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5-2010

Refuge Update – May/June 2010, Volume 7, Number 3

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"Refuge Update – May/June 2010, Volume 7, Number 3" (2010). *RefugeUpdate (USFWS-NWRS)*. 40.
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RefugeUpdate

National Wildlife Refuge System

www.fws.gov/refuges



INSIDE: Palmyra Atoll is part of the marine national monuments of the Pacific, which are like no place else in the National Wildlife Refuge System. See Focus section. (Kydd Pollock/The Nature Conservancy)

Looting's Costly Aftermath

By Susan Morse

A court award is only as good as your ability to spend it. That's what Cypress Creek National Wildlife Refuge, IL, is learning after a federal court in Illinois awarded it \$150,000 to mitigate archaeological losses and repair a looted site. The looter ripped more than 13,000 ancient artifacts from the ground before he was caught in 2007.

In January, the court found the man guilty of violating the Archaeological Resources Protection Act (ARPA), which makes it a felony to disturb, damage or remove historic material from public lands. The court ordered him to pay the damages and serve 30 days in jail. But he claims no income, and few experts think the southern Illinois refuge will ever collect the \$150,000.

Sadly, that's typical in such cases, says Carla Burnside, an archaeologist at Malheur National Wildlife Refuge, OR. Her investigation several years ago into thefts from federal lands out west helped break up a major archaeological looting ring. In Operation Indian Rocks, cleanup costs and damage assessments just at Desert National Wildlife Refuge, NV, and other looted refuge sites totaled about \$176,000, Burnside recalls. Court-ordered payments never materialized.

"The guys who got convicted weren't working," she says. "There was no way to recoup money from them. All my time and travel was paid by regional office law enforcement."

Tulare Basin Is Latest Addition

The National Wildlife Refuge System grew by one this spring with the acquisition of conservation easements on 777 acres to create the Tulare Basin Wildlife Management Area in central California.

On March 21, perpetual conservation easements were bought on two tracts of wetland habitat to create the new wildlife management area, which will be administered as part of the Kern National Wildlife Refuge in the southern San Joaquin Valley.

The U.S. Fish and Wildlife Service approved the creation of Tulare Basin Wildlife Management Area in 2007. Plans call for eventual protection of 22,000 acres between Kern and Pixley National Wildlife Refuges. Ninety percent of the land in the wildlife management area will be conserved through the purchase of easements from willing landowners.



President Obama, April 16, at the White House Conference on America's Great Outdoors. Looking on, from left, are EPA Administrator Lisa Jackson, Council on Environmental Quality Chair Nancy Sutley, Interior Secretary Ken Salazar and Agriculture Secretary Tom Vilsack. (Tami A. Heilemann/DOI)

Chief's Corner

The White House Is Listening



Greg Siekaniec

Could this be the next chapter in wildlife, land and water conservation history in America?

The White House Conference on America's Great Outdoors, held

April 16, ignited hope in those of us who have been waiting for years for an administration to be this interested in the Refuge System and conservation across the landscape.

I was in the audience at the Department of the Interior when President Obama talked of Theodore Roosevelt's conservation legacy, saying, "From [Roosevelt's] commitment sprang an

effort to save the great redwoods of California and the petrified forest of Arizona, the great bird rocks of the Aleutian Islands and the Tongass of Alaska. From that commitment sprang a breathtaking legacy of conservation that still enhances our lives . . . and, no matter how long I have the privilege of serving as President, I know I can never match it. But I do intend to enrich that legacy, and I feel an abiding bond with the land that is the United States of America."

The president spoke about the pursuit and partnership of conservation outside of Washington – by state and local governments, by tribes and by private groups – "so we can write a new chapter in the protection of rivers, wildlife habitats, historic sites and the great landscapes of our country." He promised

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Gulf of Mexico Oil Spill

As hundreds of U.S. Fish and Wildlife Service staff work furiously in the wake of the oil spill threatening wildlife and habitat at national wildlife refuges and other sensitive environments along the Gulf of Mexico, Americans are wondering what they can do. To report oiled shoreline, call 866-448-5816. To report oiled wildlife, call 866-557-1401. To submit a claim for damages, citizens should call 800-440-0858. For updated information, go to <http://www.fws.gov/home/dhoilspill/index.html>.

RefugeUpdate

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This newsletter is
published on recycled
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The four marine national monuments are among the Refuge System's most distinctive components. As such, they present special challenges, rare opportunities and unparalleled beauty. Pages 8 to 17

Can You Hear Me Now?

Looking for a low-cost way to connect with visitors? Try a cellphone tour. It's easy to set up. Page 23

Sandy Point: “A Maternity Ward for Sea Turtles”

By Bill O'Brian

No refuge is an island, even when it's on an island. Michael Evans, refuge manager at Sandy Point National Wildlife Refuge on St. Croix in the Virgin Islands, knows that well.

With the help of the West Indies Marine Animal Research and Conservation Service, the Virgin Islands territorial government, Earthwatch, the National Park Service, The Nature Conservancy, local volunteers and a cooperative public, Evans oversees the Refuge System's most important nesting site for endangered leatherback sea turtles. In 2009, a record year, 202 individual females made more than 1,100 nesting activities that produced at least 37,000 hatchling turtles at Sandy Point Refuge.

To attain that result on St. Croix, an 82-square-mile tropical island that is home to about 50,000 people, Evans, refuge biologist Claudia Lombard, their partners and predecessors have employed a multi-faceted, multi-year approach.

They have conducted overnight beach patrols for decades. Annually, from April through mid-July, teams of staffers and volunteers patrol from 8 p.m. to 5 a.m. They monitor and tag each nesting turtle with a passive inductive transponder (microchip) implanted as permanent ID. This permits researchers to track females as they lay nests at Sandy Point and elsewhere in the Caribbean. “It enables us to put hard numbers behind management practices,” Evans says. To avoid washout before incubation and increase the hatchling yield, the teams also relocate roughly one-third of nests from erosion zones to stable beach areas.

They close the refuge's beach 24/7 for four months annually – usually from late April through August. Even though Sandy Point has one of the most spectacular beaches on St. Croix, residents and tourists alike support the closure, Evans says, because they realize that “we're not doing it to say ‘no’ to people; we're doing it to say ‘yes’ to turtles.”

They involve the community. At the height of the leatherback nesting season



A leatherback sea turtle returns to the Caribbean after attending to her nest on Sandy Point National Wildlife Refuge on St. Croix in the Virgin Islands. (Claudia Lombard/USFWS)

in late spring, they lead nocturnal turtle watches that are open to the public. Year-round, they publicize human-caused hazards that turtles face, including people disturbing nests; horses trampling nests; adult turtles and hatchlings being injured or pulverized by boat propellers (especially during breeding season); and poaching, which is not a problem on federal land but is an issue off the refuge.

They help hatchlings. The leatherback incubation period is 60 days under sand, and each nest typically produces 60 to 70 hatchlings. After gestation, hatchlings instinctively leave the nest at night, head for the lightest horizon to find the water line and then swim in a frenzy to open sea. During this phase, they often become disoriented and move toward artificial onshore light, and, the next morning, when they should be miles out in the ocean, they are just offshore, exhausted and vulnerable to predatory fish. To counter this and increase viability, staff members sometimes manually disperse the hatchlings along a wide expanse of beach.

“The whole goal of our management is to end up with as many hatchlings as possible,” says Evans.

Older Than Dinosaurs

The species is at least 50 million years old. “Leatherbacks were leatherbacks before dinosaurs became extinct,” says Evans. They are the largest, deepest diving and most migratory of sea turtles. An adult is four to eight feet long and can weigh 500 to 2,000 pounds. Adult males never leave the water and stage offshore near nesting sites to copulate (randomly) with females. An average female lays five nests per season.

“Nesting beaches are maternity wards for sea turtles. We know a lot about this one aspect of their biology, but we have no idea about what happens out in the water,” says Evans, who has been involved with the 30-year-old program for almost two-thirds of its existence.

Evans is proud that Sandy Point Refuge has been so successful with relatively little funding and just a two-person staff. “It's a very lean operation, and it doesn't need to be much more than a lean operation. I think that's pretty neat,” he says.

And, to this day, the enormous turtles remain surreal to him: “I've been watching leatherbacks for 17 years, and I still get excited each time I see one.” 🐢

After Rehab, Vessel Starts Over in Alaska

By Mike Boylan

Here's what we know about the *Caroline*, the latest addition to the Refuge System's fleet of vessels in Alaska: It was built in 1979. It spent much of its life on the wrong side of the law. After it was seized by the Drug Enforcement Administration in a late-1990s bust, the DEA used it undercover for a decade. In 2009, knowing that 30 is prime age in some careers but old in the drug trade, the DEA let the *Caroline* go.

Soon, despite its shrouded past, the *Caroline* will be ferrying biologists, conservationists and law enforcement officers around the rugged mountains, volcanoes and turbulent seas of the Alaska Peninsula and Becharof National Wildlife Refuges to inventory islands and shorelines that have not been fully explored since the two refuges were established in 1980.

"To me, the coolest thing is that we've been talking about having a presence on the north Pacific coast for a long time. Now, we will," says Bill Schaff, refuge manager at the Alaska Peninsula/Becharof complex. "We'll be able to use this vessel as a mobile camp" for staff and researchers.

And they'll be able to do it for a fraction of what it might otherwise have cost the Refuge System, thanks to Schaff and Northeast Region property acquisition specialist Lloyd French.

In August 2009, French notified U.S. Fish and Wildlife Service offices that the *Caroline* was available in San Diego. He noted that "this is a nice looking vessel; it won't last."

Schaff recognized that the 63-foot Bertram sport fishing boat had the right stuff for Alaska's coastal waters. At 76 tons and 16 feet wide with a six-foot draft, its twin 675-horsepower diesel engines gave the *Caroline* a cruising speed of 10 knots. Its 1,500-gallon fuel tank gave it a range of 600 to 700 miles, ideal for surveying the hundreds of miles of rugged coasts. Its three bedrooms and three baths (heads) could



The latest addition to the Refuge System's Alaska vessel fleet, the *Caroline*, overwintered in Juneau. (Helen Clough/USFWS)

be modified to accommodate a dozen crew and passengers. Two large winches could hoist field supplies. Even a tuna tower designed for spotting fish could find new life surveying seabirds and marine mammals.

So, after Schaff got an appraisal, secured the vessel at no cost from General Services Administration surplus, paid about \$100,000 to have the foredeck and motors refurbished, Refuge System now owns a seagoing craft with a replacement value of \$2.5 million.

The Voyage to Alaska


Late last summer, Schaff, who is an experienced boat handler who teaches motorboat operator certification courses, and a small crew sailed the vessel more than 2,000 miles from California to Alaska. The crew included Marion Burgraff, a maintenance worker at the Alaska Peninsula/Becharof complex, who holds a 100-ton Coast Guard license; the *Caroline's* DEA skipper; a special agent with a Coast Guard 150-ton license; and another law enforcement officer.

"That was probably the longest single voyage I've ever gone on," says Schaff. "The fun thing was just hitting some beautiful days out there and learning about the vessel."

He and the others left Southern California on August 25. Basically, they sailed 24 hours a day until reaching Bellingham, WA. They sailed mostly in daylight through Inside Passage to avoid logs, whirlpools, other ships, debris and, in Wrangell Narrows (a.k.a. "Christmas Tree Alley"), abundant navigation markers. On September 9, they reached Juneau, where, because of a storm, the *Caroline* was secured to overwinter in the Fish and Wildlife Service dock.

