

Fieldwork

## Scientists Discover a New Pacific Iguana and More Clues to a Longtime Mystery

By Robert Fisher (USGS) and Scott Keogh (Australian National University)

A new iguana has been discovered in the central regions of Fiji. The colorful new species, named *Brachylophus bulabula*, joins only two other living Pacific iguana species, one of which is critically endangered. The scientific name *bulabula* is a doubling of *bula*, the Fijian word for “hello,” offering an even more enthusiastic greeting.

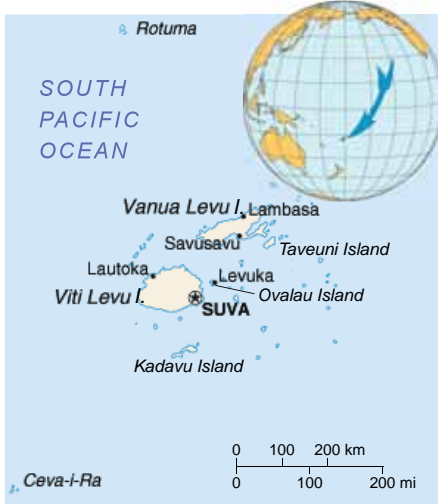
Pacific iguanas have almost disappeared as the result of human presence. Two species were eaten to extinction after people arrived on the islands nearly 3,000 years ago. The three living *Brachylophus* iguana species face threats from loss and alteration of their habitat, as well as from feral cats, mongooses, and goats that eat iguanas or their food sources.

“Our new understanding of the species diversity in this group is a first step in identifying conservation targets,” said **Robert Fisher**, a research zoologist at the U.S. Geological Survey (USGS) in San

Newly discovered Pacific iguana *Brachylophus bulabula*; male. Photograph copyright © **Paddy Ryan**, Ryan Photographic (URL <http://www.ryanphotographic.com/>); used with permission.



*Brachylophus bulabula*; female on Kadavu Island, Fiji. Photograph copyright © **Paddy Ryan**, Ryan Photographic (URL <http://www.ryanphotographic.com/>); used with permission.



Fiji comprises more than 300 islands, of which approximately 110 are inhabited.

Diego and coauthor of a study on the new iguana with scientists from the Australian National University and Macquarie University in Australia.

An important finding for conservation of the genetic diversity in these iguanas is that, with only one exception, each of the 13 islands where living iguanas were sampled showed at least one distinct iguana genetic line that was not seen elsewhere.

The Fiji crested iguana, *Brachylophus vitiensis*, is gone from many islands it once occupied and is now listed as Critically Endangered on the “Red List” of the International Union for Conservation of Nature (IUCN), the world’s oldest and

largest global environmental network (URL <http://www.iucn.org/>). “Unfortunately, this new study indicates that the other, previously identified Pacific iguana species, *Brachylophus fasciatus*, is probably critically endangered also,” **Fisher** said.

The mystery of how the Pacific iguanas originally arrived has long puzzled biologists and geographers. Their closest relatives are found nearly 5,000 miles across the ocean in the New World.

“The distinctive Fijian iguanas are famous for their beauty and also for their unusual occurrence in the middle of the

(New Iguana continued on page 2)

### Sound Waves

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### Submission Guidelines

**Deadline:** The deadline for news items and publication lists for the March issue of *Sound Waves* is Wednesday, January 14.

**Publications:** When new publications or products are released, please notify the editor with a full reference and a bulleted summary or description.

**Images:** Please submit all images at publication size (column, 2-column, or page width). Resolution of 200 to 300 dpi (dots per inch) is best. Adobe Illustrator® files or EPS files work well with vector files (such as graphs or diagrams). TIFF and JPEG files work well with raster files (photographs or rasterized vector files).

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Can't find the answer to your question on the Web? Call 1-888-ASK-USGS

Want to e-mail your question to the USGS? Send it to this address: [ask@usgs.gov](mailto:ask@usgs.gov)

### Fieldwork, continued

(New Iguana continued from page 1)

Pacific Ocean—all of their closest relatives are in the Americas,” said **Scott Keogh**, an associate professor at the Australian National University in Canberra, Australia, and lead author of the study.

The highest islands of Fiji have been continuously above sea level for at least the past 16 million years, and the current study's findings suggest that the Pacific iguanas, both extinct and living, were likely on the islands much of that time. Ancestors of the Pacific iguanas may have arrived as early as 13 million years ago after making a 5,000-mile rafting trip from the New World.

Realizing that scientists are just now describing the diversity in even such colorful and distinctive groups as Pacific iguanas is important in setting biodiversity targets for the Pacific Basin.

