 1980s, and our identity to the public as their protectors and conservation officers for the natural and cultural resources of the Refuge System is more critical than ever," said Jim Hall, the division's chief. "Refuge officers are often the first employees that visitors encounter. This is another means to identify who we are and the unique treasure of our public lands." The badge rollout coincides with the division's step of moving refuge officers from the 025 park ranger job classification to a new land management

California



A rare falcated duck, left, comes face to face with an American widgeon at Colusa National Wildlife Refuge. The falcated duck—which is common in Asia and is a member of the teal family—drew more than 10,000 visitors to the 4,507-acre refuge north of Sacramento this winter. (Steve Emmons/USFWS)

law enforcement series, 1801, with the title of federal wildlife officer. That move is designed to better support officers in human resources-related areas, including recruitment.



This new badge is being issued to all Refuge System law enforcement officers this spring.

Hawaii

In the spirit of service on Martin Luther King Day, 274 volunteers removed 3,672 pounds of trash in a coastline cleanup at James Campbell National Wildlife Refuge. Local high school students and several nonprofit organizations participated in the event, organized by Sustainable Coastlines Hawaii. Charles W. Moore, author of *Plastic Ocean*, was among the volunteers. Dave Ellis, project leader at Oahu National Wildlife Refuge Complex, said plastics are the biggest part of the trash problem along coastlines, posing a danger to turtles, seabirds and other wildlife. The cleanup, which was done along a newly acquired two-mile-long area of coastline that has been closed to the public, gave many residents their first chance to see the land. 🦋

Newly Conserved Land




Red River National Wildlife Refuge
Louisiana

Ronnie Maum



Umbagog National Wildlife Refuge
New Hampshire

Jerry and Marcy
Monkman/Ecophotography

The National Wildlife Refuge System Division of Realty held a photo contest last fall as a way to gather photographs of newly acquired land to illustrate its 2011 Annual Report of Lands. More than 100 photographs of national wildlife refuge land acquired by the U.S. Fish and Wildlife Service in fiscal year 2011 were submitted to the contest. The photos on these two pages are a sampling of them. The photo from Missisquoi National Wildlife Refuge in Vermont, taken by refuge manager Ken Sturm, will appear on the report's cover. 



Humboldt Bay National Wildlife Refuge
California

Andrea Pickart/
USFWS



Missisquoi National Wildlife Refuge Vermont

Ken Sturm/USFWS



Red Rock Lakes National Wildlife Refuge Montana

Nathan Korb/The Nature Conservancy



Refuge Manager of the Year Charlie Pelizza, with his father and Interior Secretary Ken Salazar behind him, installs a plank on the walkway at Pelican Island National Wildlife Refuge. (Vince Lamb)



Kate O'Brien, a wildlife biologist at Rachel Carson Refuge in Maine, received the Employee of the Year Award. (USFWS)

Pelizza Named Refuge Manager of the Year

The National Wildlife Refuge Association and the National Fish and Wildlife Foundation have honored three individuals and a Friends group with 2012 National Wildlife Refuge System Awards.

The annual awards recognize refuge conservation professionals, a volunteer and a Friends group who exemplify outstanding dedication and passion for wildlife conservation in advancement of the mission of the Refuge System.

Charles A. Pelizza received the Paul Kroegel Award for Refuge Manager of the Year.

Pelizza, a 32-year Refuge System veteran, was recognized for his leadership that culminated in January's establishment of Everglades Headwaters National Wildlife Refuge and Conservation Area. In particular, Pelizza was lauded for his ability to work with nonprofit organizations, ranchers, sportsmen, the state of Florida and other important stakeholders to make the 150,000-acre project happen.

"His experience and commitment to building partnerships and recognizing others' contributions are hallmarks of his career," Refuge Association president Evan Hirsche said of Pelizza, who is manager at Pelican Island, Archie

Carr and Lake Wales Ridge National Wildlife Refuges and, now, the new conservation area.

Kate O'Brien received the Employee of the Year Award. A wildlife biologist at Rachel Carson Refuge in Maine, O'Brien was praised for her work with the endangered New England cottontail rabbit and the rare saltmarsh sharp-tailed sparrow.

O'Brien "is considered an expert in migratory bird research and management by her peers," the groups said in announcing the award.

David Govatski received the Volunteer of the Year Award. Govatski, who is president of the Friends of Pondicherry in New Hampshire, was honored for serving more than 11,000 volunteer hours at Silvio O. Conte Fish and Wildlife Refuge.