Schaff hopes to have the vessel up to the Alaska Peninsula/Becharof complex in time for law enforcement duty on the spring bear hunt and to provide logistical support for a three-year seabird colony monitoring project at Paule Bay that begins in June 2010.

But, first – as the final chapter in the *Caroline's* makeover from drug runner to conservation vessel – he is planning a rename-the-vessel contest.

"I've been with the Service for 32 years, but I've never done a 'name-the-anything' contest, so I'm trying to track down the rules and regulations on that," he says with a laugh. 

Mike Boylan is one of two Alaska Region refuge supervisors.

Phosphorus, Sediment and the Power of Persuasion

By Bill O'Brian

Q. What do a knowledgeable and personable USDA retiree, a dairy and cheese products manufacturer, a wastewater treatment plant and the staff at Horicon National Wildlife Refuge, WI, have in common?

A. They all have played vital roles in dramatically reducing the amount of phosphorus and sediment entering Horicon Marsh.

The marsh, a shallow, peat-filled lakebed formed by the Wisconsin glacier 12,000 years ago, has long been recognized as a Wetland of International Importance by the Ramsar Convention. It is the kind of place that makes sunrise special. “That’s when the marsh wakes up,” says Horicon Refuge manager Patti Meyers. “It is just incredible to hear all the critters at that time of day.”

But in the mid-1990s, not long after Meyers came onboard at the refuge, located about 70 miles northwest of Milwaukee, she noticed something was wrong with the 32,000-acre marsh.

“The diversity of plants wasn’t there,” she says. Phosphorus-loving cattails were crowding out native plants. Local residents would tell her of former fishing holes that had been filled in by sediment to the point “that they couldn’t support any fish, except maybe carp.”

Meyers initiated a study, with support from the state of Wisconsin, which manages the southern one-third of the marsh. The study, conducted by the U.S. Geological Survey (USGS) from 1998 to 2000, determined that roughly 60 percent of the phosphorus was coming from point sources, primarily a dairy factory and a wastewater facility in Waupun, WI, and that the rest was coming from non-point sources, mostly adjacent farmland.

In short order, the two major point sources cleaned up their acts, Meyers says. The dairy factory modified its operation to release wastewater with less phosphorus content, and the city of Waupun installed a state-of-the-

art sewage treatment facility. Even with these improvements, there was still a lot of phosphorus and sediment coming from non-point sources, mostly agricultural land.

“The Perfect Person for the Job”

Meyers and Partners for Fish and Wildlife Program staff tried communicating directly with landowners, but without much success. She soon realized that she needed help. Enter the personable retiree.

In mid-2006, Meyers turned to Erv Lesczynski, a native Wisconsinite who had recently retired from the local USDA Natural Resources Conservation Service office after 39 years. Under a contract with Fond du Lac County and funded by the U.S. Fish and Wildlife Service, Lesczynski was hired to meet one-on-one with landowners to encourage them to devise individual conservation plans and install conservation practices on their farms.

Since then, according to Meyers and Lesczynski, he has met with about 450 landowners. He has accounted for 35,000 acres of new general conservation plans, including 23,000 acres of new nutrient-management plans. He has facilitated the planning of 55 miles of new grass buffers.

He and staff from the National Wild Turkey Federation, Pheasants Forever and Wings Over Wisconsin have encouraged reduce-tillage or no-till regimens in which local corn, soybean, alfalfa hay and large dairy farmers turn over soil as little as possible. The latter practice minimizes sediment runoff, “keeps the soil where it belongs, on the farm,” and benefits the farmers economically

because it dramatically reduces equipment fuel, maintenance and purchase costs.

“I think we’re within 35 to 40 percent of doing what should be done out there” to protect the marsh, Lesczynski says. He estimates that the measures have cut phosphorus entering the marsh by 95 percent from point sources and 30 percent from non-point sources – and sediment by 1,100 tons per year.

“He is just the perfect person for the job,” says Meyers. “People have come to trust that he is not going to shove anything down their throats. He’s just going to provide them with information” and let them consider their conservation options.

What makes him so persuasive? First, he says, because he has lived and worked in the community since 1975, he knows most of the farmers personally and understands their needs. He also deals with people on a case-by-case basis because “landowners are very independent to their own operations.” And, finally, he respects the farmers and appeals to their ideals. “By far, the majority of landowners have a great land ethic,” he says. “They really do.” 🦋



The marsh at Horicon National Wildlife Refuge has been well-served by refuge manager Patti Meyers’ decision to enlist the help of local resident Erv Lesczynski. (Ryan Hagerty/USFWS)

Sprucing Up the Forest

By Karen Leggett

Canaan Valley National Wildlife Refuge, WV, and its multiple partners are using the principles of strategic habitat conservation as they conserve high-elevation forests and restore spruce forests, which once may have covered nearly 1.5 million acres in the state and are now down to 30,000 acres. Red spruce and spruce hardwood forests cover just 2 percent of their original range in West Virginia.

The hardwood forests literally fueled the West Virginia economy in the 19th and early 20th centuries, from their use in tanneries and coal mining to logging. Civilian Conservation Corps crews replanted the forests above Canaan Valley in the 1930s with non-native Norway spruce. But they were

“simply providing an emergency measure to stabilize the soil, not planting strategically,” says Canaan Valley Refuge wildlife biologist Ken Sturm.

More than 26 partners have been involved in collaborative efforts since 2000 to restore and conserve the red spruce and northern hardwood forests and the wetland ecosystem in West Virginia. The Central Appalachia Spruce Restoration Initiative (CASRI), which includes Canaan Valley Refuge, the Department of Agriculture (Monongahela National Forest), The Nature Conservancy and several state agencies and nonprofit conservation organizations, was formed in 2007.

CASRI members recognize the importance of the high-elevation conifer ecosystem. “West Virginia has more

acreage above 4,000 feet than Vermont and New Hampshire combined,” says Sturm. “These large ridges provide ecological corridors that are important refugia for northern species. As the climate warms, these areas may become increasingly important for maintaining connections among other patches of similar forest communities.”

The spruce forest provides habitat for a variety of wildlife species, including fisher, snowshoe hare, saw whet owl and northern goshawk. The threatened Cheat Mountain salamander and

recently de-listed Virginia northern flying squirrel rely on mixed spruce forests, where Sturm says wildlife populations are limited and often fragile due to the fragmented and limited nature of the current spruce ecosystem.

Mapping the Forest

A regional approach is essential to address fragmentation and create a more resilient forest community, one better adapted to buffer impacts from climate change. CASRI has created conceptual maps for spruce forest management and restoration throughout the mountain region of West Virginia. Since 2005, the group has planted trees on more than 175 acres of refuge lands in West Virginia. This year, 200 acres will be planted in Monongahela National Forest and 60 acres on Canaan Valley Refuge.

CASRI will exist as long as members find it useful. That could be a long time, because overall there are an estimated 16,750 acres to be restored, including about 2,300 acres within the refuge. The restoration work is funded through grants and money from member agencies and organizations.

CASRI uses computer models developed by the refuge, The Nature Conservancy and the West Virginia Division of Natural Resources to identify where to protect habitat that matters most and then design restoration projects accordingly. In one case, the top criterion might be to create connected corridors of habitat by reducing the distance between existing forest patches. In another case, the model might list salamander or brook trout habitat as the top criterion so that patches for restoration are identified near streams or occupied salamander habitat.

“We want to develop cross-regional dialogue for working on these issues on an even larger scale than CASRI,” says Sturm. “You can’t just think inside your blue goose sign.” 🦋

Karen Leggett is a staff member of the Refuge System Branch of Communications.



Canaan Valley National Wildlife Refuge and multiple partners are using principles of strategic habitat conservation to restore high-elevation spruce forests in West Virginia. (Marquette Crockett/USFWS)

In Arizona, Refuges Are Oases for Fish

By Bill O'Brian

Cactus in Alaska? No. Snow in the Keys? None on record. Manatees in Maine? Nope. Fish in the desert? Absolutely.

San Bernardino and Leslie Canyon National Wildlife Refuges, AZ, are two of at least three national wildlife refuges in the desert Southwest whose establishing mission is to protect fish. According to a 2009 annual narrative report, “the primary role of the two refuges is the sustainability and recovery of native fish in the Rio Yaqui Basin.”

The refuges, whose combined 5,100 acres hug the U.S.-Mexico border in southeastern Arizona, currently support six species of native fish: beautiful shiner, Yaqui chub, Yaqui catfish, Yaqui topminnow, Mexican longfin dace and Mexican stoneroller. Additionally, the Mexican round-tailed chub and Yaqui sucker are found just across the border in Sonora.

The star of the show is the beautiful shiner.

“It’s just a pretty fish,” says San Bernardino/Leslie Canyon refuge manager Bill Radke. “Even for people who don’t like fish that much, this is a beautiful fish with all of its colors. It’s a charismatic fish. People like things that grab their attention.”

The beautiful shiner, which grows to just four inches, is an iridescent silvery olive color until breeding season (late February to summer), when males display an orange-blue body hue with bright orange fins. The species was extirpated from the United States in the 1960s, is still found in Mexico and is listed as threatened in both nations.

The goal of Radke and refuge staff is to protect existing fish in the watershed’s oasis-like wetlands, streams, ponds and springs and to restore habitat so that beautiful shiners and other native fish can be self-sustaining.

With beautiful shiners, that effort began in 1989, seven years after San Bernardino Refuge was created and



A male beautiful shiner displays an orange-blue body hue with bright orange fins during breeding season. (William R. Radke/USFWS)

11 years before Radke became refuge manager. About 900 beautiful shiners were collected from a Rio Yaqui tributary in Mexico. Those fish were propagated at Dexter National Fish Hatchery in New Mexico, and 300 beautiful shiners were reintroduced into San Bernardino Refuge ponds in 1990.

“If that hadn’t occurred, we still wouldn’t have shiners,” says Radke.

As it is, all beautiful shiners in the United States are living and reproducing in refugium populations: in four ponds on San Bernardino Refuge that overflow into the Rio Yaqui Basin; at the Arizona-Sonora Desert Museum; at the Dexter hatchery; and at the National Aquarium in Washington, DC. Researchers recently have learned that, to raise the fish in artificial settings, the shiners use plastic plants as a place to lay eggs and the babies (fry) must be separated from the adults

to avoid being eaten. (In the wild, the fry separate themselves by hiding in shallow water that adults can’t get navigate.)

An Ongoing Challenge

Restoring wild habitat where the beautiful shiners and other desert fish can thrive is an ongoing challenge. Since the 1800s, agriculture, mining and cattle-ranching interests have coveted the basin’s water. Today, subdivisions as far away as Tucson (150 miles) and Sierra Vista (50 miles) could try a water grab from the Rio Yaqui. Because 98 percent of the watershed is in Mexico, agricultural practices and dam diversions there influence the flow and temperature of the river on and off the refuges. Finally, some Rio Yaqui tributaries flow less than year-round – and, says Radke, “if you’re a fish, and you have one dry day out of the year, you’re dead.”

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Rio Yaqui headwaters are on San Bernardino National Wildlife Refuge, whose establishing mission is to protect native fish in the desert. (William R. Radke/USFWS)

Focus... Marine National Monuments



Palmyra Atoll National Wildlife Refuge is part of the Pacific Remote Islands Marine National Monument. (Kydd Pollock/The Nature Conservancy)

Sprawling Across the Pacific, Refuges Unlike Any Others

By Bill O'Brian

It is hard to get to the National Wildlife Refuge System's four marine national monuments. It can be almost as hard to get a handle on what exactly they are, too. So let's begin with the basics.

Some of the individual refuges that make up these far-flung monuments in the Pacific date back decades. One, Hawaiian Islands National Wildlife Refuge, has been a refuge for more than a century. But, as collective entities, the marine national monuments are less than five years old.

