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RefugeUpdate

National Wildlife Refuge System
www.fws.gov/refuges

INSIDE: As sea levels rise and storm surges become more powerful, the Atlantic Ocean is enveloping a marine forest at South Carolina's Cape Romain National Wildlife Refuge. The three-mile stretch is known as Boneyard Beach. To learn how the National Wildlife Refuge System is adapting to climate change, see the Focus section on pages 8-13. (Stacy Shelton/USFWS)

Service Launches SoCal Project, 6 More Urban Refuge Partnerships

Two important announcements were made this summer in the U.S. Fish and Wildlife Service's ongoing effort to connect urban Americans with nature and the conservation mission of the National Wildlife Refuge System.

Interior Secretary Sally Jewell announced a first-ever award by the Service of special funding to engage residents of one of the nation's densest urban areas in conservation and outdoor recreation. And the National Fish and Wildlife Foundation (NFWF) announced that it and dozens of partners will help fund six new Service urban wildlife refuge partnerships.

The special funding announced by Jewell will support the Southern California (SoCal) Urban Wildlife Refuge Project. Based in and near Los Angeles and San Diego, the project aims to expand outdoor learning for students, create refuge-based jobs for at-risk youth and develop culturally sensitive community programs that build an appreciation for nature. In the process, the Service plans to help build a next-generation conservation constituency. The $1 million-a-year award starts this year. It is part of the Refuge System's Urban Wildlife Refuges Program.

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Focus: Adapting to Climate Change, pages 8-13

Malheur Refuge Targets Invasive Common Carp

By Kendall Slee

Malheur National Wildlife Refuge and an array of partners are laying the groundwork for what they expect to be the largest, most complex common carp control effort ever undertaken. The goal is to diminish the non-native fish's population so wetland vegetation critical to birds and other wildlife can rebound.

Controlling the common carp is the refuge's top priority, according to its 2013 comprehensive conservation plan.

As an initial step, the refuge tested commercial fishing on Malheur Lake in May. With two boats, fishermen hauled out 54,600 pounds of carp, proving that commercial fishing is possible in the shallow lake. Partners funded most of the $35,000 contract.

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From the Director

We Must Help Nature Adapt to Climate Change

The National Climate Assessment released in May puts it bluntly: "Evidence for climate change abounds, from the top of the atmosphere to the depths of the oceans. Scientists and engineers from around the world have meticulously collected this evidence, using satellites and networks of weather balloons, thermometers, buoys, and other observing systems. Evidence of climate change is also visible in the observed and measured changes in location and behavior of species and functioning of ecosystems. Taken together, this evidence tells an unambiguous story: the planet is warming, and over the last half century, this warming has been driven primarily by human activity."

Dan Ashe

The scientific debate about whether human-induced climate change is occurring – or whether rising average surface temperatures are disrupting the natural systems that support life on Earth – is over. But two significant questions remain to be answered: How catastrophic will the effects of this disruption be? And what can be done to avert the worst impacts and help wildlife and natural systems cope with those that occur?

These are not easy questions to answer. Fortunately, we still have time to act to sustain the web of life that sustains human population.

The U.S. Fish and Wildlife Service is working with the scientific, conservation and business communities to prepare for these impacts and ensure forward-thinking and effective conservation

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Chief's Corner

Reflecting on the 50th Anniversary of Wilderness

As we mark the 50th anniversary of the Wilderness Act, much is being written about wilderness. Some challenge its relevance in a changing world; others wonder if it is an artificial construct of a particular point in our history. I have written about those things myself. But not today.

I love wilderness. My worldview, my faith, my professional life, have all been shaped by my experience in wild places.

Jim Kurth

The first wilderness I experienced was Breton Wilderness. Breton National Wildlife Refuge in Louisiana was the second refuge established by Theodore Roosevelt. It is the only national wildlife refuge he established that he actually set foot on. The 40-mile crescent of the Chandeleur Islands is one of the most magical places I have ever seen.

For the bird nations of the Gulf of Mexico, I have always thought that the Chandeleurs must be their capital city. Sandwich, royal and Caspian terns by the tens of thousands, along with black skimmers, lay their eggs on the beach. Magnificent frigatebirds from South America spend our North American summers wintering there. Reddish egrets, night herons, laughing gulls and others lend their voices to the cacophony of this wild place. Sharks plow the waters. What has happened at Breton through sea-level rise, from Hurricane Katrina, from God knows what saddens me. But the eons roll on, and they shape the land. I fear she is dying.

The Seney Wilderness in Michigan is a no man's land. Its sedge meadows, pine-covered sand islands and patterned bogs at their southernmost range define her. Almost no one goes there. I did. A few

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Refuge Update

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Inside

An Ode to Wilderness

By Kristine Sowl

On the occasion of the 50th anniversary of the Wilderness Act – signed on Sept. 3, 1964 – my thoughts turn to the Andreafsky Wilderness at Yukon Delta National Wildlife Refuge in western Alaska.

I had the privilege of spending three early summers there, studying the elusive bristle-thighed curlew. I became intimately familiar with small parts of the vast wilderness, sensed its rhythms and witnessed the amazing seasonal transformation that occurs annually.

The 1.3-million-acre Andreafsky Wilderness includes a series of ancient ridges that run from southwest to northeast. They form a uniquely textured landscape that is the summer home of the bristle-thighed curlew, a rare and fascinating shorebird. The wilderness provides habitat for almost two-thirds of breeding bristle-thighed curlews in the world. Their large territories, low-density breeding and use of camouflage to hide from nest predators make them difficult to study.

Each year, my colleagues and I arrived in early May when the tundra was mostly snow-covered and creeks were frozen. Few migratory birds were present, and the wilderness was quiet except for the gargles and cackles of willow ptarmigan defending territories. Soon, we were thrilled to hear that first distinctive *chui-et* call of a bristle-thighed curlew.

Next, the migratory bird trickle turned into a flood. Swans and geese flew toward the coast. Pectoral sandpipers stopped to forage before continuing north. Northern harriers and red foxes patrolled the tundra. Lapland longspurs gave their tinkling songs. Curlews, whimbrels, golden-plovers and bar-tailed godwits began to conduct territorial displays. The complex whistles of curlews filled the air as the birds traced gigantic circles overhead.

Mid-May brought the agony of rapid snowmelt. We fought through deep drifts of rotten snow, skittered over shelves of ice and detoured around swollen streams. Beavers braved rushing waters to relocate. River otters scampered and tobogganed along creeks. Moose disappeared into the willows to give birth to spindly calves. Looking out of place, woolly bear caterpillars and black spiders rested on the snow's surface. The songs of sparrows, thrushes and warblers filled shrub patches. Modest blooms of coltsfoot and anemone sprang up from ground recently vacated by snow.

A bristle-thighed curlew sits on a nest next to a chick in the Andreafsky Wilderness at Yukon Delta National Wildlife Refuge in western Alaska. The author spent three early summers studying the elusive shorebird in the wilderness. More photos: http://bit.ly/1mFk7AY. *(Kristine Sowl/USFWS)*

By May's end, leaves had popped on willows, filling the valleys with a bright green haze. White blossoms of cloudberry, Labrador tea and dwarf dogwood dotted the tundra, interspersed with the pink, purple and yellow of woolly lousewort, bog violet and marsh marigold. Most curlews inconspicuously settled onto their nests. Early June was the doldrums for curlew researchers.

A dramatic change occurred in mid-June as eggs began to hatch. Sometimes ptarmigan protecting their brood hissed at us or anxious long-tailed jaegers dive-bombed us. Songbirds carried beaks full of insects. Curlews morphed into over-protective parents. Adults would fly up from a chick several hundred yards away and loudly protest our presence.