“This island basin is currently under attack by a number of invasive species, such as the brown tree snake, various rat species, and the coqui frog, which tend to reduce biodiversity,” said **Fisher**. “Climate change may reduce coastal habitats and alter coastlines in the Pacific, further putting biodiversity at risk. A more accurate understanding of the patterns and processes that impact diversity in these unique island groups will help land man-



*Brachylophus bulabula*; male in threat posture on Kadavu Island, Fiji. Photograph copyright © **Pad-dy Ryan**, Ryan Photographic (URL <http://www.ryanphotographic.com/>); used with permission.



*Brachylophus bulabula*; male on Ovalau Island, Fiji. Photograph copyright © **Peter S. Harlow**; used with permission.

agers set appropriate goals for conservation of these resources.”

The new discovery was published in a recent special edition of *Philosophical Transactions of the Royal Society B* that pays tribute to **Charles Darwin's** contribution to our understanding of evolution in the Pacific region. The other coauthors of the study are **Danielle Edwards** at the Australian National University and **Peter Harlow** at Macquarie University in Australia.

The full reference for the paper is:

Keogh, J.S., Edwards, D.L., Fisher, R.N., and Harlow, P.S., 2008, Molecular and morphological analysis of the critically endangered Fijian iguanas reveals cryptic diversity and a complex biogeographic history, *in* Trewick, S.A., and Cowie, R.H., eds., *Evolution on Pacific islands; Darwin's legacy: Philosophical Transactions of the Royal Society B*, v. 363, no. 1508, p. 3413-3426, doi:10.1098/rstb.2008.0120 [URL <http://dx.doi.org/10.1098/rstb.2008.0120>].



## A Day in the Life of a Marine Biologist— Tracking Sea Otters off the California Coast

By **Tania Larson**

As I arrive at the marina in Monterey Bay, the sky is the dull gray of early morning. A thin fog floats over calm waters—a horizon of glass interrupted by protruding kelp leaves, the occasional emerging head of a sea lion, and an otter floating effortlessly on its back. But the seagulls are starting to call from overhead, a few sea lions hauled out on the pier are beginning to bark at each other, and the engine of a whale-watching boat is just rumbling to life in the distance.

Both the marine and the human world are waking up, and our small crew needs to hit the water soon if we want to be at the table as the sea otters enjoy their breakfast. This is my day to live the life of a marine biologist studying sea otters, and I couldn't be more excited. If you love the water, are enthralled by marine mammals, and want a job that makes a difference, marine biology is working the dream.

For the morning, I am heading out in a boat to track and observe sea otters in the bay. In the afternoon, I will set out along the California coastline to spot them from the shore.

I meet up with researchers **Tim Tinker** and **Michelle Staedler**, and we immediately begin to load the boat. Snacks, log-books, life jackets, and a jumble of tracking equipment are all stored and secured. **Tim** is lead scientist for the U.S. Geological Survey (USGS) sea-otter-research program in California. **Michelle** is the Sea Otter Research and Conservation coordinator for the Monterey Bay Aquarium; she also conducts graduate research for her M.S. degree at the University of California, Santa Cruz.

And then, we're off on the chase. We're not looking for just any otter; we hope to find a specific few that the team has been following as part of a study examining how the otters eat and how they raise and train their pups. **Tim** drives the boat, while **Michelle** holds out a VHF (very high frequency) radio receiver, waiting for the beep that will tell her that one of the study animals is in the vicinity. We haven't gone far when Michelle has located "6-068," so called



*A sea otter swims in Monterey Bay, California. USGS scientists and their partners study sea otters in efforts to help the threatened species continue to recover from near extinction. Photograph by **Tania Larson**, USGS.*



*Sea-otter researchers **Michelle Staedler** (left) of Monterey Bay Aquarium and **Tim Tinker** of the USGS work together to locate sea otters for their study of sea-otter diet and behavior. Photograph by **Tania Larson**, USGS.*

because that is the otter's radio-transmitter frequency. As they suspected, this mother otter is foraging in the local marina.

Like humans, when it comes to dining, each otter has its own favorite dives. One may prefer the crabs and clams at the marina; another, the delectable sea urchins from a more private spot up the coast. Also like humans, some sea otters use tools when they eat. In areas where

otters have to compete with each other for limited food, individuals tend to specialize in particular foraging skills. One otter may focus on finding abalones, another on using tools to crack crab shells. These variations in their foraging techniques help the species to survive.