All four were established by President George W. Bush. The land and water they protect totals more than 335,000 square miles – an area almost six times the size of Alaska.

The largest and oldest is Papahānaumokuākea Marine National Monument (MNM), which includes Hawaiian Islands Refuge and Midway Atoll Refuge. It was established in June 2006. It is composed of a chain of 10 islands, atolls, submerged banks, shoals, reefs and associated waters stretching more than 1,200 miles – roughly the distance from San Diego to Seattle.

Papahānaumokuākea MNM holds cultural and spiritual significance for native Hawaiians, and the monument provides habitat for hundreds of unique marine species, endangered Hawaiian monk

seals and land birds, millions of seabirds, and plant species found nowhere else on Earth. It is cooperatively managed by the state of Hawai'i, the National Oceanic and Atmospheric Administration and the Refuge System.

The other three marine national monuments were established in January 2009.

Rose Atoll MNM, the southernmost of the monuments, is one of least visited areas of the world. Its marine and terrestrial communities provide an extraordinary opportunity for research and an invaluable scientific baseline for biological and geological studies of the low Pacific islands.

Rose Atoll, which has been managed as a national wildlife refuge in cooperation with the government of American Samoa since 1973, is known for the pink hue of its fringing reef, caused by the presence of crustose coralline algae, one of the atoll's primary reef-building species. Coral communities at Rose Atoll include 113 distinct species. The atoll also supports 270 species of reef fish, nesting sites for green and hawksbill turtles, and important seabird colonies.


The Deepest Point on Earth

Marianas Trench MNM, which is closer to Japan than it is to Honolulu, consists of three units. The Island Unit includes the waters and submerged lands of the three northernmost Mariana Islands. The Volcanic Unit is the submerged lands

within one nautical mile of 21 designated volcanic sites. The Trench Unit includes the submerged features of the Marianas Trench itself, which, at 35,840 feet, is the deepest point on Earth. No waters are included in the Volcanic and Trench Units, and the Commonwealth of the Northern Mariana Island maintains authority for everything above the mean low water line in the Islands Unit.

The Volcanic Unit is an arc of undersea mud volcanoes and thermal vents that supports unusual life forms in highly acidic and boiling waters. The Island Unit includes biologically diverse reef habitat that is home to marine life that is dependent on basalt rock foundations.

Pacific Remote Islands MNM, which sprawls across the central Pacific, is composed of seven national wildlife refuges: Palmyra Atoll; Kingman Reef; Johnston Atoll; Howland Island; Baker Island; Jarvis Island; and Wake Atoll. The monument comprises the most widespread collection of coral reef and seabird and shorebird protected areas on the planet under a single nation's jurisdiction. Palmyra Atoll Refuge alone is habitat to 418 fish species.

All told, the four marine national monuments are among the most distinctive components in the Refuge System. As such, they present special challenges, rare opportunities and unparalleled beauty. 

A Signature Spectacle

A signature phenomenon of the Pacific ecosystem is known colloquially as the “bait ball feeding frenzy.”

The phenomenon works something like this: Large underwater prey (typically tuna) chase small underwater prey (typically small fish and squid), forcing them to close ranks into a protective school, or bait ball. The continued threat from the large prey pushes the small prey en masse toward the surface of the open ocean. Once the small prey are pinned at the surface, seabirds begin their feeding frenzy.

The phenomenon “captures the essence of the tropical Pacific and how it works,” says Beth Flint, wildlife biology supervisor for the Pacific Remote Islands Marine National Monument.

But she doesn’t particularly like the term “bait ball” because, she says, the participants “are not all generic bait” – they are a lot of different species functioning and coexisting independently. And it’s not a really “feeding frenzy,” she says, but rather “a lot of really dramatic, prey-capture and foraging ... These organisms are really focused.



As fish are pinned at the surface, birds hover and dive to feed. (Kydd Pollock/ The Nature Conservancy)

They haven’t lost their minds ... Each individual is doing something in a very calculated and skillful way.”

Whatever you call it, the phenomenon is vital to seabirds’ survival because during breeding season a bird’s success depends on it occurring regularly within 300 miles of the colony. Birds can forage throughout their pelagic ranges, which encompass the entire tropical ocean, but they are most successful at feeding their

young when they can find food close to their breeding colonies.

The phenomenon is also integral to the 50-mile protective zones in waters of the recently established marine national monuments that surround existing national wildlife refuges. Those zones protect the large prey from commercial fishing, which

means adequate densities of tuna survive to force the small prey to close ranks regularly near islands and atolls; the seabirds survive; their guano replenishes nutrients in coral reefs; one-celled algae thrive; the food web is fueled; and the ecosystem functions naturally.

“It’s a really interesting and complicated world that humans don’t know as much about as they know about land,” Flint says. 🐦

You Say Hawai‘i, I Say Hawaii ...

Generally speaking, we at *Refuge Update* follow the Associated Press style on how words are rendered in print. That style favors mainland U.S. English usage.

However, in a respectful bow to the culture and language of Hawai‘i, in this Focus section about the marine national monuments of the Pacific, we are using the precise diacritical marks on some place names.

In the Hawaiian language, these marks are used to assist the reader

with pronunciation. To omit them is considered a misspelling.

According to the Hawaiian dictionary, the ‘okina is a glottal stop, and the word actually contains an ‘okina at its beginning. The *kahakō* represents a slightly longer vowel. The word *kahakō*, too, contains a *kahakō* over the last letter.

Hawai‘i contains a glottal stop represented by an ‘okina and is pronounced either “Hawai-ee” or “Hawai-ee,” depending on whom you ask.

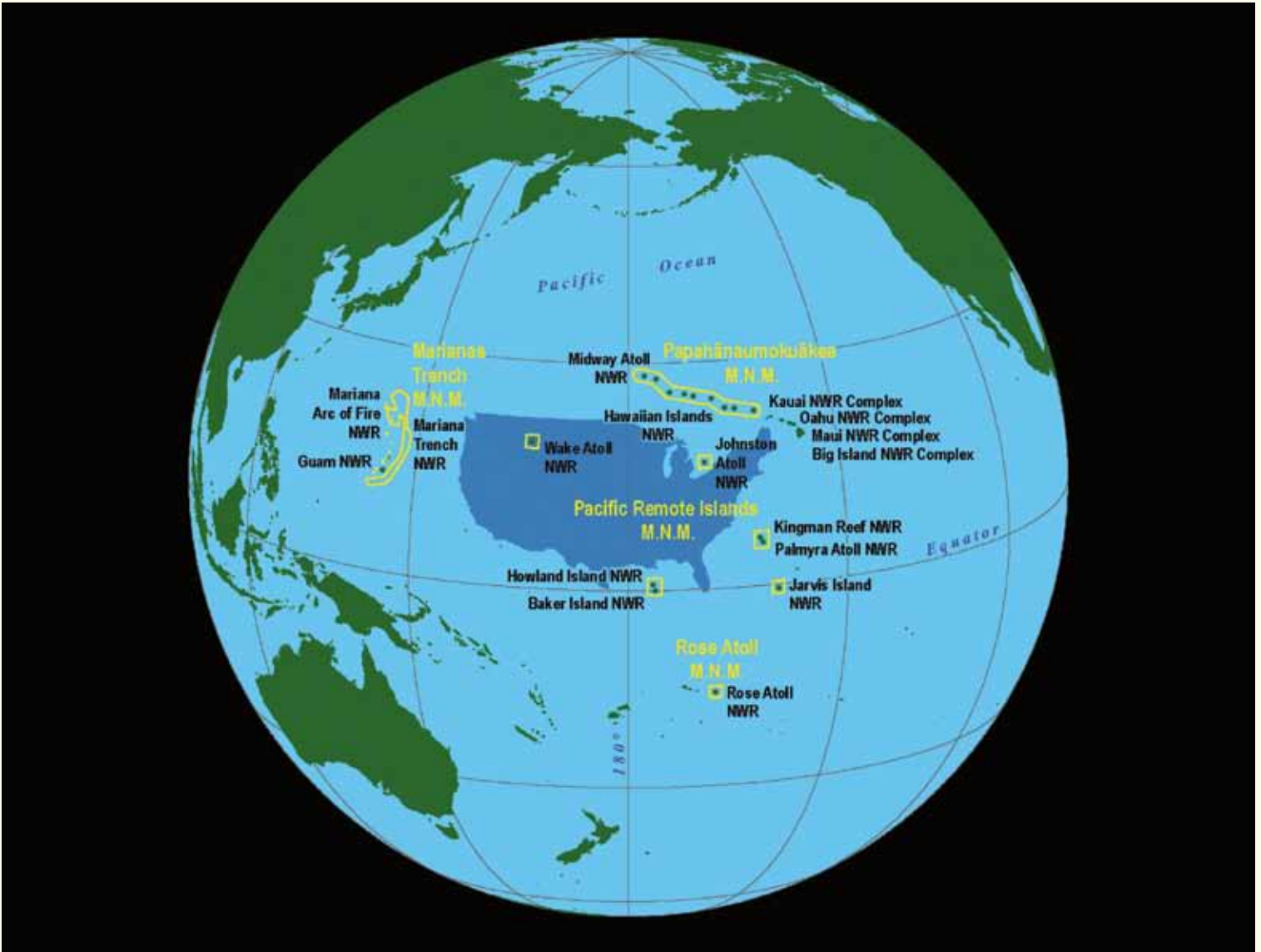
The name of the first marine national monument, Papahānaumokuākea, contains two *kahakō* (one does not add an “s” to the end of Hawaiian words to make them plural). This makes the third and fifth a’s different from the other four. Thus, the name is pronounced something like “Pa-pa-hah-now-mow-coo-ah-kay-uh.”

“Hawaiian,” by the way, is an English word and thus does not contain an ‘okina.

Aloha, y’all. 🐦

Focus... Marine National Monuments

By the Numbers



The marine national monuments dwarf the continental United States in terms of expanse. (USFWS)

Barry Stieglitz, project leader of the Hawaiian and Pacific Islands National Wildlife Refuges, has compiled the following factoids relating to the Refuge System's four marine national monuments.

- The monuments span more than **five** time zones.
- The monuments protect parts of **six** major Pacific archipelagos.
- The monuments encompass **215 million acres**, **54.7 million** acres in national wildlife refuges.
- Approximately **28 million** seabirds of some **23** species use the refuges of the tropical Pacific as their nesting site, including the largest nesting albatross colony in world.
- **98 percent** of the world's population of both Laysan and black-footed albatrosses nest within Papahānaumokuākea Marine National Monument.
- More than **90 percent** of the Hawaiian population of green turtles nests in one locale, the French Frigate Shoals.
- Sooty terns, which rely on the monuments' ocean ecosystems, spend **91 percent** of their lives at sea.
- **12** national wildlife refuges form the core for marine conservation in the monuments. 🦅

Challenges Abound in Refuges So Remote and Unfamiliar

By Barry Stieglitz

In 2005, I leapt at the chance to join the small but passionate ‘ohana (family) of National Wildlife Refuge System conservationists in Hawai‘i and on a handful of fragile Pacific islands. There were 19 Refuge System units across the Pacific then, covering about 1 million acres.

Imagine my great surprise in June 2006 when the President established the first marine national monument – Papahānaumokuākea. In partnership with NOAA and the state of Hawai‘i, my colleagues and I were suddenly responsible for 140,000 square miles of marine protected area, the largest in the world – eclipsing even Australia’s Great Barrier Reef Marine Park. For reference, Papahānaumokuākea is larger than all but four U.S. states.