Late June brought warmer temperatures, frequent showers, humid conditions and clouds of annoying mosquitoes. Fritillaries, Old World swallowtails and alpine butterflies fluttered on sunlit days. Fledgling longspurs and sparrows with stubby tails flushed from the tundra. Salmon reached the creek beside our camp after an arduous journey from the ocean and were followed by brown bears. Fireweed flowered and berries began to form.

By early July, as curlew chicks became older, their parents' protective response tapered. Most parents deserted their young and headed to the Yukon-Kuskokwim Delta to fatten up on berries and invertebrates before the long migration south. Once fully grown, the chicks followed, unescorted. And we returned to civilization, knowing we had been fortunate to study this special bird in this special place.

Kristine Sowl is a wildlife biologist at Yukon Delta National Wildlife Refuge in Alaska.

A Q&A Interview With I&M Data Manager Todd Sutherland

Databases at the Natural Resource Program Center in Fort Collins, CO, make it easier to access and share reports, datasets, maps, custom tools and survey information across the Refuge System. Above: a survey of pectoral sandpipers at Arctic National Wildlife Refuge in Alaska. (USFWS)

The Refuge System Inventory and Monitoring (I&M) initiative was established in 2010 to gather, analyze and disseminate scientifically rigorous biological data about national wildlife refuges. Todd Sutherland, a 17-year veteran of the U.S. Fish and Wildlife Service, is the national I&M data manager based at the Natural Resource Program Center in Fort Collins, CO. Here are excerpts from a recent *Refuge Update* interview with him.

Q. *What are the main I&M databases that every Refuge System scientist should know and use?*

A. ServCat (Service Catalog) and PRIMR (Planning and Review of I&M activities on Refuges). Both are available to Service staff via the Environmental Conservation Online System (*http://go.usa.gov/9qtC*). By the end of fiscal year 2015, there will be a new database module available to document species occurrence on refuges.

Q. *What kind of information does each database house?*

A. ServCat is a customized data management system we retrofitted from the National Park Service. You use ServCat to describe, upload and archive final products such as reports, datasets, maps and custom tools you have developed. It not only protects the valuable information produced by refuge biologists, but it allows others to easily discover their "stuff." PRIMR is a database that describes the myriad survey activities being conducted across Refuge System lands. For example, if you want to know which refuges are conducting surveys for the red-cockaded woodpecker, you can generate such a list from PRIMR and obtain the name of the lead biologist. The real beauty is that PRIMR is linked to ServCat, so you can also discover any products generated from surveys and review the protocol being used to conduct the survey.

Q. *What kind of databases existed before you came to this position?*

A. There were a few database products, but not any used nationally. For example, the Alaska Region manages a species-occurrence database, but it is used primarily by refuges in Alaska. The U.S. Geological Survey managed bird point count and marshbird databases, which were used primarily by refuges in the Midwest, Southeast and Northeast Regions. What was missing was an information system designed to allow multiple databases to be integrated and made available Refuge System-wide.

Q. *Are all the data public?*

A. No, by law, legally sensitive data such as endangered species locations or personally identifiable information (PPI) cannot be made available to the public. So it is necessary to categorize our data according to levels of access. For example, a document in ServCat might contain operationally sensitive information. This document can be classified as "internal only," which restricts access to the public but allows our staff to view the document. The public cannot directly access the database applications (PRIMR/ServCat), however, the data that reside in them are made available to the public through other mechanisms, such as Data.Gov. This is critical for collaboration with our partners.

Q. *In terms of data gathering, in what areas has the Natural Resource Program Center (NRPC) made the most progress since its inception in 2010?*

A. Definitely ServCat. Not only is it used by refuge staff; other programs are starting to use it as well. We have tied ServCat into Department of the Interior efforts to support the President's Open Data Initiative. Our documents in ServCat are harvested and made available to the public via Data.Gov.

We have over 30,000 records in ServCat and have a dedicated team in Fort Collins entering priority refuge documents such as management plans and annual narratives. The Southeast Region has also done an excellent job of describing their survey activities in PRIMR. Finally, we have worked with all regions and Ecological Services staff members to improve information regarding what endangered species occur on refuge lands.

Q. *In terms of data gathering, what are the most difficult challenges NRPC has faced since 2010?*

A. Inconsistency in regional staffing and priorities. It is hard to change the culture of the Service and lead a system-wide effort. Field stations have fewer staff, and now they have I&M-related tasks to accomplish, too. The regions that have implemented a zone system and added staff to help refuges with I&M are doing well. Bandwidth is another issue. The Service and DOI have not done a good job of funding IT infrastructure. We build centralized database applications, but many remote refuges have extremely poor connectivity and are still expected to use our web-based tools. It is very frustrating for users to enter data with slow connections.

Q. *What are the data-gathering priorities over the next year or so?*

A. We want all regions to have their stations describe their survey activities in PRIMR, not just the Southeast Region. The Pacific Southwest Region is developing workflows for documenting species occurrence on refuges. Documenting species occurrence on refuges is going to be the next big push for I&M.

Q. *How can employees in the field help meet those priorities?*

A. Attending webinar training sessions offered by I&M, either regionally or nationally, is the best first step. These systems are easy to use, but training is key for ensuring consistency in these data across the system. Also, contact I&M staff if you have questions or suggestions as we roll out our systems. We are constantly tweaking these products to make them more user friendly and beneficial to end users. A national and regional I&M primary contact list is at *http://go.usa.gov/9qtF*.

Biologist Sara Vacek monitors grassland vegetation at Minnesota's Morris Wetland Management District. (Lauren Dennhardt)

Hydrologist Jasper Hardison takes water measurements at Kanuti National Wildlife Refuge in Alaska. (Maureen Clark/USFWS)

Prescribed Fire and Other Heated Language

By Karen Miranda Gleason and Kim Van Hemelryck

U.S. Fish and Wildlife Service firefighters regularly reduce wildfire risk and help restore wildlife habitat by conducting prescribed burns at national wildlife refuges. When they do so, they use technical talk that can be confusing.

So, here's a primer of commonly used terms, adapted from the *National Wildfire Coordinating Group Glossary of Wildland Fire Terminology*.

Wildfire: A fire in a natural area started by lightning or by people, accidentally or illegally. While some wildfires threaten people and property, they can also stimulate the growth of new forage and create other benefits for wildlife on refuges.

Wildland fire: Any fire burning in a natural area, either a prescribed fire or a wildfire.

Prescribed fire: A planned wildland fire started and managed by professional firefighters in accordance with an approved **prescribed fire burn plan**, which specifies allowable conditions for burning and desired results. Also called a **prescribed burn**. Sometimes called a **controlled burn** by the news media, the public and some state and local agencies.

Drip torch: Hand-held steel canister with a spout commonly used by wildland fire specialists to ignite prescribed fires or fight wildfires by dispensing flaming liquid – a mixture of diesel and gasoline – onto burnable vegetation. Related tools include: **flame thrower** (aka Terra Torch®), usually mounted on a truck, trailer or off-road vehicle, used to shoot a horizontal stream of gelled gasoline; **helitorch**, hung from or mounted on a helicopter to disperse ignited lumps of gelled gasoline from the air; and **ping pong balls**, plastic balls filled with flammable chemicals that are dropped from a helicopter and ignite after hitting the ground.

Fuels: Live or dead vegetation – such as grass, overgrown brush, trees or logging slash – that could fuel a wildfire. Also called **hazardous fuels** when referring to conditions creating high risk of wildfire.