Our job today is to watch and record the mother otter's behavior, particularly her

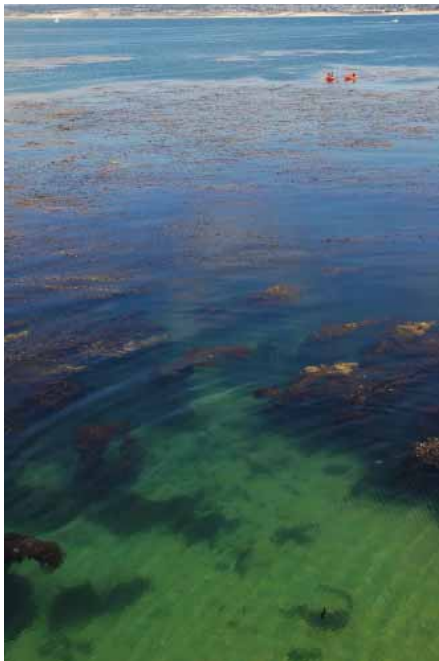
*(Day in the Life continued on page 4)*

## Fieldwork, continued

(Day in the Life continued from page 3)

eating habits: how long she dives, what she brings back to the surface, whether she shares it with her pup, and so on. The logbook is precise and detailed. For each dive, **Michelle** fills in a grid of information: dive time; successful dive (yes or no for returning with food); types, quantities, and sizes of food; handling time of the food; and full surface time. To measure the size of the food, the scientists compare it to the width of an otter's paw, which averages 5 cm. So, if it's the size of one paw, the food is rated a 1; of two paws, 2; and so on. No matter what the otter is doing, we keep the stopwatch running.

The mother appears at the surface, and **Michelle** begins writing. The otter has returned with a clam, one paw wide, roundish. She handles it for 6 seconds and then dips beneath the surface. When she reappears, she has a collection of food. Otters will often use their abdomen as a makeshift serving tray, and they can pile it high with goodies. She chomps down on a fat innkeeper worm. When she's finished,



*Kelp forests are often called the rainforest of the sea; they support wide varieties of marine life. Sea otters are both a sentinel and a keystone species for the health of kelp forests. Without sea otters to limit sea urchins and other herbivores, overgrazing drastically diminishes the kelp.* Photograph by **Tania Larson**, USGS.



*A sea-otter pup watches eagerly as its mother eats a fat innkeeper worm in Monterey Bay, California. Photograph by **Tania Larson**, USGS.*

she offers a morsel of something to the pup; the pup refuses it. Again, she offers it to the pup, and again the pup declines. She dives back down to hunt for tastier fare.

"She's keeping the good stuff for herself," **Michelle** comments. "Whatever she just offered the pup, neither of them wanted to eat."

**Michelle** records all of these details to help scientists understand how much the individual mothers invest in their pups, how much energy they expend in finding food, and whether different investments, energy expenditures, and nutrition affect the success rates for the mothers. Sharing food is considered a big part of the mother's "investment" in the pup. To develop a more precise understanding of this investment, **Michelle** has been investing a lot of time herself. Depending on the number of females in the study who have pups, she conducts anywhere from two to seven "activity budgets" per week, watching for all the big firsts for the young otters. Each budget is a 6-hour session of collecting continuous data on a mom-and-pup pair from shore. Over the length of the study, **Michelle** is learning when the pups stop nursing and when they begin to dive, use tools, and forage on their own.

Scientists have found that the mothers teach the tricks of their favorite trades to their young, passing on not only their specialized skills but also their specialized diets. If the mother uses tools, the pup will learn to use tools. If the mother has a penchant for crabs, the pup will develop one too. Scientists are wondering whether these individualized diets are the secret to success for some otters and the road to ruin for others. They hope that seeing

where and what otters eat will shed some light on the recent rise in the mortality rate of California sea otters. Sea otters are listed as threatened under the Endangered Species Act, and the goal of the science is recovery and conservation of the species.

Number 6-068 pops back to the surface with a cancer crab. **Michelle** notes the dive time and begins counting the handling time for this particular fare. There is, of course, a reason for this stopwatch obsession: recording the times of the activities will help the scientists align the data from their observations with data from an instrument that researchers implanted in the otter's abdomen at the beginning of the study. This time-depth recorder provides a detailed look into the life of the otter: when she's eating, resting, and diving; how deep she's diving; and what her internal body temperature is. With these implanted devices, the researchers are able to follow an otter's every move for 1 to 2 years. A second device, the VHF radio transmitter, allows scientists to locate the animals by radio telemetry for 3 to 5 years.

From these recorders, the team will get data on thousands of foraging dives. And with all the observational and electronic data lined up according to **Michelle's** carefully noted times, scientists might eventually be able to determine what otters are eating simply by examining the electronic data on where, how long, and how deep they are diving. By comparing this information with survival notes, including necropsy and pathology data, the researchers hope to track not only food patterns but also sources of contamination in sea otters' food supply.

**Tim** points out that the things we do near the coast impact the otters. "Pesticides, washing your car, fertilizing your lawn—these things affect the sea otter and the habitat directly," he says.