Then, in January 2009, three *more* monuments were established. In less than three years, our responsibility had grown from 1 million to 54 million acres, more than one-third of the Refuge System.

Since then, we have faced an array of obstacles, in part because the refuges of the Pacific are unlike most mainland refuges. For instance: Midway Atoll National Wildlife Refuge is the only unit to operate a fully equipped (albeit lightly used) airport. Most of our refuges can be reached only by seagoing vessels – and on trips that take days or weeks, not hours. Impoundment management in the Pacific differs from almost anywhere else because a 12-month growing season means constant mowing and habitat management. And the cost of living and doing business in Hawai‘i is astronomical. These differences can make it difficult for many people to fully understand our needs.

The very thing that keeps the Pacific refuges suitable as cores for marine national monuments – their remoteness – also works against them. It balloons the costs of getting there, even to conduct basic refuge management. Think

\$10,000 per day for passenger vessel contracts. Think \$40,000 or so for flights from Honolulu to Midway or Palmyra Atoll National Wildlife Refuge.

“Junket Stigma”

One way to drive home these points is to provide firsthand experience to decision makers. However, decision makers often are reluctant to visit because of the expense and what I call “junket stigma.” Trips to Hawai‘i are seen as vacations rather than business trips, and decision makers will not come to where we live and work every day.

From the beginning, funding has been a challenge. The outgoing President did not include budgets to implement the monuments. We receive about 3 cents per acre of land and water under our jurisdiction. And we in the Pacific often must try to explain why our stations are different from more-familiar models to decision makers who have no experience here.

Partnerships can be a challenge, too. The proclamations establishing the four monuments also established several government partnerships by fiat. Some are natural relationships; others are not. Differing agency missions sometimes create tensions in accomplishing a common goal, with little time to climb the learning curve before results are expected. Many of the Pacific refuges are not in a state and thus lack congressional representation altogether. Not surprisingly, it also can be difficult to find partners when there are no “neighboring landowners” for literally hundreds of miles.



With settings like this one at Palmyra Atoll National Wildlife Refuge, it’s easy to see why the marine national monuments suffer from what the author calls “junket stigma.” (Kydd Pollock/The Nature Conservancy)

Finally, we face the challenge of global climate change. Given that the maximum elevation on the majority of our island refuges is less than 30 feet, sea-level rise is a more pressing concern here than it might be in, say, Kansas.

Our colleagues sometimes joke that so much of our “lands” are underwater that sea-level rise should not be an issue. However, many corals have narrow environmental requirements, including depth and light. These corals may not be able to keep pace with sea-level rise while also facing ocean acidification. If the corals were to go, the habitat they create for so many species of fish and invertebrates would follow.

Most things worth having are also worth fighting for. We are stewards of a significant marine protection legacy for which we are grateful. We have significant challenges to overcome in the next few years, not the least of which is garnering enough support to implement the vision that inspired creation of the four marine national monuments. 🦋

Barry Stieglitz is project leader of the Hawaiian and Pacific Islands National Wildlife Refuges.

Focus... Marine National Monuments

Understanding a Last Frontier

By Jennifer Anderson

The answers to how quickly and severely climate change, ocean acidification, sea-level rise and other global threats could affect us all may lie in the least understood places on Earth.

“The truth is, we know more about the moon than we do about some of the remote areas in the Pacific,” said Don Palawski, deputy project leader for the Hawaiian and Pacific Islands National Wildlife Refuge Complex.

The National Wildlife Refuge System has long recognized that it cannot begin to comprehend the resources of the Pacific on its own. For decades, partnerships on all levels of exploration – from NASA satellite systems recording changes in currents and water temperature to volunteers gathering data on the ground – have played a vital role.

Still, our knowledge of one of nature’s final frontiers amounts to what Palawski called “a snapshot.”

The lens may broaden under a new push by the Refuge System to inventory and monitor (I&M) the nation’s natural, historical and cultural resources, including those in the marine national monuments. The I&M initiative will bring additional resources, although exact allocations have not been determined, said Mark Chase, chief of the Refuge System’s Natural Resource Program Center.

Even with additional funding and possibly staff, new partnerships should be pursued, Chase said, and those already in place – with other agencies, individuals, the state of Hawai‘i and non-governmental organizations – must continue.

“Through partnerships,” Chase said, “we can develop protocols and leverage resources across the various agencies and organizations to build an integrated monitoring system that would provide scientific information that transcends the Refuge System and provide insights into the Pacific marine environment as a whole.”



Volunteer Ruth Brown, left, and wildlife refuge specialist Paula Hartzell adjust a band on a Laysan albatross at Tern Island Field Station, part of Papahānaumokuākea Marine National Monument. (Pete Leary/USFWS)

Modern-Day Exploration

Sporadic exploration of the Pacific’s coral reefs dates at least to the 1920s, initially to monitor seabird colonies. Consistent efforts began in 2000, Palawski said, when the Refuge System teamed up with National Oceanic and Atmospheric Administration to visit locations in the Hawaiian Islands and Midway Atoll National Wildlife Refuges.

Known as RAMP – Reef Assessment and Monitoring Program – the partnership helps both agencies, with assistance from the U.S. Coast Guard, to inventory and monitor coral species, algae, fish and invertebrates. Similar assessments are done every two years at refuges in the Pacific Reefs National Wildlife Refuge Complex.

Because scientists typically are able to spend just four days at each place, “we get a snapshot of what’s out there,” Palawski said. Under the I&M push, he said, longer stays may be possible.

More Resources Yield More Results

The benefit of multiple partners becomes clear at Palmyra Atoll National Wildlife Refuge. At this string of islands a thousand miles south of Hawai‘i, 10 scientific research institutions joined the Refuge System in 2005 to form the Palmyra Atoll Research Consortium. The partners, including The Nature Conservancy and Scripps Institution of Oceanography, maintain a field presence there, using a kitchen,

laboratory, sleeping quarters and small boats.

“At Palmyra, we can do more focused studies, looking at climate change and at all parts of the ecosystem and how they and the different species interact,” Palawski said.

Exploration of the natural world is just one way partnerships are vital, explained Susan White, who, along with representatives from the Department of Commerce and state of Hawai‘i, manages Papahānaumokuākea Marine National Monument. In one partnership, with Friends of Midway Atoll, Dow Chemical and the National Fish and Wildlife Foundation, the Refuge System and volunteers monitor another threat – marine debris.

To understand cultural significance, native Hawaiian practitioners and researchers visit an island to survey heiau (shrines) that were built by ancestors with large,

continued on pg 26

Two Hazards to Habitat: Shipwrecks and Yellow Crazy Ants

By Mary Tillotson

Seafarers have always known shipwrecks can be hazardous to human health. Now scientists are discovering just how damaging shipwrecks can be to the health of the marine environment. There are two clear examples in the Pacific Remote Islands Marine National Monument.

In the spring of 1991, a Taiwanese fishing boat ran aground in about 20 feet of water off Palmyra Atoll National Wildlife Refuge. The 121-foot boat is intact, but it cannot be towed because it would likely break up. The wreck is metal-hulled; dissolving iron from the wreck is leaching into the surrounding water. Scientists think the iron has contributed to the rapid growth of corallimorph that now infests more than 250 acres of nearby coral.

A corallimorph is a relative of true coral, but it has no hard skeleton and produces a dense carpet that smothers and kills other reef organisms.

Andrew Gude, formerly with the Refuge System marine program, says the wreckage at Palmyra needs to be cut up in place and removed for proper disposal.

A second shipwreck at Kingman Reef National Wildlife Refuge represents a different but related threat. The fishing boat that ran aground at Kingman in 2007 – a wooden-hulled vessel about 84 feet long – burned to the waterline. But the hull, propeller and other heavy parts of the boat are intact in shallow water, battered by surf and at risk of breaking up, scattering and damaging the reef. As at Palmyra, rusting metal from the wreck is feeding fast-growing blue-green algae that can block sunlight and smother the coral. Gude says this wreck, too, needs to be cut up and removed.

Reproduction Run Amok

A 2007 study by the U.S. Geological Survey and the University of Hawai'i

Institute of Marine Biology found that the infestation initially fed by the wreck “may now be caused by a critical mass of animals ... reproducing and essentially running amok.” If that’s the case, the study continued, removing the wreckage may not solve the infestation problem: “Additional management intervention” may be necessary. By 2008, study published on the Public Library of Science Web site concluded that the infestation at Palmyra “is beginning to reach catastrophic proportions.”

But so far, the Refuge System has not found funding to cover the cost of both wreck removal projects, estimated at \$8.4 million, including monitoring the sites after removal.

Habitat restoration throughout the Pacific Remote Islands MNM could benefit from other projects not yet in the budget, says Barbara Maxfield, external affairs chief for the Pacific Islands. Those projects include reducing the number of the coconut palms that have been introduced to the atolls by humans. The coconut palms do not provide habitat for nesting birds and compete with the native pisonia beach forests, which do, says Maxfield.

Beth Flint, wildlife biologist at the Pacific Reefs National Wildlife Refuge Complex, says ants – another invasive brought to the area by humans – are also a threat to the pisonia forests and other native species in the Pacific. For example, yellow crazy ants (named for their frenetic activity) have infested Johnston Atoll in the past two years, she says, and are wreaking havoc, spraying acid into the eyes of birds, forcing them to abandon nests.

“Nothing can withstand them,” says Flint. She adds that such invaders can be “devastating” in a Pacific environment where they have no natural enemies.

Flint and Maxfield also would like to see removal of the causeway between the



Dissolving iron from this wreck has been leaching into the surrounding water since 1991. (Jim Maragos/USFWS)

islets and the airstrip built on Palmyra during World War II, when the atoll was a link in the allies’ supply line for the Pacific campaign. The construction so vital to the war effort nearly 70 years ago serves no purpose and now interrupts the circulation of water in Palmyra lagoons.

Staff at the Pacific Remote Islands MNM point with pride to successes in habitat restoration on the islands. Invasive rats and feral cats that were destroying native species have been controlled on every refuge but Palmyra Atoll. But other invaders brought by humans to these remote areas still threaten the “intrinsically elegant and beautiful ecological balance” that existed before man came, says Flint. Restoring that balance, she says, “is what the American public has charged us with doing.”

Mary Tillotson is frequent contributor to Refuge Update.

Focus... Marine National Monuments



Clockwise from left: Massive plate corals are among the 130 species of coral on the reef at Palmyra Atoll. Butterfly fish, tangs and parrot fish reflect a neon look. A red-footed booby adopts a courting posture in a pisonia tree.



PAGE 14-15 PHOTO CREDITS:

Plate coral and butterfly fish, Kydd Pollock/The Nature Conservancy; red-footed bobby, USFWS; all others, Jim Maragos/USFWS.



Above: At Kingman Reef National Wildlife Refuge, where coral reef space is a precious commodity, adult giant clams are an ideal growing surface for other young clams.

Left: A coconut crab can break open a fresh coconut, or snap off a human finger, with its pincers.

Right: A crown-of-thorns starfish feeds on coral polyps.



Focus... Marine National Monuments

Paradise Threatened by *Rattus rattus*

By Mary Tillotson

Palmyra Atoll National Wildlife Refuge may be the nearest thing to Eden left on Earth – a ring of some 50 low-lying islets (at most about seven feet above sea level; many of them connected at low tide) that have developed atop a submerged volcano and are now fringed with majestic pisonia trees that are a haven to nesting birds.

The emerging islets are encircled by 15,000 acres of coral reefs, turquoise water where the reefs are shallow, shading to darker cobalt where the reefs lie deeper. But this tropical paradise halfway between Hawai'i and American Samoa is threatened by its own “serpent.” It's not reptilian, though. It's an invasive mammalian species – the black rat (*Rattus rattus*).