Fuels management: The practice of reducing wildfire risk through planned and approved actions – known as treatments or projects – to thin or remove wildland vegetation that could fuel a wildfire. Fuels treatments can also improve wildlife habitat and commonly are done on a rotating schedule using prescribed fire, mechanical removal with chainsaws or heavy equipment, and chemical treatment with herbicides. Also called **hazardous fuels reduction** when referring to conditions creating high risk of wildfire.

Control line: An inclusive term for constructed or natural barriers used to stop the spread of a wildland fire. The part scraped or dug to mineral soil is called a **fireline**.

Spot fire: A new fire ignited outside of control lines by blowing or falling embers from the main fire. Wildland firefighters managing wildfire and prescribed fire must routinely monitor for problematic spot fires, which can occur miles away depending upon weather conditions.

Smoke management: Decisions and actions taken by wildland firefighters, land managers and air quality regulators, especially during prescribed fire, to minimize or divert smoke from settling into populated or high-traffic areas. This prevents health and safety hazards, such as poor air quality or impaired visibility. Managing smoke is more difficult during wildfires. It sometimes involves scientific monitoring of particulate levels and public notice of air quality.

Cohesive Strategy: An initiative of the Departments of the Interior and Agriculture in which governmental and non-governmental organizations collaborate to manage wildland fire by responding to individual wildfires, supporting fire-adapted communities, and restoring and maintaining fire-resilient lands. It is officially known as the National Cohesive Wildland Fire Management Strategy.

U.S. Fish and Wildlife Service Northeast Region fuels coordinator Steve Hubner uses a drip torch to ignite a prescribed fire. (USFWS)

Karen Miranda Gleason is a public affairs specialist and Kim Van Hemelryck is a fuels management specialist in the Refuge System Branch of Fire Management in Boise, ID.

Kenai Refuge Advance Work Saves Houses From Fire

By Karen Miranda Gleason

Two fuel breaks created in advance along a Kenai National Wildlife Refuge boundary helped saved thousands of houses and other structures from destruction during last spring's Funny River Fire.

When the fire's path met the fuel breaks, it slowed and bought firefighters valuable time and space to conduct burn-out operations around several subdivisions. No one was injured, and only four seasonal cabins and two outbuildings were lost, all in an area inaccessible by road.

Also known as fuel treatments, the breaks – in which vegetation is cleared or thinned – were constructed with funding from Kenai Refuge's hazardous fuels reduction program.

"We couldn't have done it without the help of our partners, the Alaska Division of Forestry and Cook Inlet Region Inc. (CIRI)," said refuge manager Andy Loranger.

CIRI, an Alaska Native corporation, owns private land adjacent to the refuge. Through a cooperative agreement the Division of Forestry cleared a 200-foot-wide area there. On refuge land, a second stretch of thinned understory 100-150 feet wide was improved by local contractors into a more aesthetic, shaded fuel break.

The Funny River Fire started at the refuge on May 19. That is early in the fire season on the Kenai Peninsula – home to 60,000 year-round residents in subdivisions surrounded by thick spruce forests and the attendant threat of wildfire.

The communities of Soldotna, Funny River, Kasilof and Sterling along the Sterling Highway were in the direct path of the fire, which was pushed by high winds as tourists arrived for Memorial Day weekend.

Firefighters conduct a burn-out operation near a fuel break to protect homes in forested subdivisions during the Funny River Fire at Kenai National Wildlife Refuge last spring. In such operations, fire crews start small fires to burn vegetation near the break that could otherwise fuel the larger fire. Video: http://bit.ly/1mCSXda *(USFWS)*

The fire eventually covered 195,858 acres. It was mostly contained on the 2-million-acre refuge, continued to burn and smolder for more than a month, and remains in "monitor" status until first snowfall.

"Without these two fuel treatments, it is highly likely homes would have been lost on the northern flank," said Rob Allen, the fire's incident commander from May 20 to June 6.

In the past 10 years, every $1 spent on the two fuels treatments at or near Kenai Refuge produced about $165 worth of residential, commercial and industrial structures protected, according to fire management specialists. The total investment in fuels reduction on or near the refuge was $1.5 million, which funded 7.5 miles of fuel breaks and protected more than 3,800 structures. These structures were valued at nearly $255 million, according to the latest estimate in Kenai Peninsula Borough's 2004 "All Lands/ All Hands" community action plan (*http://bit.ly/1oA7EdJ*). The plan, which involves local organizations and local, state and federal government agencies, aims to reduce wildlife threat through fuels reduction.

While the impact of the Funny River Fire on people was lessened by advance work, it's too early to tell how the fire will affect wildlife and refuge habitat.

Assessment of the burned area will begin next year to determine if any rehabilitation is needed on the 10 percent of the refuge touched by the fire. Staff members have been asked often if the fire will result in increased growth of deciduous tree species like willow, birch and aspen to improve habitat for declining moose populations.

"These plants can re-sprout from surviving roots or they can seed into the burn. However, seeds of deciduous species are more likely to germinate on mineral soil, and much of this early-season fire likely burned too lightly to clear duff to bare soil," said U.S. Fish and Wildlife Service Alaska Region fire ecologist Lisa Saperstein. "It is too early to tell, but either way, it would take time for the regeneration to have an effect on moose on a population level."

Karen Miranda Gleason is a public affairs specialist in the Refuge System Branch of Fire Management in Boise, ID.

The island that is home to Egmont Key National Wildlife Refuge in Florida was 328 acres in 1974. It is about 275 acres today. Despite several beach re-nourishment projects, as sea level rises and storms become more severe, the island continues to shrink and cabbage palm trees fall into the Gulf of Mexico. (Joyce Kleen/USFWS)

Refuge Staff "Will Guide Us in Setting the Objectives"

By Bill O'Brian

In recent months, the U.N. Secretary-General has called climate change and sustainable development "the defining issues of our time," the President of the United States has said "the baseline fact of climate change is not something we can afford to deny," and a bipartisan group of businesspeople has said climate change puts the U.S. economy at risk.

In line with that sense of urgency and inspired by its *Conserving the Future* vision, the Refuge System is addressing climate change in myriad ways.

Conserving the Future Recommendation 1 calls for the development of new conservation and habitat management plans in a landscape context beyond refuge boundaries. Recommendation 2 is: "Develop a climate change implementation plan for the National Wildlife Refuge System that dovetails with other conservation partners' climate change action plans and specifically provides guidance for conducting vulnerability assessments of climate change impacts to refuge habitats and species as well as direction for innovation in the reduction of emissions and improved energy efficiency on federal lands."

A "Planning for Climate Change on the National Wildlife Refuge System" publication completed in March combines those two notions into one practical primer for U.S. Fish and Wildlife Service employees.

The publication (*http://go.usa.gov/9bFc*) builds on Department of the Interior secretarial orders and the 2010 Service climate change strategy ("Rising to the Urgent Challenge"). It is designed to help employees weave climate change adaptation, mitigation and engagement strategies into comprehensive conservation plans (CCPs), habitat management plans, land protection plans and landscape conservation design formats.

It is "an important document for planners who are involved with individual refuge CCPs and with landscape conservation designs," says Kurt Johnson, the Service's national climate change scientist. "But the document is also going to be valuable for refuge managers, assistant managers, biologists and even an interpreter on a refuge to understand about climate change and what effects that climate change might have on their refuge – because there's a lot of background material relevant to such issues as drought, sea-level rise, invasive species and wildfire."