"Dave is well known for the energy and enthusiasm he brings to volunteering," Hirsche said. "He invented a new technique of trail maintenance for wetland trails that is now used by other trail organizations."

The **Coastal Wildlife Refuge Society** in North Carolina was named Friends Group of the Year. The society works closely with Alligator River and Pea Island Refuges. The group was cited for engaging wildlife enthusiasts of all

ages and for being a founding partner in the Wings Over Water Wildlife Festival, which celebrates wildlife and wild lands in eastern North Carolina. The 16th annual festival is scheduled for Nov. 6-11, 2012.

Other Honors

Refuge System national climate coordinator **John Schmerfeld** received the 2011 Eugene W. Surber Professional Fisheries Biologist Award from the American Fisheries Society's Virginia chapter. He was cited for his work as the Service's Natural Resource Damage Assessment and Restoration (NRDAR) coordinator for the state from 2000 to 2010. Schmerfeld was instrumental in settling cases that brought more than \$8 million to restoration of Virginia's aquatic resources. As a result, the Virginia Department of Game and Inland Fisheries and Virginia Tech each established freshwater cultivation facilities that have produced more than 2 million mussels as part of the Tennessee River drainage restoration program.

The **Nisqually Estuary Restoration Team** in Washington state, received a Coastal America Partnership Award. The restoration team, which is closely affiliated with Nisqually National Wildlife Refuge, was honored for the restoration of more than 900 acres of tidal habitat near Puget Sound. 

Refuge Specialist Shows His Mettle by Recycling Metal

By Jennifer Anderson

After three years as a Peace Corps volunteer in one of South America's most beautiful rainforest ecosystems, Cyrus Brame sought employment back home.

"I knew at that point that the only places in the United States as beautiful and pristine as the Mache-Chindul Mountains in Ecuador are at national wildlife refuges," he says. Refuges should not only be picturesque, they should "shine," says Brame, a wildlife refuge specialist at Eastern Virginia Rivers National Wildlife Refuge Complex.

Maintaining that vision, Brame created the James River Excess to Asset program, cleaning up refuge lands by recycling scrap metal, equipment and construction debris. So far, more than 23,000 pounds of scrap metal have been recycled. In 2010 alone, the program generated \$1,300 for the refuge complex through recycling and more than \$30,000 for the federal government's general fund through auctioning of old equipment for reuse.

For his ingenuity and initiative, Brame was named a 2011 Sustainability Hero through the Department of the Interior's Environmental Achievement Awards program. He was one of three individuals and several teams within Interior to receive awards for exceptional stewardship of the environment.

"Cyrus' passion for natural resource conservation has converted a former equipment bone yard into habitat," says Andy Hofmann, manager of the refuge complex. Hofmann, who nominated Brame for the award, describes his employee's program as a "model" for any refuge looking to rid itself of heavy equipment and related debris.

A native of rural North Carolina, Brame graduated from North Carolina State University's College of Natural Resources and went on to Ecuador through the Peace Corps to teach local farmers to manage rainforests without clear-cutting. His station was remote, and few people passed through. Once a group



Cyrus Brame navigates a creek at Presquile National Wildlife Refuge. He received a 2011 Department of the Interior Sustainability Hero award for his innovative program to recycle or sell heavy equipment, scrap metal and construction debris at Eastern Virginia Rivers National Wildlife Refuge Complex. (USFWS)

of teachers from New Jersey visited as part of an Earthwatch International expedition, and that is how Brame met his future wife, Victoria Winterhalter.

After his Peace Corps tour ended in 1997, Brame interned at Back Bay National Wildlife Refuge in Virginia before moving to Philadelphia in 1999 as volunteer coordinator at John Heinz National Wildlife Refuge at Tinicum. He and Winterhalter married that year and now have two daughters.

One of his larger projects at John Heinz Refuge was an annual clean-up of Darby Creek, which runs along the refuge. Every year Brame and his cadre of volunteers pulled out hundreds of pounds of trash, recycling mostly aluminums and metals.

As satisfying as the clean-up was, Brame says, "it was disheartening to know you've done a good job in April, and in August you start seeing debris again."


After five years in Philadelphia, Brame moved to Eastern Virginia Rivers Refuge Complex in 2003, initially as an outdoor recreation planner.

With help from Luther Vick, a long-time refuge maintenance worker, Brame set

about identifying old trucks, bulldozers and other equipment that could be reused elsewhere. Most of the equipment was at Presquile National Wildlife Refuge, an island in the James River accessible only by boat or cable ferry.