The warm, moist climate that makes Palmyra Atoll Refuge an ideal breeding ground for seabirds and a winter-feeding ground for migratory shorebirds, home to towering stands of pisonia beach forest and native ferns and shrubs, has unfortunately been equally welcoming to non-native rats. The moderate climate and abundant food supply (turtle and bird eggs and chicks, crabs and plants) mean the rats on Palmyra Atoll Refuge are capable of producing several litters of up to seven rats every year and are substantially changing the atoll's ecological balance, says Beth Flint, wildlife biologist at the Pacific Reefs National Wildlife Refuge Complex.

Occasional fishing vessels and pleasure boats visited Palmyra Atoll before World War II. The war brought the U.S. Navy, 6,000 military personnel, and the construction of an airstrip. The Navy installation was temporary. But invasive rats, insects and plants that had hitched a ride with the ships and boats of an earlier era took up permanent residence.

The Nature Conservancy purchased Palmyra Atoll in 2000. The atoll was established as a national wildlife



Unfortunately, the humid pisonia forests of Palmyra Atoll National Wildlife Refuge are welcoming to invasive rats. (Jim Maragos/USFWS)

refuge the next year and became part of the Pacific Remote Islands Marine National Monument in 2009. Invading rats have been brought under control in every other national wildlife refuge in the Pacific Remote Islands, but they still threaten native species of birds, invertebrates and plants on Palmyra.

Eradication Begins Next Year

Barbara Maxfield, external affairs chief for the Pacific Islands, says the U.S. Fish and Wildlife Service, The Nature Conservancy and a second private group, Island Conservation, are working on a plan to rid Palmyra Atoll Refuge of its non-native rats – an important step in restoring the atoll's native habitat. The current budget includes \$1 million for the project. Maxfield expects an Environmental Impact Statement to be completed soon; Palmyra's rat eradication program should be initiated by June 2011.

Because the tropical rainforest jungles of Palmyra are too lush and dense to make trapping the rats practicable, Maxfield predicts the eradication regime will likely employ rodenticides specifically targeted to kill the invading rats without harming such native species as crabs.

Why the struggle to restore the delicate ecological balance on Palmyra Atoll Refuge? This speck of land is the only breeding site within 450,000 square miles of ocean for migrating seabirds. Maxfield says six species of seabirds that once nested at Palmyra no longer do, and are declining in numbers worldwide. The atoll is also home to the largest land invertebrate on Earth – the coconut crab. And threatened green sea turtles nest on its beaches. All of these Palmyra natives are delicacies to the ravenous rats.

Perhaps as important, Palmyra's history has been so relatively free of human influence, it may be the best laboratory left on Earth in which scientists can study coral reef development, how to maintain a clean ocean environment, and precisely what impact human activity has on such near-pristine environments.

If the pollution-afflicted urban areas of the world provide snapshots of “after,” Palmyra Atoll may be the closest we ever come to a picture of “before.”

Mary Tillotson is a frequent contributor to Refuge Update.

“Unusual” Doesn’t Begin to Describe Mariana Arc of Fire

By Bret Wolfe

The Volcanic Unit of the Marianas Trench Marine National Monument might be the most otherworldly place on Earth. It is the most extraordinary habitat in the National Wildlife Refuge System.

Where else in the Refuge System could life thrive without photosynthesis? Where else could you find submerged hot springs that produce almost pure liquid carbon dioxide? Where else could you find a submerged volcano that churns out a pool of molten sulfur?

The Volcanic Unit, also called the Mariana Arc of Fire National Wildlife Refuge, stretches for 750 miles along the Northern Mariana Islands in the western Pacific, where its status as a monument precludes any future economic exploitation. The entire unit is on the ocean floor several miles below the surface. Pressure there can exceed 400 times that at the surface. The unit is composed of 21 undersea volcanoes, hydrothermal vents and other volcanic features along the boundary where the Pacific tectonic plate subducts (or slides under) the Mariana plate. One submerged volcano, or seamount, is 31 miles in diameter and a mile high.

The Volcanic Unit includes vents called smokers that spew superheated water rich in dissolved minerals. When the spring water comes in contact with the cold ocean water, the minerals precipitate to form a chimney-like structure resembling a cave stalagmite. At the Champagne Vent, which bubbles liquid carbon dioxide, venting fluids have been measured at 217 degrees Fahrenheit and the surrounding water at 36 degrees.

The most unusual geological phenomenon in the Volcanic Unit occurs at the Daikoku volcano. There, during a 2006 National Oceanic and Atmospheric Administration (NOAA) expedition, scientists observed a black pool of liquid sulfur churning in the crater. The only other known occurrence

happens 400 million miles away – on Io, a moon of Jupiter.

“The Volcanic Unit supports unusual life forms in some of the harshest conditions imaginable,” says the Marianas Trench Marine National Monument Web site. “Here, species survive in the midst of hydrothermal vents that produce highly acidic and boiling water.”


Unlike most ecosystems, where the base of the food chain is sustained by plants and algae that obtain energy from the sun through photosynthesis, the food chain of some deep sea vent communities are dependent on bacteria that obtain energy directly from chemicals in the environment through chemosynthesis. Before these chemosynthetic communities were discovered in the 1970s, scientists assumed that all life on Earth obtained energy directly or indirectly through photosynthesis.

Creatures of the Deep

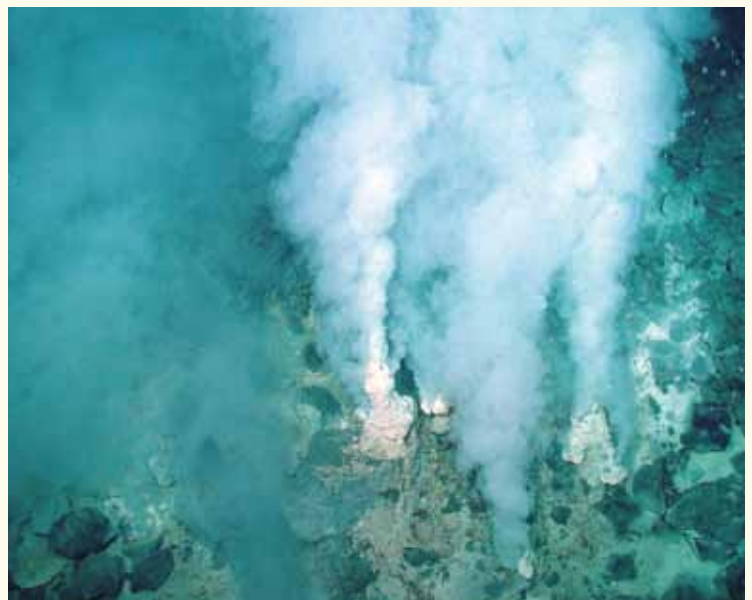
Massive mats of these bacteria provide food for various familiar animals, including shrimp, crabs and mussels, which possess adaptations that allow them to survive near the vents. Perhaps the most unusual creatures of deep ocean vents are giant tube worms. These worms, some reaching eight feet in length, do not appear to have mouths or digestive tracts. Instead, their insides are lined with bacteria that digest hydrogen sulfide, which is toxic to most other organisms. The bacteria benefit from the relationship because they use hemoglobin in the

worms’ blood to break down the sulfides.

Most of the Volcanic Unit has never seen the light of day. However, the peaks of some seamounts come close enough to the surface for photosynthetic life to flourish. At Maug Crater, coral reef ecosystems overlap with hydrothermal vents. This is one of a handful of places on Earth where photosynthetic and chemosynthetic communities are known to coexist.

But don’t plan on visiting the Volcanic Unit anytime soon. It is accessible only by the most modern submersibles and remotely operated vehicles. Just eight scientific research expeditions have been made to the region, all since 2003. Although the public may never get to see this refuge in person, an important mission of the U.S. Fish and Wildlife Service is to provide opportunities for national and international scientific exploration. And the public benefits from that. 

Bret Wolfe is a marine biologist in the Refuge System’s Branch of Wildlife Resources.



At Champagne Vent, superheated spring water spews into cold ocean water to form bubbles of liquid carbon dioxide. (Pacific Ring of Fire 2004 Expedition/NOAA)

Around the Refuge System

Pennsylvania

For the first time, bald eagles have successfully nested and hatched two chicks at John Heinz National Wildlife Refuge at Tinicum, just across Interstate 95 from Philadelphia International Airport. It is the only active bald eagle nest in Philadelphia, where two years ago a chick fledged at the Philadelphia Navy Yard and in 2009 another hatched at Pennypack Park.

When the Heinz Refuge nest was first built in 2008, the eagles were young. “For the first two years they were just playing house like a couple of teenagers in love, with no eggs, as is typical of young eagle behavior,” says refuge manager Gary Stolz. The eagle pair fixed up the nest last fall and built a second partial nest as well; the chicks hatched in early April 2010.

“With a cleaner environment and protected habitat, bald eagles are now making a wonderful comeback throughout the Refuge System,” says Stolz, who, in early April, did not yet know the sex of the eaglets.

California

Humboldt Bay National Wildlife Refuge has been awarded a competitive allocation of \$1 million to eradicate the highly invasive *Spartina densiflora*, a perennial grass, from the refuge. Commonly known as dense-flowered cordgrass, this plant is native to South America and should not be confused with *Spartina alterniflora*, or smooth cordgrass, which is native to the eastern United States but is highly invasive on the West Coast. Dense-flowered cordgrass probably arrived in Humboldt Bay in the 1800s with the solid ballast of ships carrying lumber; but it was not recognized as a non-native species until the 1980s. It now has invaded an estimated 90 percent of the salt marshes at the refuge.

Wyoming

A U.S. District Court judge in Washington, DC, has ruled in favor of the Department of the Interior regarding the supplemental feeding program and the Bison and Elk Management Plan at National Elk Refuge. The judge, in



This bald eagle nest made history at John Heinz National Wildlife Refuge at Tinicum, PA. Left to right: the male, the two eaglets and the female. (Bill Buchanan/USFWS)

a March 26 opinion, denied a motion by Defenders of Wildlife and other plaintiffs to set aside the plan because it permits indefinite feeding of elk, a practice the plaintiffs maintained will lead to the spread of disease and disrupt the biological integrity of the refuge.

That the refuge seeks “to avoid losses of bison and elk caused by the lack of winter habitat is hardly contrary to the conservationist provisions of the [National Wildlife Refuge System] Improvement Act or the overarching purposes of the refuge,” Judge Richard J. Leon wrote. “And while the threat of disease is real and must be addressed, it makes little sense to avert population decline caused by disease only to bring about population decline caused by starvation.”

Under the supplemental feeding program, which runs for about 75 days in late winter, elk and bison on the refuge are fed alfalfa pellets until natural forage is exposed by receding snow in spring. The program supported 5,500 elk and 760 bison this past winter.

Puerto Rico

A 1,249-acre area of saline lagoons, salt flats and mangrove swamps at Cabo Rojo National Wildlife Refuge has been designed as the Caribbean’s first site of

regional importance for shorebirds by the Western Hemisphere Shorebird Reserve Network (WHSRN). The salt flats section of the refuge in southwestern Puerto Rico supports 5.3 percent (80 individuals) of the world population of the tenuirostris subspecies of snowy plover and 2.5 percent (151 individuals) of Wilson’s plover, according to the WHSRN. The site, which is also an Important Bird Area, hosts 28 shorebird species.