A "Climate Change Vulnerability Assessment for Natural Resource Management" publication *(http://go.usa.gov/9bMm)* issued in May is a toolbox of methods and case studies for assessing the vulnerability of individual species, habitats, landscapes, ecosystems and other resources to climate change.

That publication, which was compiled by Johnson, is a technical resource for planners inside and outside the Service. "In planning for climate change adaptation," Johnson says, "you have to understand the vulnerability of your resource to climate change impacts."

A "Biological Carbon Sequestration Accomplishments Report 2009-2013" published in May is a compendium of carbon sequestration management and research activities on Refuge System lands and waters. The report (*http://bit.ly/1oTumB4*) illustrates the breadth of Service-supported carbon sequestration activities.

"I think the on-the-ground staff are really key to helping us address climate change over the next several decades," says Johnson.

Whether it's at a coastal refuge where sea-level rise and related storm surges are likely to be issues, or at an inland refuge where water management, invasive species increases and more frequent wildfires are likely to be concerns, refuge staff "will guide us in setting the objectives for climate adaptation," Johnson says. "They're seeing the transitions and the changes that are happening now, and they are in a great position to document those changes and help us determine what management actions should be taken."

Beyond the three new reports cited above, climate change information is available on the Service Web site (*http://www.fws.gov/home/climatechange/*) and the Refuge System site (*http://www.fws.gov/refuges/whm/climateChange.html*).

Tijuana Slough National Wildlife Refuge, south of San Diego, near the U.S.-Mexico border, is highly susceptible to sea-level rise. The refuge is engaged in a collaborative effort to develop a climate adaptation strategy, helping to increase coastal resiliency to rising seas. (Ralph Lee Hopkins with aerial support by LightHawk)

Beyond LEED Certification

What follows are 10 national wildlife refuges where a total of 17 buildings comply with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*:

- Texas Chenier Plain Refuge Complex
- Hagerman Refuge, TX
- Upper Mississippi Refuge, WI
- Mingo Refuge, MO
- Coastal North Carolina Refuges
- Tennessee Refuge
- Great Swamp Refuge, NJ
- Wertheim Refuge, NY
- Audubon Refuge, ND
- San Luis Refuge, CA

The guiding principles, which emanate from Executive Order 13423 signed by President George W. Bush in 2007, were expanded by Executive Order 13514 signed by President Obama in 2009. They are generally more stringent in consumed energy reductions and align better with the Refuge System mission than the popular private sector rating for sustainability: Leadership in Energy and Environmental Design (LEED) certification.

The fact that the federal guiding principles exceed LEED certification requirements in consumed energy reduction has led the Department of the Interior to amend policy to make third-party certifications like LEED optional. The six basic elements of the federal principles are: employ integrated design; optimize energy performance; protect and conserve water; enhance indoor environmental quality; reduce environmental impact of materials; and promote sustainable location and site development.

The list above does not include dozens of U.S. Fish and Wildlife Service buildings that have been remodeled to meet the guiding principles. To learn more about the principles, go to *http://bit.ly/1s8zp4m*

CLIR Tool: A New Level of Energy Analysis

By Bill O'Brian

The U.S. Fish and Wildlife Service has launched a software tool to make it easier for managers, staff and visitors at national wildlife refuges to be more energy efficient.

The CLIR (Climate Leadership in Refuges) tool enables individual refuges to gauge greenhouse gas emissions and comprehensively assess – and over time, reduce – the carbon footprints of facilities, vehicles, workforce and operations. CLIR can help inform refuge visitors of their energy usage, too.

Service Director Dan Ashe approved CLIR in June. It was developed with the Federal Highway Administration. While the tool initially targets about 80 refuges for testing and feedback, it is available on the Service sustainability page (*http://go.usa.gov/XYY5*) for any field station seeking to understand its greenhouse gas emissions and the sources.

"If you understand that, you can start to address where you have inefficient systems in place that you can reduce and address with investments like solar energy and more efficient power sources," says Refuge System visitor services branch chief Kevin Kilcullen, who helped oversee CLIR's development. "I think people sort of know this intuitively, but the tool gives you a level of analysis that no one has had before."

Ward Feurt has tried to stay ahead of the climate change curve in his 18 years as manager at Rachel Carson National Wildlife Refuge in Maine. During his tenure, the refuge has purchased three hybrids and several alternate-fuel vehicles; switched to green fluorescent lighting; installed insulation and double-pane windows.

"What we are trying to achieve is to be less a part of the problem," Feurt says. "I would like to think that the National Wildlife Refuge System has an opportunity to be part of the solution … The CLIR tool is the best thing we have to address what everyone agrees is a worldwide issue."

Tracking energy efficiency requires significant management and administrative effort, Feurt says. CLIR facilitates that effort, provides uniformity, consolidates reports and, importantly, he says, "once data are entered, the information is accessible and doesn't ever need to be reentered again."

The CLIR (Climate Leadership in Refuges) tool is designed to help any U.S. Fish and Wildlife Service field station understand its greenhouse gas emissions and the sources. "It's pretty user friendly," with a lot of guides and instruction prompts, says Allie Pesano, an intern this summer at Rachel Carson National Wildlife Refuge in Maine.

The tool allows a user to calculate how changes in facilities energy consumption (electricity, fuel oil, natural gas, propane), employee vehicle fleet consumption (miles per gallon; gasoline, diesel, biodiesel) and visitor transportation (personal vehicle, group bus, on-refuge tram) would affect a refuge's greenhouse gas emissions.

> *"The CLIR tool is the best thing we have to address what everyone agrees is a worldwide issue."*

Allie Pesano, an intern who worked with Feurt this summer at Rachel Carson Refuge, finds CLIR promising because of its hands-on practicality. "It'll be a lot easier to see trend lines – and know when we need to take extra steps," she says. She also likes that "it's pretty user friendly," with a lot of guides and instruction prompts. "It's not complicated. I'm not too intimidated by it."

For Feurt and Kilcullen, CLIR's visitor component is vital.

In fact, the initial 80 refuges were selected because they took part in the 2010-12 Visitor Survey Information Tool (VISIT) project conducted with the U.S. Geological Survey. That tool produced calculations about how and how far visitors were traveling to, from and within the participating refuges. For those 80 refuges, visitor numbers and preliminary calculations involving emissions associated with visitation are pre-populated in CLIR.

Feurt plans to use CLIR to analyze the collective carbon footprint of Rachel Carson Refuge's 250,000 annual visitors – and he looks forward to helping reduce it.

Kilcullen has similar Refuge System-wide aspirations.

"The only way this is really going to be effective is if we get others to understand what's going on and act as well," he says. "So the bottom line is: It's all about behavior change for both ourselves and for others."

Sanderlings and ruddy turnstones at Maryland's Blackwater National Wildlife Refuge, where a $5 million project supported by The Conservation Fund will seek to increase salt marsh acreage and enhance resiliency as part of the Obama administration's climate action plan. (Bill Buchanan/USFWS)

Interior Secretary Announces Storm-Resiliency Grants

As part of the Obama administration's commitment in its climate action plan to make local communities more resilient against future storms, Secretary of the Interior Sally Jewell in June announced $102.7 million in competitive matching grants to support 54 projects along the Atlantic Coast.

The grants will fund science-based solutions to restore wetlands and other natural areas, better manage stormwater using green infrastructure and assist states, tribes and local communities in protecting themselves from major storms such as Hurricane Sandy, which devastated much of the East Coast in 2012.

Four of the projects directly benefit national wildlife refuges, and many others at least indirectly affect refuges.