Despite logistical hurdles and lots of paperwork, Brame identified the assets and then loaded them onto trailers to cross a narrow expanse of the river. Approximately 32 items have been removed and sold at General Services Administration (GSA) auctions.

In addition to regular clean-ups, Brame also coordinated a major restoration initiative on Earth Day 2009, enlisting the help of more than 100 volunteers. Nearly 30,000 pounds of debris, including old tires, were removed. Sapling bald cypress and green ash were planted on the previously trashed property.

Most satisfying for Brame is the permanence of the restoration. Unlike at Darby Creek, where new debris washes up, most of the trash at the James River refuges was left over from an old farming operation. He estimates it all will be gone in three to five years. 

Jennifer Anderson is a frequent contributor to Refuge Update.

From Papahānaumokuākea Reefs, Reasons for Hope — continued from page 8

“The population collapsed and never came back.” Lacking that prey, the young seals weaken and are picked off by sharks.

The dredged corals at Midway’s lagoon have not recovered, Maragos says. But elsewhere Papahānaumokuākea’s reefs are healthy, with species found nowhere else in the world.

“There’s a huge number of undescribed species out there,” says Maragos, who was chief investigator on two research expeditions to the remote islands in 2000 and participated in several others. “I found at least 50 (coral) species that have not been described in the literature.”

Stieglitz says the management philosophy for the Midway Atoll and Hawaiian Islands refuges is like the Hawaiian concept of *ahupua’a*—safeguarding living communities from the mountains to the sea.

“As an agency in the past we have tended to think of the ecosystem ending at the shoreline,” he says, “but what happens immediately offshore is affected by what happens onshore.”

“The primary action was to stop destruction, stop the harm and stop the



Cauliflower coral and others species on the reefs off the Northwestern Hawaii Islands are responding well to changes in the way humans treat the ecosystem. (Mark Sullivan/USFWS)

excessive take of resources,” he says. “If you can do that, these ecosystems have evolved over millions of years, so they’re quite capable of taking care of themselves.” 🦋

Heather Dewar is a writer-editor in the Refuge System Branch of Communications.

From the Director — continued from page 2

In one pilot program, the I&M initiative is cataloging wilderness character—untrammelled, natural, undeveloped and providing solitude—and the results should tell us what effects we are having on wilderness. The program will also let us evaluate impacts of proposed actions on wilderness character.

In another pilot program, the initiative is gathering data about invasive species. This should help refuge managers assess which species pose the greatest threats.

The initiative does not stop with just traditional wildlife, either.

Coastal refuges are benefitting from I&M through SLAMM (Sea Level Affecting Marshes Model). SLAMM

helps refuge managers predict effects of sea-level rise on coastal wetlands, non-tidal wetlands, low-lying uplands and associated species. This modeling is available on the Service Web site at <http://www.fws.gov/slamm> to anyone—fellow researchers, conservation partners, members of the public.

Open access to data is key for any science-driven organization. It promotes collaboration within the Service and with our partners. It provides accountability if others can see the data that informs our decisions.

We must learn from our data and our experiences. If the pilot projects do not perform as needed, we will learn from

our mistakes to develop ones that do. Moving forward, we will work to apply adaptive management strategies to continually improve our conservation delivery and thus ensure we support landscape-scale habitat conservation frameworks.

I am still struck by what 10-year-old Alesha Ouren told the *Conserving the Future* conference audience last summer. Alesha, a student at Prairie Wetlands Learning Center in Minnesota, told us to “look closer. You’ll see more than meets the eye.”

Alesha is so right. 🦋

Everglades Headwaters Established as Refuge System's 556th Unit — continued from page 1

initiative last year,” Salazar said at the time of the announcement. “Working in close partnership with landowners, we are taking a major step to safeguard the long-term health of the Everglades in the Kissimmee Valley, while ensuring the area’s ranching and farming heritage and economy remain strong. Just as we have done in Kansas, Montana and the Dakotas, our locally driven, cooperative approach to conserving the Everglades Headwaters will help grow a robust outdoor recreation economy for central Florida, while preserving ranchers’ rights to live off the land.”

The Service is working with ranchers and other private landowners, the Florida Fish and Wildlife Conservation Commission and other state agencies, conservation organizations, users’ groups, Native American tribes and federal agencies in creating the new refuge and conservation area.

“We are inspired by the excellent conservation opportunities that exist here as a result of the efforts of our ranching community to protect working lands across generations,” said Service Director Dan Ashe. “The extraordinary vision of our many partners will help protect significant wildlife species while supporting a way of life that is vital to our citizens. This effort will restore wetlands in the headwaters area, preserve working ranches, and support a healthy environment for central and south Florida, as well as increase opportunities to hunt, fish, hike, bird-watch and learn about the importance of this landscape.”