Florida

A juvenile manatee rescued at Chassahowitzka National Wildlife Refuge has been named “Hamilton” in honor of late director of the U.S. Fish and Wildlife Service Sam Hamilton. The young manatee, which measures 5 feet



This rescued manatee has been named in honor of Fish and Wildlife Service Director Sam Hamilton. (Stacy Dunn)

8 inches, was found in February, injured and on its own with no mother, at Three Sisters Springs near Crystal River on Florida's Gulf Coast. A manatee rescue team composed of refuge staff and volunteers transported the 205-pound animal to the David A. Straz Jr. Manatee Hospital at Tampa's Lowry Park Zoo for rehabilitation. The manatee responded well to care, was relocated to the Columbus Zoo and Aquarium in Ohio for housing for the next year or two, and probably will return to Tampa for release conditioning prior to reintroduction into Florida waters, according to a Lowry Park Zoo spokeswoman.

Missouri

The Conservation Fund's voluntary carbon offset program, Go Zero, reached a milestone in March when it planted its 1 millionth tree – as part of a 367-acre forest restoration project at Mingo National Wildlife Refuge. Working with the Refuge System and Environmental Synergy Inc., Go Zero partners planted 100,000 native walnut, hickory, oak or cypress trees at Mingo Refuge. The Conservation Fund estimates that as the forest matures it will trap the equivalent of 100,000 metric tons of carbon dioxide from the atmosphere. Go Zero is jointly funded by corporations, foundations and individuals.

Michigan

Humbug Marsh on Detroit River International Wildlife Refuge has become Michigan's first Wetland of International Importance under the Ramsar Convention. Humbug Marsh is the 27th Ramsar site to be listed in the United States and joins approximately 1,880 sites listed worldwide. The Ramsar Convention is an international treaty signed in Ramsar, Iran, in 1971 to encourage voluntary protection of wetlands. Countries that sign the treaty demonstrate their commitment to conserve wetlands as a contribution toward sustainable development throughout the world. Humbug Marsh is a vital habitat for 51 fish species, 90 plant species, 154 bird species, seven reptiles and amphibian species, and 37 species of dragonflies and damselflies.



Humbug Marsh on Detroit River International Wildlife Refuge is Michigan's first Ramsar site. (Gary Muehlenhardt/USFWS)

Texas

The U.S. Supreme Court on February 22 let stand a lower court ruling upholding the creation of the Neches River National Wildlife Refuge in east Texas. The Neches River Refuge was established in 2006. The decision was challenged by the Texas Water Development Board and the City of Dallas, claiming the refuge could have hurt the economy and water supply of north Texas. Dallas had identified the same site as a potential location to build a dam and create a lake to supplement the city's water supply. The refuge now includes one acre donated as a conservation easement by a landowner and 30 acres donated in 2008 by The Conservation Fund. The refuge's eventual acquisition boundary is more than 25,000 acres in the Neches River watershed.

Washington, DC

Over the past five years – fiscal 2005 through 2009 – the Refuge System has requested \$498 million in emergency supplemental funding to repair damages from federally declared natural disasters, according to an analysis by the Refuge System Division of Budget, Performance and Workforce. However, Congress has appropriated only a fraction of that amount, about \$257 million, in supplemental funding. Therefore, more than \$241 million has been added to the

Refuge System's deferred maintenance backlog as a result of federally declared natural disasters. This is in addition to damages from localized natural disasters, such as flooding and storm damage, that were not eligible for emergency supplemental funding. The deferred maintenance backlog stood at \$2.7 billion as of September 30, 2009.

California

A ghost town that was once a weekend getaway for Bay Area residents is slowly sinking into marshland at Don Edwards San Francisco Bay National Wildlife Refuge. About 20 buildings remain from the town of Drawbridge, which was established in the late 1800s and had its heyday in the 1920s. The town is "a landmark, so we're not going to do anything to accelerate its decay, but we're not going to prevent it, either," Don Edwards Refuge manager Eric Mruz told the *San Francisco Chronicle*. "We're letting the buildings return to the marsh." The ghost town is accessible only by boat, and it is closed to the public, Mruz said.

Virginia

Jenny Somers of Pocomoke City, MD, won the 16th Annual International Migratory Bird Celebration art logo contest at Chincoteague National Wildlife Refuge. This is the second time in 10 years that Somers, a renowned artist and owner of an art studio on Chincoteague Island, has won the contest. Her winning entry, a line drawing of blue birds nesting in a box, adorned program flyers, T-shirts and other items for a May 8 International Migratory Bird Day celebration at Chincoteague Refuge. 🦋

Thinning Pines and Wasting Nothing

By Catherine J. Hibbard

“**E**verything that comes into this [logging] landing goes out,” forester Bryan Poovey said of a project to thin pine trees at James River National Wildlife Refuge in Virginia. “It’s the cleanest thinning job I’ve ever seen.”

The project, which began last summer, is an important step to provide rooting and nesting habit for bald eagles, reduce fire risk, increase biodiversity and restore ecological health to the 4,200-acre refuge along the James River about 30 miles southeast of Richmond.

The refuge was created in 1991 because the riverfront is one of the largest summer roost areas for bald eagles east of the Mississippi River. Before then, the property had been managed for commercial timber production. Hundreds of acres had been clearcut and then densely reseeded with loblolly pine.

Poovey, then an employee of Great Dismal Swamp National Wildlife Refuge, VA, first evaluated the stand at James River Refuge in 1992. “Even

then, it needed treatment,” he said of overstocked pines that competed with one another for light.

The refuge did not actively manage the stands in the early 1990s because the trees were too small to be commercially marketable and a historical/cultural resources plan needed to be worked out. In 2006, after years of meetings among state and federal officials who became increasingly aware that the densely packed pines were a fire hazard, timber harvest standard operating procedures were approved, giving the refuge the green light to thin the stands. By then, the pines had grown to a commercially viable diameter of 6 to 10 inches, and eventually Poovey, who had helped administer an Atlantic white cedar salvage project at Great Dismal Swamp Refuge, was named to oversee the project.

Thinning operations began in July 2009 under a special use permit authorizing the removal of 30 percent to 40 percent of pines in selected stands at James River Refuge. The permit outlines a goods-for-services agreement whereby the permittee – Isle of Wight Forest

Products Inc. – compensates the refuge based on stumpage prices in the form of materials or services. For example, in a second phase of the project, Isle of Wight will grade and restore a refuge road.

Thinning and Burning

Not only will the project reduce fire risk, it will release loblolly pines and help them become future old growth trees suitable for bald eagle nesting and roosting. It will increase biodiversity, too, especially for rare plants. “It will also improve habitat for animals and improve visibility and access for deer hunters and wildlife observers,” said Cyrus Brame, outdoor recreation planner at the refuge.

Tim Craig, a U.S. Fish and Wildlife Service fire management officer who oversees Virginia and West Virginia, said that the project is an initial step to restore habitat to more than 2,000 acres of forest at James River Refuge through thinning and prescribed burning. “This is a good example of an integrated project. The thinning does no good without prescribed burning, and the prescribed burning does no good without the thinning,” he said. “You have to have both, or you’re just wasting time and money.”

Poovey praised Isle of Wight Inc. for its eco-friendly thoroughness. Because the company uses a tub grinder, it can make mulch out of waste from a chipper. “They have the right equipment to get the job done effectively and efficiently,” Poovey said. “Usually contractors pile and back-haul this material [into the forest], but Isle of Wight sells mulch, so instead of waste, this too becomes a forest product.”

“This really is a win-win situation,” said Joe McCauley, refuge manager of Eastern Virginia Rivers National Wildlife Refuge Complex. “Working with partners, we have developed procedures to protect sensitive historic and cultural resources while improving migratory bird habitat, reducing the potential for catastrophic wildfire, and producing forest products.”

Catherine J. Hibbard is a wildlife refuge specialist in the Northeast Region’s fire management program.



Bryan Poovey in a thinned stand at James River National Wildlife Refuge, VA. Removing 30 to 40 percent of the trees promotes tree growth, increases diversity and reduces wildfire hazard. (Gerald Vickers/USFWS)

Harmony From Discord

By Shawn Gillette

The adage that a picture is worth a thousand words can be turned on its head. Sometimes thousands of words can make great pictures.

That's just the outcome of what began as a heated orientation session about refuge resources between Bosque del Apache National Wildlife Refuge, NM, staff and veteran photographers.

Bosque del Apache Refuge is a photographer's dream. Each year, thousands come to photograph wildlife on the refuge; many of their photographs have appeared in prestigious magazines and books and on Web sites. Among the thousands are a handful of professional photographers who conduct commercial workshops. As a requirement of their special use permits, the commercial photographers and their groups must attend an orientation about refuge resources.

Generally, the sessions are interactive, but in the fall of 2007, many popular impoundments were in their final growth rotation. Much of the vegetation had grown higher than in previous years, resulting in poor wildlife viewing and photography opportunities in some areas. Moreover, refuge staff was concentrating on priority tasks that ranked higher than mechanically cutting the emergent vegetation. It all led to friction between the refuge and some visitors.

Some folks who had been coming to the refuge for years complained about what they considered "neglect" of refuge resources. Arthur Morris, a passionate commercial photographer whose work has been exhibited around the world, and his group got into a heated exchange with refuge staff. The verbal exchange continued until John Vradenburg, Bosque del Apache Refuge's senior biologist, offered Morris the chance to be part of a solution. To the refuge's delight, he accepted.

Working with refuge staff in September 2008 to select locations for optimal wildlife viewing and photography, Morris

and his group cut view windows in the vegetation. He recruited 12 volunteers, all photographers, to hand-cut eight spacious view windows through swaths of cattail, coyote willow, phragmites and mounds of kochia. Visitors used the windows throughout 2008 and 2009. "Their work was phenomenal," Vradenburg says. "Not only did they hand-cut some tenacious vegetation, but their work was so much better than we could have done if we had to cut it mechanically."

Extending the Partnership

The partnership extended to the neighboring community of Socorro. Thanks to Morris's coordination, several restaurants provided free meals to the volunteers and local hotels gave free rooms. "It was amazing to see just how much the community supported the efforts of these volunteers," says refuge manager Tom Melanson.

Long after the others went their separate ways, five volunteers remained in close contact, often visiting each other for photography opportunities. Gary Rouleau from New Mexico, Debbie and Jerry Stevens from Texas, Steve Garner from Wyoming and William Lloyd from California formed the nucleus of the team that returned in 2009.

On September 26, 2009, Rouleau and the others – nicknamed "The Animals" by Morris – returned to Bosque del Apache Refuge to assist with view window improvements. Morris again coordinated with hotels and local restaurants to provide free meals and rooms. The team




Volunteers helped cut view windows in vegetation at Bosque del Apache National Wildlife Refuge, NM, to enhance photo opportunities such as this one of a heron. (Steve Garner)

hand-cut a dozen more view windows in 2009, in addition to dressing up many of the 2008 windows.

"One of the benefits was the opportunity to spend time during the cool morning hours, taking photographs," says Rouleau. An exhibit of the team's photography is planned for the refuge visitor center in 2010.

"I'm retired," says Garner, "and photography is my passion. I can spend my time anywhere, but my love for the Bosque runs so deep that I came back to assist with the work." Garner donated some of his photography to the refuge, which recently used one of his pictures for a Comprehensive Conservation Plan update. Debbie Stevens, an accomplished artist, uses her photos as the basis for her entries in the annual Duck Stamp competition.

Thousands of visitors have been able to view, photograph and enjoy wildlife thanks to the efforts of the photographers and the partnership that grew out of a heated debate on a cool fall day in 2007. 

Shawn Gillette is supervisory outdoor recreation planner at Bosque del Apache National Wildlife Refuge.