"We are taking the lessons learned from this natural disaster to help local communities strengthen natural barriers between themselves and major storms such as Sandy that can cause major flooding and other damage," Jewell said. "Together with our partners, we are stabilizing beaches, restoring wetlands and improving the hydrology of coastal areas, both protecting local residents from the next big storm while creating jobs and restoring habitat for wildlife."

The National Fish and Wildlife Foundation (NFWF), which administers the grant program, helped guide the process that led to Interior's selection of the 54 projects out of 375 proposals submitted after Jewell announced the availability of the grants last fall.

DOI's commitment of $100 million was matched with $2.7 million in funding from the U.S. attorney general offices in New Jersey and Delaware, as well as donations from Bank of America and Wells Fargo. The $102.7 million grant commitment was further leveraged by $72 million in grantee partner match, making the entire conservation impact of the grant program more than $175 million.

The projects will restore an estimated 6,634 acres of wetlands and marshes, 225 acres of beach, 364 acres of riparian buffers, and 16 miles of streams. The efforts will also open 287 miles of streams to fish passage and restore 147 acres of flood plain.

The grants "address current challenges, but at the same time, they lay the groundwork for addressing community needs and advancing long-term conservation of critical habitat and species," said NFWF CEO Jeff Trandahl. "These grants leverage the initial investment from the Department of the Interior with millions of dollars of additional funding and in-kind contributions, leading to a much greater conservation impact."

The projects with direct refuge involvement are:

- an $8.5 million Back Bay Restoration Foundation-supported project to enhance more than 5,700 acres of wetland and forest at and near Back Bay Refuge, VA.
- a $5 million The Conservation Fund-supported project to increase salt marsh acreage and enhance resiliency for Blackwater Refuge, MD.
- a $3.7 million Rhode Island Coastal Resources Management Council-supported project to reuse dredged materials to enhance Ninigret Refuge.
- a $427,000 University of Delaware-supported project to create a three-dimensional wetland model for Bombay Hook Refuge.

A list of the projects announced under the competitive grant program is at *http://go.usa.gov/95c3*

From the Director – *continued from page 2*

As temperatures rise and storms become more powerful, permafrost is thawing and eroding along Kotzebue Sound near Selawk National Wildlife Refuge in western Alaska. (ShoreZone)

of fish, wildlife and plants, and their habitats. Guided by the President's Climate Action Plan and the National Fish, Wildlife and Plants Climate Adaptation Strategy, we are leading efforts to protect natural resources.

What happens in the next few decades will have profound implications for society.

The scale and intensity of climate change impacts pose an enormous challenge.

But there is hope, and we are making progress. Here are a few examples:

- At Neal Smith National Wildlife Refuge in Iowa, the Service and partners are finding that restoring diverse, native tall-grass prairie vegetation helps protect the soil year-round, slowing overland flow of water. It also helps recharge groundwater and provide important habitat.
- By planting trees at refuges in the Red River and Lower Mississippi River valleys of Louisiana, the Service and partners are reducing greenhouse gases in the atmosphere and restoring habitat that feeds and shelters songbirds and other wildlife. Similarly, refuges in Texas, Hawaii and Kansas are planting trees to restore habitat and reduce greenhouse gases.
- Refuge managers in North Carolina and Virginia are helping to restore the natural hydrology of peatland ecosystems, which reduces fire potential and cuts carbon emissions.
- In California, refuge staff, Coastal Program staff and partners have been working to raise the elevation of former salt marsh areas around Humboldt Bay that have experienced significant subsidence. This project has helped offset the loss of approximately 95 percent of historic salt marsh around the bay, and builds resiliency to climate change and sea-level rise by providing areas for salt marshes to migrate to behind dikes.
- Biologists and university researchers have been monitoring the ecological impacts of climate change, such as the rising treeline in the mountains and American marten colonization of the lowlands, at Kenai Refuge in Alaska for decades.
- The Refuge System has worked to reduce its carbon footprint by purchasing hybrid vehicles, constructing low-energy "green" visitor center/headquarters buildings and installing renewable wind and photovoltaic systems.

What happens in the next few decades will have profound implications for society. How we choose to respond here and now – or whether we respond at all – will determine the kind of world in which we and our families live for the foreseeable future, as well as the kind of world we leave to future generations. Everyone has a stake in the outcome of those efforts – and we must succeed.

"We Are Articulating the Change We See"

By Karen Leggett

"The king of the swamp has survived here for centuries. As old as the dinosaur, the American alligator has learned to adapt." The narrative in a video at the Coastal North Carolina National Wildlife Refuges Gateway Visitor Center focuses on change as a constant. The alligator "saw the rise of sea level 12,000 years ago when ice age glaciers began to melt …"

The subtle video never uses the term "climate change." It refers instead to a future with "shifts and transformations that we are just beginning to understand … Careful stewardship of our lands, our wildlife and our lifestyles help us adapt, like the alligator."

"The only constant is change, and we have to adapt, and wildlife has to adapt," explains Bonnie Strawser, vistor services manager at the center, which serves Alligator River and Pea Island National Wildlife Refuges, nine other eastern North Carolina/Virginia refuges and one national fish hatchery.

"Our message is not fear," says refuge manager Mike Bryant. "We are articulating the change we see. If the sea level rises a foot, we can show what will be underwater. We can't say when it's going to rise one foot or four feet."

The communication goal, Bryant says, is for people to walk away "understanding that change is the norm and our management will respond to that change. We are going to adapt, mitigate and build in resiliency in the areas where we are stewards."

Climate change communication is a balancing act in a state where political and business leaders fear the impact of rising sea levels on coastal tourism and local economies.

"The only question we consistently get from the public," says Strawser, "is, 'Do you believe in climate change?' " Her response? "Climate change is not a belief system; it is a matter of recognizing that things are changing in the environment. We are trying to manage some things to help plant and wildlife communities adapt to changes that we have documented. It's not a faith-based concept."

Summer campers visit stations at Pea Island National Wildlife Refuge in North Carolina to learn about the potential impact of climate change on different birds. (USFWS)

"We focus on the solution side," says Bryant. "We can't hold back the sea, but we can manage our land to make it more resilient to this change." He is concerned that regular beach nourishment and bulkhead filling might manage beaches as static features for tourists without adapting the habitats for wildlife or acknowledging a changing future.

Refuge staff members communicate about climate change in various ways.

Biologist Dennis Stewart regularly takes this message to university students. Visitor services specialist Cindy Heffley is a NOAA-certified climate steward educator (*http://go.usa.gov/5qe9*). The one-year, no-cost, mostly-online training program she completed has been valuable for staying current with available resources and for finding ideas refuges can replicate.

Heffley has added climate change information to talks that volunteers and staff give during regular activities, such as canoe tours. She has modified a page of the Service coloring book "Changing Climate, Greening Energy: An Eagle's Eye View" to include the Scuppernong River and other local features. She and other staff use kids' questions as starting points for climate change discussions. If children ask why so many trees are dead along a shoreline, staff members talk about the rising sea pushing more saltwater into fresh water systems.

Whenever and however the information is delivered, the closing theme is usually a call to action.

"Dynamic management of our wildlife resources helps a host of species survive today's changes and those yet to come," the visitor center video concludes. "You can help … Become a volunteer at your local national wildlife refuge. Help shape our tomorrow today."