The establishment of the new refuge and conservation area is one of a series of conservation projects under the Obama



Lightsey Ranch in Florida is within the acquisition boundary of Everglades Headwaters National Wildlife Refuge and Conservation Area. (Carlton Ward Jr./CarltonWard.com)

administration that works locally and collaboratively to conserve vital habitat on working landscapes. These include:

- The million-acre Flint Hills Legacy Conservation Area in Kansas—the first new unit of the Refuge System authorized under the Obama administration, which will help maintain the integrity of tallgrass prairie wildlife habitat, stream water quality and the agricultural heritage of the Flint Hills.
- The Dakota Grassland Conservation Area, which will conserve prairie landscapes, wildlife resources and working lands in the Prairie Pothole Region, an area that supports more than half of the nation’s migratory waterfowl.

- The successful community-based conservation initiatives taking place in the Crown of the Continent, a vast and intact landscape that includes portions of northwestern Montana as well as British Columbia and Alberta.

The Everglades, which receives water from the Kissimmee River Valley, will benefit from the conservation and restoration of its headwaters through enhanced water quality, quantity and storage. Additional details about the Everglades Headwaters Refuge and Conservation Area are at <http://www.fws.gov/southeast/evergladesheadwaters/>.




Hardy Corn With Deep (Cultural) Roots — continued from page 7

low-water-availability stresses that Aztec corn did last summer. “When other corn was wilting, this was growing nice and green,” he says. “It still produced a small cob with some seed production. It’s surprising how strong and resilient these things are.” Aztec corn produces a tighter husk

than conventional corn and seems more resistant to most pests, he says.

Vradenburg envisions a day when Bosque del Apache Refuge produces enough Aztec corn to supply other refuges, when Aztec corn draws tribal partners into the cooperative agreement, when a National Wildlife Refuge System

partnership with seed companies increases the inventory of heirloom seeds for corn and other produce, such as milo.

That all would be good, he says, because “we *know* these crops are not genetically modified.” 



RefugeUpdate

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A Look Back ... David B. Marshall

During a 1939 Audubon trip to southeastern Oregon, 13-year-old Dave Marshall decided he wanted a career being paid to watch birds. Birding was already in his genes. His great-great grandfather traveled by covered wagon to Oregon carrying a pair of field glasses, and his parents were early members of the Audubon Society of Portland. Wildlife photographer and conservationist William L. Finley was a family friend.

Marshall began working for the U.S. Fish and Wildlife Service in Nevada and California in 1951, returning to Oregon and Malheur National Wildlife Refuge in 1955. Asked to locate lands in the Willamette Valley for wintering dusky Canada geese, he identified habitat that would become William L. Finley, Ankeny and Baskett Slough National Wildlife Refuges, in addition to portions of Tualatin River, Lewis and Clark and Willapa Refuges. “He felt that uplands were important to the health of the wetlands,” says Doug Spencer, recently retired manager of the Willamette Valley National Wildlife Refuge




Dave Marshall, who died in November 2011 at age 85, cradles a young red-winged blackbird in 1947. The Wildlife Society's Oregon chapter gave Marshall its award for outstanding wildlife stewardship in 1993; in 2007, the award was named after him. (Tom McAllister)

Complex. “Because of Dave Marshall, today we have a great mix of habitats on these refuges.”

During a 30-year career in the Service, Marshall also worked as a regional refuge biologist, producing an inventory of wildlife on remote Pacific islands and working to return musk ox to Alaska. He was once asked to deliver two

greater sandhill cranes to Tokyo as a gift for Japan’s Emperor Showa. When the flight was delayed, he arranged to have the cranes spend the night in the pilots’ lounge.

Marshall retired in 1981 but kept on working, developing a non-game wildlife management plan for Oregon that became a model for other states. While writing that plan, he told Oregon Islands National Wildlife Refuge manager Roy Lowe how happy he was that the refuge now includes 1,854 islands off the Oregon coast. In 1963, he had been told that only rock islands with large seabird colonies could be added to the Refuge System—and he could identify just 28.

Also in retirement, Marshall wrote an autobiography—*Memoirs of a Wildlife Biologist*—and edited the definitive *Birds of Oregon: A General Reference*. He had a certain disdain for birding lists because “he wanted people to appreciate birds for their natural history,” recalls Lowe. “He was a conservationist at heart.” 

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Send Us Your Comments

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