Boosting Visibility by Reaching Audiences

By Jennifer Anderson

With few visitor centers nationwide and sometimes only kiosks to welcome visitors, it's no wonder national wildlife refuges can project the image that they are little interested in human visitation.

To change this perception, several national wildlife refuges are launching training programs in hopes of boosting visibility, and educating and involving neighbors in their missions.

At Mississippi's Dahomey National Wildlife Refuge, the catalyst to launch a training program came in 2006, when graduate students of sociology professor Alan Barton at Delta State University questioned residents about the refuge as part of a study on sustainable development.

Several neighbors thought of the refuge as a mysterious landscape, quick to ward off trespassers. Barton, who also is vice president of the Friends of Dahomey National Wildlife Refuge, traced those misperceptions to the land's history as a private, all-white hunting club before it became a refuge in 1990.

So, in January 2009 the Friends launched a one-credit course for high school science teachers, "Seminar in Environmental Education," which meets for an hour each week. Barton visited with teachers at the area's two high schools to share course information and sent a press release to local newspapers, which published articles about the course. Barton also sent flyers to area schools advertising the opportunity "for high school teachers interested in the environment and the outdoors" to earn continuing education credits.

Of the 20 people enrolled, four were high school science teachers, three taught at the elementary or community college level, one was a Delta State University student, several belonged to the Friends group and two are U.S. Fish and Wildlife Service employees.

The National Fish and Wildlife Foundation funds the course, including field trips to the refuge and stipends for guest lecturers. Teachers pay a nominal fee.



An elementary school student at Bear River Migratory Bird Refuge, UT, studies data he and his classmates collected about water quality, plants and wildlife. (USFWS)

Barton, who coordinates the class, arranged for representatives from various agencies, businesses and organizations to lead discussions. Among them, a representative from the Audubon Society discussed private land management; the refuge manager talked about the history of the refuge and its mission; a Delta State professor of geology covered the area's ecology; and a timber company biologist shared information on management of the region's bottomland hardwood forest.

Each lecture seeks to familiarize teachers with environmental education and the resources available at the refuge. Course requirements include three visits to the refuge; next fall, five field trips have been scheduled for high school students.

As students become familiar with the refuge, Barton others in the Friends group believe more people in the

community will be inspired to visit. Youngsters may even consider pursuing careers in conservation.

Moving West


In 2006, Utah's Box Elder School District adopted as part of its curriculum an environmental educational program that Bear River Migratory Bird Refuge helped develop, says Kathi Stopher, instructional specialist at the refuge.

As the refuge was contemplating ways to educate residents about the watershed, she explains, Hardware Ranch wildlife management area in the northern Rockies proposed a partnership targeting elementary school students. The union was ideal: "They are in the mountains, and we are at the end of Bear River, so we could connect the two ecosystems."

With funding from the federal Challenge Cost Share Program, the partners each semester help educate fourth-graders. Field trips include visits to Hardware Ranch to study the riparian zone and plants and animals in high elevations, and to the refuge in the spring to study water quality and wildlife and plants in the wetlands.

Students wade into creeks that drain into Bear River to collect dragonflies and other macro invertebrates as they study water quality. They also are encouraged to think about human impacts: This year, they will stencil storm drains with "No Pollution—Drains to Refuge."

In the winter, lessons learned outside are reinforced with classroom instruction provided by the partners, Stopher says. One lesson might cover shorebird dependency on wetlands while another might teach students to identify animal and plant habitats in both elevations.

"Our lesson plans correlate highly to state science standards," Stopher says. "It was a perfect union of partners, funding and the willingness of school district to provide teachers to attend trainings." 

Jennifer Anderson is a regular contributor to Refuge Update.

Can You Hear Me Now?

At Montezuma Refuge, the Answer Is Yes



The Montezuma National Wildlife Refuge cellphone tour, which cost \$900 to install and runs about \$200 a month to operate, includes walking and auto portions. (Andrea VanBeusichem/USFWS)

By Ashley Hodges

Like other refuges, Montezuma National Wildlife Refuge is always looking for ways to engage visitors at a low cost.

The nearly 10,000-acre refuge, located on the northern end of Cayuga Lake in the Finger Lakes region of New York state, is a major resting area for Canada geese, snow geese, mallards and American black ducks on their journeys to and from nesting areas in eastern Canada. It is also home to nesting bald eagles, osprey, black terns, black-crowned night herons and great blue herons. It is always seeking to expand its environmental interpretation component to help visitors appreciate its importance to birds and waterfowl.

So, last summer, when I was working as a Student Cooperative Education Program (SCEP) intern at Montezuma Refuge, visitor services manager Andrea VanBeusichem asked me to research a

company called Guide by Cell and start a cellphone tour.

Andrea had read that Upper Mississippi River National Fish and Wildlife Refuge implemented a similar program. She wanted to bring one to Montezuma Refuge because it is an innovative feature that would make a visit more memorable. She liked that interpretive messages could change with the seasons, and she believed that the cellphone tour would appeal to technologically savvy visitors.

Ultimately, however, Andrea wanted to maximize limited resources.

“We don’t have the staff to give daily or even weekly tours. So, this is one way to have personal contact with visitors and tell the story,” Andrea said. “It’s more personal than a sign or brochure.”

A cellphone audio tour allows visitors to call a local number at various locations around the refuge and listen to an interpretive message. The messages typically last one minute, and they use the landscape as a springboard for interpreting biological phenomenon, facts, and refuge history. For example, among the 13 messages on the Montezuma Refuge tour, one explains the concept of emergent marshes, another details the refuge’s role in recovering bald eagle populations, and a third presents the history of a branch of the Erie Canal that runs through the refuge.

These interpretive messages can be recorded as often as desired, unlike expensive signs that, comparatively speaking, are set in stone. The audio messages also can be used to disseminate news, promote upcoming events and collect comments and suggestions from visitors. Additionally, because there is no limit to the number of destinations on a tour, a refuge can incorporate as many locations as it can manage.

At Montezuma Refuge, audio tour usage varies with the season, with the highest during the summer and peak migration seasons and the lowest during winter months.

Easy Setup

Setting it up wasn’t difficult. All I had to do was contact San Francisco-based Guide by Cell to learn the procedures of getting a cellphone tour off the ground. Montezuma Refuge is part of a wetlands complex composed of lands owned by the New York Department of Environmental Conservation and the Audubon Society. So, we decided to partner with these organizations in starting the tour. I presented a proposal to the Friends of the Montezuma Wetlands Complex, and the Friends immediately approved funding.

Guide by Cell, whose service cost \$900 to install and runs about \$200 a month, taught all visitor services staff how to record messages, upload messages, monitor visitor usage and access visitor comments. The final step was to order and post signs and rack cards instructing visitors on how to use the cellphone tour.

The hardest part was setting deadlines and maintaining communication with partners during the busiest seasons of the year. I learned that it is important to be flexible and patient.

But the payoff was worth it. The tour went live just in time for the spring 2010 migration. 🦋

Ashley Hodges is a student at Howard University and an intern in the Division of Visitor Services and Communication.

CARE Honors Four Members of Congress

The Cooperative Alliance for Refuge Enhancement (CARE) recently recognized four federal lawmakers for their service to the Refuge System and conservation in general.

Rep. Norm Dicks of Washington state, the former chair of the House Appropriations subcommittee on Interior, Environment, and Related Agencies, received a lifetime achievement award. CARE also cited Sen. Daniel Inouye of Hawaii, Rep. Frank LoBiondo of New Jersey and Rep. Ed Perlmutter of Colorado for their environmental stewardship of national wildlife refuges.

“With at least one refuge in every state and within an hour’s drive of most major U.S. cities, it is safe to say that Chairman Dicks has improved the lives and surroundings of literally millions of Americans across the entire country,” said Evan Hirsche, president of the National Wildlife Refuge Association and chair of CARE. “At a time when the National Wildlife Refuge System was reeling from funding cuts and being considered for downsizing, Chairman Dicks stepped in to resurrect this unique system of conservation lands, leading the way to securing a total increase of \$105 million . . . He leaves behind a legacy that

we are all indebted to and of which his constituents can be very proud.”

Rep. Jim Moran of Virginia replaced Dicks as chair of the House Appropriations subcommittee in March after Dicks was elected chair of the House Appropriation Defense subcommittee.


Inouye is chair of the Senate Appropriations Committee. In that position and previously as a senior member, CARE noted, Inouye has helped to secure significant increases for the operations and maintenance of the Refuge System nationwide. And last year Inouye secured more than \$8 million of federal funding for four national wildlife refuges in his home state of Hawaii. The funds were part of the American Recovery and Reinvestment Act of 2009 and went toward energy efficient infrastructure projects.

LoBiondo and Perlmutter are vice co-chairs of the Congressional Wildlife Refuge Caucus. LoBiondo and Perlmutter have helped to raise awareness of the Refuge System, support adequate Refuge System budgets and ensure the sustained growth of the System for future generations, CARE said. In addition, they have helped to



Rep. Norm Dicks of Washington state, the former chair of the House Appropriations subcommittee on Interior, Environment, and Related Agencies, received a lifetime achievement award. (Tami A. Heilemann/DOI)

secure an increase of nearly \$70 million, almost 16 percent, for Refuge System operations and maintenance over the past two years.

“With three wildlife refuges in my district, I am keenly aware of the environmental and economical benefits they provide to local communities and South Jersey at large. Given that New Jersey is the most densely-populated state, I continue to support our national wildlife refuge network as a critical tool to preserve pristine space for future generations,” LoBiondo said. 

CARE Seeks \$578 Million for Refuges in 2011

The Cooperative Alliance for Refuge Enhancement (CARE) has urged Congress to increase Refuge System operations and maintenance funding to \$578 million in fiscal year 2011. That is \$78.5 million more than President Obama’s 2011 budget request.

In its annual report, CARE expressed concern that the President’s request of \$499.5 million will undermine progress, particularly in matters related to law enforcement and invasive species eradication.


In recommending the funding increase, CARE noted that the Refuge System

provides “essential habitat for migratory birds and other wildlife, a safe haven for endangered species, \$1.7 billion annually to local economies, and compatible recreational opportunities such as hunting, fishing, wildlife watching, and environmental education for more than 41 million visitors each year.”

“Every dollar invested in the Refuge System returns, on average, \$4 to local communities,” said Evan Hirsche, president of the National Wildlife Refuge Association and chair of CARE.

Regarding law enforcement, the CARE report said, 213 officers patrol the Refuge System’s more than 150 million acres and

that an additional 209 are needed at an additional annual cost of \$31.4 million to protect visitors and respond to various legal violations.

On the subject of invasive species eradication, the CARE report said, “approximately 2.3 million acres of refuge lands are overrun with non-native invasive plants, while more than 4,400 invasive animal populations ravage millions more acres.” The report estimated that the Refuge System needs at least \$25 million per year to treat just one-third of its infested plant acreage and begin low-level control of invasive animals. 

University of Alaska Is Site of First DOI Climate Science Center

The University of Alaska Anchorage has been chosen as the site of the first of five regional Department of the Interior Climate Science Centers (CSCs) to be created this year and next, Secretary Ken Salazar announced this spring.

“With rapidly melting Arctic sea ice and permafrost, and threats to the survival of Native Alaskan coastal communities, Alaska is ground zero for climate change,” the Secretary said. “We must put science to work to help us adjust to the impacts of climate change on Alaska’s resources and peoples.”



A polar bear saunters along the coast at Arctic National Wildlife Refuge, AK. (Susanne Miller/USFWS)

“With rapidly melting Arctic sea ice and permafrost, and threats to the survival of Native Alaskan coastal communities, Alaska is ground zero for climate change.”