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

R/V Tiglax: Shipshape for Another Four Years

In 2013, the research vessel Tiglax *traveled 16,500 miles and hosted 160 scientists in support of conservation at far-flung Alaska Maritime National Wildlife Refuge. Early in 2014, right, the vessel underwent major, once-every-four-years dry dock maintenance in Seattle. (USFWS)*

By Billy Pepper

Each summer, the research vessel *Tiglax* supports projects at Alaska Maritime National Wildlife Refuge, which extends more than 1,500 nautical miles from Homer, her home port. It can take seven full days and nights of steaming at 10 knots from Homer to reach the western limits of the refuge in the Aleutian Islands.

Tiglax (pronounced TEK-la) was built in 1986 specifically for the refuge. The 120-foot, 415 gross-ton, ocean-going vessel owned and operated by the U.S. Fish and Wildlife Service cost $3.4 million, though purchasing a similar vessel today would be far more expensive. Like all equipment, the ship has to be maintained. Daily and seasonal maintenance is done at sea or dockside. But every four years, *Tiglax* must visit a shipyard to get hauled out of the water for major maintenance. Generally she is put in a dry dock and the hull is cleaned and painted while various components are inspected and refit. The shafts, propellers and rudders are removed and sent out for detailed analysis for what repairs may be needed, along with maintenance of the cathodic protection system, which protects the hull from electrolysis.

This year, the ship set sail from Homer on Feb. 16 and arrived more than 2,000 nautical miles later at Lake Union Dry Dock in Seattle on Feb. 23 to begin more than $800,000 in major maintenance.

The work consisted of 21 line items, including a waste water system upgrade, repair to the damaged bulbous bow; replacement of the knuckle boom of the forward crane; a new boiler system; and complete painting from mast to keel to protect *Tiglax* from the harsh environment of the Bering Sea. All this and more was completed in just over six weeks. It was an intense time for crew and subcontractors; at the project's peak, 20-plus skilled shipwrights worked alongside the ship's crew on the vessel.

The project took much planning, and support came from throughout the Service.

The ship's captain and engineer decided which tasks would make up the 21 items. Many in the Service scrimped and scrounged to find project money, which is beyond the normal equipment maintenance funding process. The contracting division wrote and oversaw the contract while accommodating multiple adjustments as new repair needs were identified. *Tiglax*'s crew was integral. Refuge administrative staff provided travel, timekeeping and troubleshooting support, all from long-distance.

It was a team effort, and although folks at the regional and national levels may not get the opportunity to see the results of their hard work firsthand, they should know their support is vital to *Tiglax*'s conservation mission.

Tiglax is manned by a crew of six professional mariners, with capacity for 14 more passengers conducting work aboard the ship and at land-based sites en route. An average field season begins in late April and is completed by late September.

The final numbers are not in for 2014, but in 2013 *Tiglax* traveled 16,500 miles and hosted 160 scientists and staff. While the ship supports a variety of cooperative science work, much of the refuge work relates to either invasive species eradication or to long-term monitoring of the globally significant seabird nesting colonies. With more than 40 million nesting seabirds, the refuge plays a critical role in global seabird conservation and in understanding the role of climate change and other stressors in marine ecosystems.

Everyone in the Service should feel a deep sense of satisfaction knowing *Tiglax* will spend the next four years safely conducting projects for Alaska Maritime Refuge in shipshape condition.

Billy Pepper is captain of the research vessel Tiglax.

Passion and Innovation at Cape Romain Refuge

By Nicole Rankin and Jared Chrisp

South Carolina's Cape Romain National Wildlife Refuge has been involved in efforts to recover the endangered red wolf for almost 40 years. A litter of pups born in April has reinvigorated the refuge's breeding effort and brought a touch of off-the-cuff innovation to it.

The red wolf is a critically endangered mammal that historically thrived in the eastern and south-central United States. As a result of predator-control programs and habitat loss or alteration, red wolf populations declined drastically in the 1900s, which led to endangered species listing. Today, approximately 100 red wolves roam their native habitats in northeastern North Carolina, and nationally more than 200 red wolves are in captive breeding facilities.

Cape Romain Refuge, one of more than 40 captive breeding facilities participating in the Red Wolf Species Survival Plan, has been a part of recovery efforts since 1976. Bulls Island on the refuge was the first island-propagation site in 1987. Twenty-six pups were born on the island through 2005, when efforts ended there for fiscal and logistical reasons. Today, the refuge has a captive breeding enclosure on the mainland at the Sewee Visitor and Environmental Education Center (SVEEC).

In April, a captive breeding female gave birth to six pups, four of which survived. Two pups were relocated into a wild den at North Carolina's Alligator River National Wildlife Refuge. They are being fostered by free-ranging wolves to allow genetically viable captive-born pups to integrate with the wild population. The two other pups – named Jewell and Colbert, after the Interior Secretary and late-night comedian Stephen Colbert, respectively – are being raised by their parents at Cape Romain Refuge, with care from staff and volunteers.

Volunteer Rob Johnson has been particularly instrumental in that effort, the first successful litter of red wolf pups at the SVEEC.

This red wolf pup, named Jewell for Secretary of the Interior Sally Jewell, is 10 weeks old in this photo. She was among a litter born on April 8, 2014, at the Sewee Visitor and Environmental Education Center, adjacent to Cape Romain National Wildlife Refuge in South Carolina. The refuge is one of more than 40 captive breeding facilities participating in the Red Wolf Species Survival Plan. (Karen Soltis)

Johnson, a retired special education teacher who has spent much of his life helping at-risk children and coaching Special Olympics swimmers, has been Cape Romain Refuge's wolf caretaker since 2010.

Last year, Johnson, whose nickname is "Wolfman," worked closely with the captive pair that produced April's litter. He worked with staff to ensure the male and female acclimated, received enrichment and felt safe in their captive environment. He ensured the wolves were given high-quality dog food, a variety of oils and meat supplements, including deer carcasses. He continues to do so, and he educates the public by conducting red wolf discussions and feedings twice per week.

"Having an individual as invested as Rob in the husbandry of the wolves has been paramount to the success we have seen this year," says refuge manager Sarah Dawsey. "We are very fortunate to have Rob as our wolf caretaker."

As part of that care, the pups received vaccinations four times and deworming six times from birth to 16 weeks of age. That entailed catching the pups so a veterinarian could administer the vaccines. It became difficult because the pups hid in the underground den their mother had dug.

"Because the den is very elaborate and has tunnels in multiple directions, the pups can hide very well," Johnson says. "We typically try to crawl in or dig out part of the den in order to locate the pups for vaccinations."

So refuge staff came up with an innovative way to find them. Using a GoPro camera and a headlamp attached to a fabricated pole, a Wi-Fi connection, and an iPhone, we were able to pinpoint the location of one pup in den and eventually find the other. We plan to use this technology to locate the pups over the next year.

Nicole Rankin is a coastal ecologist based at Cape Romain National Wildlife Refuge, SC, where Jared Chrisp was an intern this summer.

Around the Refuge System

Alaska

St. George Island, part of Alaska Maritime National Wildlife Refuge, is home to 2 million nesting seabirds. It is also one of the world's few populated islands where house mice have not become established. So when workers found mice inside an incoming shipping container earlier this year, the St. George city government, the island's Traditional Council and the refuge acted quickly. The city helped devise a plan to remove the mice, a council crew immediately set traps and refuge invasive species biologist Steve Ebbert and refuge biological technician Greg Thomson flew to St. George promptly, thanks to National Fish and Wildlife Foundation financial help. More than 50 mice were trapped; none had spread outside the original container. "We got really lucky here" said refuge biologist Marc Romano. "If mice had established themselves on St. George, they could have threatened the wildlife and gotten into the village." Mice can kill wild bird eggs and chicks, alter native vegetation and threaten a native lemming species found only on St. George Island. The refuge encompasses roughly 20 percent of the island, and its residents have a long history of helping to keep invasive rodents off St. George.

Oregon

Nestucca Bay National Wildlife Refuge and The Nature Conservancy hosted a partners gathering in July to celebrate two important land acquisitions that conserve a spectacular peninsula now considered the crown jewel of the refuge. The acquisitions of a 102.5-acre former Jesuit retreat property and the 90.1-acre Harder Tract closed last year. They were made possible with support from TNC, Federal Highway Administration, Oregon Department of Transportation, Land and Water Conservation Fund and others. "I'm nearly speechless that this stunning piece of coastal landscape will be protected in perpetuity for the public as part of the National Wildlife Refuge System," Oregon Coast Refuge Complex project leader Roy W. Lowe said at the time of the closing. The property, at the confluence of the Nestucca and Little Nestucca rivers, is now called the Two Rivers Peninsula Unit. Migratory songbirds, bald eagles, peregrine falcons, bobcats, black-tailed deer and estuarine fish use the area.

Florida

The Florida Fish and Wildlife Conservation Commission estimated that there are 100 to 180 Florida panthers in the wild in the state, including the documented birth of 21 kittens last year. The estimate is a sign of successful conservation over the past 30 years, says Southwest Florida Gulf Coast Refuge Complex project leader Kevin Godsea, but "there is still a long way to go before we reach recovery status. The recovery criteria are three sub-populations of 240 animals each. To get to that point, panthers will need to expand throughout their historic range of the southeastern United States." Godsea says the estimate is also one of many indicators that "South Florida is reaching the saturation point" of available panther habitat. The estimate comes as Florida Panther National Wildlife Refuge, the U.S. Fish and Wildlife South Florida Ecological Services Office, the state commission and others are looking into how to improve methods of counting panthers and to work with ranchers who are being impacted by increase in population. Florida panthers once ranged throughout most of the Southeast, but the species was eliminated over much of its historical range by the late 1800s by human persecution and habitat destruction. By 1995, only 20-30 panthers remained in the wild.

The wood stork was downlisted from endangered to threatened this summer. Here an adult tends to a chick at Harris Neck National Wildlife Refuge in Georgia. (Mary Ellen Urbanski)

Iowa-Nebraska

Many of us complain about workstation fatigue. Tom Cox, manager at DeSoto and Boyer Chute National Wildlife Refuges, has done something about it. He instituted Computerless Thursday a year ago. On the last Thursday of each month, he expects all employees to ditch the keyboard and get out onto the refuges' floodplain habitat straddling the Missouri River. "You can come in and for the first 10 minutes you can check your e-mail and make sure you don't have something urgent, and do the same thing at the end of the day," he has told staff. "But I expect your computer to be off and you to be out in the field, or in the [Steamboat *Bertrand*] museum, or in the visitor center, but to actually be hands-on with visitors or working with the habitat or doing something other than being behind the computer." The idea came to Cox after hearing repeated concern

Nestucca Bay National Wildlife Refuge celebrated two important land acquisitions that comprise this peninsula, which is now considered the crown jewel of the coastal Oregon refuge. (Copyright Bergman Photography)

about nature deficit disorder among kids. "We talk about our youth disconnecting from the natural world. And yet our job increasingly forces us behind a computer. I think we, as an agency – employees who have yearned to have our feet muddy and our hands on the furry critters and the feathers – we learn to accept the norm that that isn't going to happen every day. And we start to lose our own connection with the natural world. So, given the increasing time that we to spend indoors, I decided to give my staff the excuse to shut their computers off." There was grumbling at first, Cox says, but now employees are pretty much used to Computerless Thursday – and even thankful for it.

Georgia

Interior Secretary Sally Jewell announced this summer that the U.S. Fish and Wildlife Service is downlisting the wood stork from endangered to threatened under the Endangered Species Act, reflecting a highly successful conservation and recovery effort spanning three decades. Jewell made the announcement at Harris Neck National Wildlife Refuge, home to the state's largest wood stork rookery. When wood storks were listed as endangered in 1984, their population was dropping a precipitous 5 percent a year. Since then, the U.S. breeding population has shown substantial improvement in the numbers of nesting pairs as a whole and an expansion of its breeding range. Since 2004, the three-year averages (2003 to 2012) for nesting pairs ranged from 7,086 to 10,147, all above the 6,000 three-year average identified in the 1997 recovery plan as the threshold to consider reclassifying the species to threatened status. However, the five-year average of 10,000 nesting pairs, identified in the current recovery plan as the threshold for delisting, has not yet been reached.

Wyoming

Montana State University graduate student Jenny Edwards led a study of aspen trees at National Elk Refuge this summer. Parts of the refuge are dotted with aspen, but little research has documented the health and vibrancy of the stands. Aspen have been declining throughout the West for decades, causing concern among wildlife managers because aspen are important to wildlife for cover, nesting, thermal protection and food. Edwards worked with U.S. Fish and Wildlife Service biologists to collect baseline data by documenting aspen age classes and calculating the amount of browsing by ungulates like elk, deer and moose. "The measurements I take and observations I note tell a story of browsing," Edwards said. "You can learn how an area has been used by wildlife." The information Edwards collected will identify trends and help track changes in the landscape and its use. Her study will be combined with GPS collar data to determine what levels of elk activity have led to current aspen conditions. The information will also help predict how aspen stands may be affected if elk patterns change because of shifts in refuge management activities.

Canada and Texas

A record 82 whooping crane nests were counted in a survey at and near Wood Buffalo National Park in Canada this spring. That is an increase from 74 last year. The cranes make up the last wild population of endangered whooping cranes in North America. They breed at the park, which is in northeastern Alberta and southern Northwest Territories, and they winter 2,500 miles to the south at Aransas National Wildlife Refuge on the Gulf coast in Texas. The 2013-2014 winter survey estimated that 304 individual whooping cranes wintered at or near Aransas Refuge, also a record. All whooping cranes alive today, both wild and captive, are descendants of the last 15 remaining cranes found wintering at Aransas Refuge in 1941.

Malheur Refuge Targets Invasive Common Carp — *continued from page 1*

The refuge and partners are exploring the development of food processing markets for commercial fishing to become a viable part of comprehensive carp control.

Malheur Refuge, a series of wetlands in southeastern Oregon's Harney Basin, has been designated a Globally Important Bird Area by the Audubon Society as a stopover for migrating birds, including hundreds of thousands of waterfowl and tens of thousands of migrating shorebirds. But, as 5 million to 10 million carp have decimated its wetlands, the refuge has seen a sharp decline in bird populations. Breeding waterfowl around Malheur Lake have dropped to 10 percent of historic numbers.

There is no record of how carp were introduced at Malheur Refuge, but they were firmly established by the 1950s. These bottom feeders strip Malheur Lake and other waterways of bird food, and stir up mud and debris, blocking sunlight for new plant growth. Over the decades, carp have altered the wetland ecology so much that native fish and wildlife are struggling to survive.

Carp control will be multi-pronged and aimed at every stage in the carp's life cycle.

Malheur Lake averages 35,000 surface acres but can fluctuate from over 100,000 acres to bone dry, depending on precipitation. Other refuge lands and privately owned agricultural lands provide critical wetland habitat through traditional springtime flood irrigation.

During wet periods, wetlands and water bodies can interconnect, so restoring refuge habitat will require addressing carp across the basin. "Nothing on this scale and complexity with common carp has ever been done before," says Malheur Refuge manager Chad Karges.