Interior Secretary Ken Salazar

In addition, very shortly the Interior Department will be requesting grant proposals for locations to establish the next four CSCs – this fiscal year in the Northwest and Southeast regions and next fiscal year in the Southwest and North Central regions – the Secretary announced.

The climate centers’ authorizing document – Secretarial Order No. 3289 issued in 2009 – mandates their creation in tandem with a network of landscape conservation cooperatives (LCCs) covering the entire nation. All told, the Interior Department plans to have eight regional CSCs and 21 LCCs up and running by 2012.

“With their distinct yet complementary roles, CSCs and LCCs are the

cornerstones of our efforts to integrate our science and management expertise across bureaus and with our outside partners,” the Secretary said.

Together, the CSCs and LCCs will help the Interior Department develop and share on-the-ground strategies needed to tackle climate change, and they will enable the Department to better deliver science and adaptive-management strategies for critical cultural and natural resources at the regional and landscape levels, the Secretary said.

The CSCs will synthesize the climate-impact data and management strategies that Interior Department bureaus and outside partners have developed. At the same time, the LCCs will focus on impacts that typically extend beyond the jurisdictional borders of national wildlife refuges and other Interior Department lands – including invasive species, fire, drought, wildlife and changing water supplies.

“This integrated approach will improve our ability to understand and forecast which resources are most vulnerable to climate-change impacts and how to make them more resilient in the face of those impacts,” Secretary Salazar concluded. 🦋

In Arizona, Refuges Are Oases for Fish — *continued from page 7*

The secret to improving habitat and stabilizing native fish population is to encourage water conservation and wetland development by private landowners. So far, 25,000 private acres are protected under conservation easements, and some adjacent ranchers have agreed to raise threatened native fish in private ponds under safe harbor agreements that indemnify them against negative legal action.

“That is key, so that we don’t have all of our eggs in one basket, so to speak,” says Radke.

It’s a lot of work, but the beautiful shiners and other fish are worth it, Radke says. Among the reasons he cites are: Roughly one-fourth of Arizona’s native species are found on the refuges’ relatively tiny acreage. The native fish contribute to general biodiversity of the

desert region. And, by eating mosquito larvae, the fish control mosquitoes and provide a direct benefit to human, especially when something like West Nile virus breaks out, as it did near the refuges last decade. 🦋

Looting's Costly Aftermath — continued from page 1

Burnside, who now teaches a course on prosecuting looters at the Federal Law Enforcement Training Center, says it's hard to fight looting on refuges. She and other experts say Refuge System data understate the scope of the problem because many thefts go undetected. From 1996 to 2005, the Refuge System documented between one and 19 looting incidents per year and reported 26 percent as solved, according to research published by Todd Swain, a special agent with the National Park Service; there were no arrests and no felony convictions. In fiscal 2006 and again in 2007, six incidents resulted in three felony convictions.

Enforcement Staff Stretched

Even in documented incidents, experts say, few looters are brought to trial because law enforcement staff is stretched thin, the evidence-gathering process is arduous, and many prosecutors are reluctant to take ARPA cases.

Paying cleanup costs is only one challenge facing Cypress Creek Refuge after the theft. The refuge must also:

- Decide the best way to cover and restore the looted site, to protect it from weather and further vandalism. The disturbed site appears to have been a Native American settlement from about 6000 B.C. to 400 A.D.
- Find a permanent home for the man-made artifacts recovered. These include: flint grinding tools, spear heads, axe heads, pottery sherds and pieces of clay figurines, some dating as far back as 3000 to 1000 B.C., according to the archaeology report prepared

for the court. (Reburying looted artifacts is not an option; this would further compromise the integrity of the archaeological site.)

- Consult native tribes about the return of human bone fragments found with the artifacts. Under the Native American Graves Protection and Repatriation Act of 1990, federal agencies must turn over Native American human remains and burial or sacred items to their tribal descendants.

Cypress Creek refuge manager Mike Brown says the U.S. Fish and Wildlife Service regional office is handling much of this work. An added challenge for Brown and another Service point person – Great Lakes-Big Rivers Region archaeologist David Kluth – is that neither assumed his post until after the investigation had closed. Kluth, the closest regional archaeologist, is based 700 miles away in Fort Snelling, MN. He traveled to Cypress Creek Refuge this winter to inspect the recovered artifacts.

The recovered artifacts are in temporary storage at Crab Orchard National Wildlife Refuge, IL. Kluth would like to



These objects were among the artifacts found in the house of an Illinois man who was convicted of violating the federal Archaeological Resources Protection Act. (Geoff Donaldson/USFWS)

see them go to either the Illinois State Museum or Southern Illinois University, both of which meet federal guidelines and have curation agreements with the Service. “We’d like to keep the collection in the state,” Kluth says.

In mid-April, dialogue about the Native American human remains had not yet begun. Shawnee National Forest archaeologist Mary McCorvie, co-author of the refuge’s damage assessment report, suggests interested parties may include the Peoria tribe, which once belonged to the Illini (who ceded area land to the federal government in the 1800s), and the Shawnee in Oklahoma.

The Cypress Creek case marked the first successful prosecution of a looting on federal land in Illinois. 🦋

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

Understanding a Last Frontier — continued from page 12

upright stones that follow the crest of the island and track the sun. “Our real goal,” White said, “is to marry that traditional knowledge with Western science to get a more comprehensive understanding of Papahānaumokuākea – to protect the resources we have here and help perpetuate the Hawaiian culture tied to them.”

As solid as any partnership may seem at the outset, White warned, none will survive unattended. Managers must shape and nurture the vision that brought everyone together and makes data collection possible.

“I&M is the foundation and basis for all our decision making,” White said.

“Without it, we have no standardized mechanism for even measuring changes in water temperature.

“No one agency can do it alone.” 🦋

Jennifer Anderson is a frequent contributor to Refuge Update.

Tulare Basin — continued from page 1

Conservation easements provide for land to be managed for habitat purposes while allowing landowners to retain ownership. The Service received concurrence from the California Fish and Game Commission and local county supervisors before implementing the Tulare Basin Wildlife Management Area project.

“We want to rebuild waterfowl population in the Pacific Flyway to the levels they were at in the 1970s,” says Scott Frazer, a Service wildlife refuge specialist.

The pieces of land acquired this spring – the 627-acre Rancho Visalia tract and the 150-acre Santura Duck Club tract – are important building blocks in the effort to arrest and eventually reverse the recent decline in wetlands habitat, Frazer says. The



These wetlands were acquired via conservation easement for creation of the Tulare Basin Wildlife Management Area. (Scott Frazer/USFWS)

tracts will help keep adjacent private wetlands habitat intact. The creation of the wildlife management area via conservation easements will also allow Kern Refuge to give private landowners advice on how manage the wetlands to foster desirable plants – swamp Timothy (a tiny grass that produces lots of seeds), watergrass and millet – that will sustain migratory birds throughout the winter.

In addition, Frazer says, the Rancho Visalia tract contains a crucial

uplands component and is home to the endangered San Joaquin kit fox.

Funding for the conservation easements came from the sale of federal Duck Stamps and was approved in 2009 by the Migratory Bird Conservation Commission. The Tulare Basin Wetlands Association, Tulare Basin Wildlife Partners, California Waterfowl Association and California Outdoor Heritage Alliance are among the non-governmental partners in the project.

Historically, Tulare Lake was the largest freshwater wetland west of the Mississippi River and provided habitat to hundreds of thousands of migratory waterfowl annually. While Tulare Lake has vanished because of water diversions for agricultural and municipal uses, remaining privately owned wetlands have been recognized in the Central Valley Joint Venture and North American Waterfowl Management Plan for their importance to migratory waterfowl and shorebirds of the Pacific Flyway. 🦋

Chief's Corner — continued from page 2

help to landowners – including ranchers and farmers – who want to conserve their land, and to families so they can spend more time outdoors. President Obama vowed to help foster a new generation of community and urban parks so that “children across America have the chance to experience places like Millennium Park in my own Chicago.”

Finally, he noted, “Even in times of crisis, we’re called to take the long view to preserve our national heritage – because in doing so we fulfill some of the responsibilities that falls to all of us as Americans, as inhabitants of this small planet.”

So, where do we go from here? First, make your voice heard. Go to the Department of the Interior Web site to join the conversation: <http://www.doi.gov/americasgreatoutdoors/>. Scroll

down the page to the link to “Share Your Story,” where you can tell the White House and the Department just how important wildlife refuges, waterfowl production areas, conservation easements and large working landscapes are to you and your community. You can even leave photos of your favorite places.

Then there’s the link to “Share Your Ideas & Join the Conversation,” where you can tell the administration your thoughts about what should be happening regarding land conservation. Now you can share conservation strategies that engage communities, explain how to build buffers around protected areas by using conservation easements or, explain the value of wetland easements in the prairies. You can give examples of successful projects and partnerships where you have delivered conservation

strategies. Talk about the role and influence that all agencies – state and federal – can have on conservation when we together work toward common conservation goals.

Second, the Secretary of the Interior will be holding public listening sessions in coming months. The schedule is not yet finalized. So pay special attention to the news – frequenting the Department Web page (<http://www.doi.gov/>) regularly – to make sure you get to one of those public sessions.

I can’t recall a time when we have been presented with this kind of chance to make our viewpoints known. The White House has opened the dialogue. It’s our job to engage, listen and learn so we can enrich the discussion and, most important, the results. 🦋



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A Look Back ... Elizabeth "Betty" Losey

In 1947, Elizabeth "Betty" Losey – fresh from the University of Michigan with a master of science degree in wildlife management and conservation – said she couldn't get a job with the Michigan State Game Division because no one wanted a woman out in the field overnight. Fortunately, a fellow Michigan graduate offered her a job. Then Chief of Refuges J. Clark Salyer hired Losey as a waterfowl research biologist at Seney National Wildlife Refuge, MI. She lived in a sparsely furnished cabin on the refuge and studied duck brood behavior; she remembers that the refuge installed an outhouse one year "as a Christmas present."

"I made up my mind that no matter what they threw at me, I was not going to murmur, and I didn't. They had opened the door a crack, my foot was in it, and I was going to go in the rest of the way."

When the U.S. Fish and Wildlife Service proposed a transfer to North Dakota a few years later, however, Losey chose to stay in Michigan with her husband and returned to Seney Refuge as a volunteer in 1996, only after her husband had died. She was employed at Seney Refuge from 1947 to 1950, but her significant contributions as a volunteer continued almost until her death in 2005.




Elizabeth "Betty" Losey: "My favorite workplace was right in the middle of a marsh, listening to the birds and finding waterfowl nests and ducklings." (USFWS)

She gave herself the title of biological historian; wrote a history of the refuge as well as a booklet about its first manager, C.S. Johnson; mentored summer interns;

and assisted refuge staff with wildlife surveys. At 92, she wrote her final peer-reviewed paper on the history of sharp-tailed grouse at the refuge. The paper was published posthumously in 2007 in the journal *The Passenger Pigeon*.

Losey was always willing to read and learn, says Greg Corace, Seney Refuge forester, who recalls her "willingness to think on her own. When she was working here, she would go to the field with men to do surveys and she was ridiculed. Her passion for what she did drove her to overcome social norms. Betty was a leader in the way she thought and acted and held herself."

Losey was still going strong when she was named National Wildlife Refuge Association Volunteer of the Year in 2003. Former Seney Refuge manager Tracy Casselman found Betty Losey a tremendous source of knowledge and inspiration, a woman with an "infectious smile, sharp wit, keen intellect and uncompromising determination." 

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.