As an initial step in a common carp control effort, Malheur National Wildlife Refuge and partners hired a contractor to test commercial fishing on shallow Malheur Lake in southeastern Oregon. With two boats, fishermen hauled out 54,600 pounds of carp, an invasive fish. (USFWS)

The refuge, conservation community, private landowners and other agencies have formed the Harney Basin Wetlands Initiative to reduce carp populations and protect traditional flood irrigation that provides migrating bird habitat.

Carp control will be multi-pronged and aimed at every stage in the carp's life cycle, says Malheur Refuge fish biologist Linda Beck. The refuge is researching control methods, carp numbers and movement, bird populations and other baseline conditions.

Research includes:

- Using surgically implanted telemetry tags to study carp movement and aggregation areas.
- Blocking access to shallow vegetated areas where carp spawn. Fish screen improvements completed in 2013 in one refuge unit have led to a visible vegetation increase.
- The U.S. Fish and Wildlife Service Abernathy Fish Technology Center in Washington state is researching using electrical currents to kill carp eggs.

Carp control won't be easy. Upfront costs for research alone are $3 million to $4 million, much of which will come from private fundraising by partners. "It's going to cost a lot, and it's going to take many years," Bruce Taylor of Defenders of Wildlife and Intermountain West Joint Venture says. "That said, I don't think there's any other place in Oregon where we have such potential for ecological improvement at any lower cost."

For migratory birds facing shrinking habitat across the continent, the stakes are high, says Karges. "The Harney Basin is like Denver International Airport, with a high volume of birds coming all the way from Mexico, California and New Mexico, headed as far as Montana, the Dakotas, Canada and Alaska. The Harney Basin is a critical link in the few wetlands left for spring migrating birds in the western U.S."

Kendal Slee is an Upstate New York–based freelance writer.

Service Launches SoCal Project, 6 More Urban Refuge Partnerships — *continued from page 1*

San Diego National Wildlife Refuge Complex ranger Debby Good leads hikers at San Diego National Wildlife Refuge. The complex will be a driving force in the Southern California (SoCal) Urban Wildlife Refuge Project. (Lisa Cox/USFWS)

The SoCal Project, serving a culturally diverse metropolitan area of more than 17 million people, combines the efforts of five refuges and numerous public and private partners. The five national wildlife refuges in the SoCal Project are: San Diego, San Diego Bay, Tijuana Slough, Seal Beach and Hopper Mountain.

The goal under the SoCal plan is to help new and diverse audiences in the area understand that conserving wildlife and natural habitats – whether in their neighborhood parks or at refuges – is essential to sustaining healthy communities.

Five Star and Urban Waters Program

The contributions by NFWF and partners for the six new urban refuge partnerships were made possible through the Five Star and Urban Waters Program. This year, that program received major support from the Environmental Protection Agency, the U.S. Forest Service, FedEx, Southern Company, PG&E, Alcoa, Bank of America, the Service's Urban Refuges Program and others. The new partnerships bring the total number of Service urban wildlife refuge partnerships to 14.

The six new partnerships are in Denver; Philadelphia; New Orleans; Santa Barbara, CA; Pharr/San Juan/Alamo, TX; and Yonkers, NY.

The six new partnerships are in Denver; Philadelphia; New Orleans; Santa Barbara, CA; Pharr/San Juan/Alamo, TX; and Yonkers, NY.

The first eight partnerships announced in September 2013 are in Chicago; Los Angeles; Houston; Seattle; Baltimore; Albuquerque; Providence, RI; and New Haven, CT.

The urban wildlife refuge partnerships and the SoCal Project are responses to *Conserving the Future* Recommendation 13, which calls for the creation of an urban refuge initiative that defines excellence in existing urban refuges and establishes the framework for creating new urban refuge partnerships across the nation. More information is at *http://go.usa.gov/Xz5Y*

Chief's Corner — *continued from page 2*

deer hunters who want to find a closer connection to the land do. It is a wet place. Most people don't like exploring wet places. I am still trying to understand why that quiet, wet world mesmerizes me. I rode a bulldozer through her during a wildfire, following a stupid and arrogant order that illustrates why we must study and be trained in wilderness stewardship. I hope the scars on the land are not still there, but I know better.

The Arctic Wilderness is the defining place in my professional life. Not just the Mollie Beattie Wilderness, but the entire Arctic Refuge and the lands that surround her. I worked hard to protect it as wilderness, I paid a price for those efforts, and I realize that tomorrow's conservationists will determine whether any of it matters. They will determine whether the opportunity to explore the world that formed us continues to exist.

Our species isn't far removed from the forces that shaped us. The wild places of our planet that help us to feel small are important to our survival. They make us feel alive in the same way we did in our early evolution. They remind us we are not in control. They evoke humility. They kindle in us what we were at the beginning. They are more than pretty, so much more than fun. They are our primeval past and our evolutionary destiny. A hawk owl on the Firth River told me that one day a long time ago. There is nothing we do that is more important than our stewardship of wilderness. Some of you will be around to celebrate the 100th anniversary of the Wilderness Act. I wonder what you will write.

RefugeUpdate

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A Look Back . . . Jim Gritman

"If we could start restoring wetlands rather than draining them, then I could say we were making headway." Making headway with what would become the Partners for Fish and Wildlife program was a highlight of Jim Gritman's U.S. Fish and Wildlife Service career.

Born in Geneseo, IL, in 1932, Gritman grew up loving to hunt and fish with his dad and uncles – and later with his grandson. He graduated from the University of Missouri with a forestry degree after serving with the Marine Corps during the Korean War.

Gritman first worked for the Service at Necedah National Wildlife Refuge in Wisconsin in 1964. There he developed forest management plans and mapped the islands of Upper Mississippi River National Wildlife and Fish Refuge. At that point, he thought that if he could be the manager at Upper Mississippi Refuge, it would be the best job he could ever have.

But the Service had other plans for Gritman. He moved to Washington, DC, to run the Refuge System's forestry program and then returned to the Midwest as area manager in Bismarck, ND – a position he said he particularly liked because he was "closer to the resources, and closer to the problems." One of the recurring problems of his career was persuading his three daughters to move, often during critical adolescent years. The move to Bismarck came with the promise of horses.

In Bismarck, Gritman wrote the first plans to restore drained wetlands, but he would have several other positions in regional offices and headquarters before he could begin implementing those plans on a larger scale as Midwest Region director, a position he held from 1987 until his 1992 retirement.

Gritman began working with farmers who had signed up for the Agriculture Department's Conservation Reserve Program, which provided a yearly rental payment for planting grass on grain fields to reduce erosion. His team initiated the concept of putting water back on drained wetlands instead of just planting grass to benefit waterfowl. "It was very difficult to get it going. But once it started, it went like gangbusters."

Jim Gritman (1932-2013) was always looking for the big walleye in Andrusia Lake near his home in Bemidji, MN. (Courtesy of Gritman family)

Indeed, Partners for Fish and Wildlife has now worked with more than 44,000 private landowners and 3,000 partner organizations to restore more than a million acres of wetlands. One of those wetlands – the Mud Lake Waterfowl Production Area in Fergus Falls Wetland Management District, MN – is soon to be renamed in Jim Gritman's honor.

Follow the National Wildlife Refuge System on Facebook at *www.facebook.com/usfwsrefuges* and Twitter@USFWSRefuges.

Send Us Your Comments

Letters to the Editor or suggestions about *Refuge Update* can be e-mailed to RefugeUpdate@fws or mailed to *Refuge Update*, U.S. Fish and Wildlife Service, Mail stop: NWRS, 5275 Leesburg Pike, Falls Church, VA 22041-3803