The physical elements of the landscape that once filtered pathogens out of the water have largely disappeared, and sea otters are facing ever-higher levels of contamination in their environment. "We have changed the water-flow patterns with runoff, storm sewers, agriculture, loss of wetlands," says **Tim**. "Nature's sewage treatment—we've changed that drastically.

(Day in the Life continued on page 5)

## Fieldwork, continued

(Day in the Life continued from page 4)

Now water flows over the ground directly to the ocean.”

Sea otters are turning up with diseases normally found in cats and opossums. Researchers suspect that the sea otters are picking up these pathogens not from each other but by foraging in areas with agricultural or urban runoff. But scientists need more information. This is a task that is beyond just marine biologists. To see the big picture of what the sea otters are facing, the team needs ecologists, pathologists, toxicologists, epidemiologists, and other specialists. **Tim** says there are 30 scientific professions involved in the sea-otter project. And one of the things he appreciates about the work is that it’s not about competition, but collaboration. They have spent 10 years building an alliance, and **Tim** says they now have a loose, ever-growing network of partners.

“There is an atmosphere of trust,” **Tim** says. “We need to recognize how important that is and make sure to maintain it, to train new people that this is not a competitive endeavor. We share data and results.”

Part of the reason for this trust and teamwork is the concern for the animal at the center of the project. The sea otter is a keystone species. Without sea otters, there is a dramatic shift in the ecosystem: sea urchins thrive, and kelp forests wither. But the sea otter is not only a keystone species; it is also a sentinel species. “It’s the canary in the coal mine,” says **Tim**.

The importance of the sea otter to its ecosystem is the reason there’s so much collaboration among so many specialists. “We’re trying to take more than a single-species approach to our research,” he says. “The things that threaten otters threaten the whole ecosystem.”

“Human-induced impacts on kelp forests, fisheries, contaminants that come from the land—there are hundreds of substances being poured into the oceans,” says **Tim**. It’s not just water-borne contaminants that pose a problem. “There are dozens of interrelated factors that threaten sea otters and other marine species,” he says.

The good news is that despite a higher rate of mortality in recent years, the overall trend in the number of California sea



USGS wildlife biologist **Alisha Kage** holds out a VHF (very high frequency) radio receiver, hoping to hear the tell-tale beep that helps her locate sea otters that are part of a study to monitor and learn more about the species. Photograph by **Tania Larson**, USGS.

otters is a growing population. The goal is to keep it that way and to eventually be able to delist the species.

Just as the sun is beginning to break through the fog and the cloud cover, it’s time for **Michelle** and **Tim** to head back, but the day holds one more outdoor adventure for me. Back on land, I meet up with **Alisha Kage**, a USGS wildlife biologist and sea-otter researcher, for a few hours of tracking the sea otters from shore.

**Alisha** drives along the sunny California coastline, and periodically we hop out and hike along the edge of the cliffs to look out and locate tagged otters, using a VHF receiver and a telescope. We scan the surface for sea otters, and then **Alisha** zooms in on them with the telescope to identify their tags. She’s happy that these days she doesn’t have to do it all by hand. She simply enters the data into a handheld computer, which records the GPS coordinates; then she is able to download the information directly to her desktop computer. This information helps the research team track not only the sea otters with working implanted transmitters, but also those with transmitters that have stopped working and those that have been tagged for other studies.

Like **Michelle**, **Alisha** often spends long days in the field. “With driving, I do 12-hour field days,” says **Alisha**, “but

I just love being in the field so much, it doesn’t bother me.”

Walking along the sunny California coast, I have to agree that it’s hard to complain. But **Alisha** adds that the perks don’t end here. Sometimes the researchers get to travel to study sea otters in other places and compare notes with other scientists. “When you’re in the field somewhere like Alaska, you just feel so lucky to do what you do,” she says.

And like **Tim**, **Alisha** comments on the network of other scientists from the USGS; the University of California, Santa Cruz; and the Monterey Bay Aquarium who are all working together for the sake of the species.

“I always wanted to work on endangered species,” she says. “There’s a whole team of people working to save this species; it’s so interesting, and I feel that I can make a difference.”

I’ve only been at it for one day, but I suspect that’s what draws most people to this field: the opportunity to make a difference.

For more information on sea-otter studies at the USGS, visit the Sea Otter Studies Web site at URL <http://www.werc.usgs.gov/otters/>. To listen to a series of three podcasts featuring **Tim Tinker** talking about sea otters, visit the USGS CoreCast site at URL <http://www.usgs.gov/corecast/> and start with episode 65. ❁



## Alaska's Sea-Otter Decline Affects Health of Kelp Forests and Diet of Eagles

By Paul Laustsen

Who would have guessed that as the number of sea otters in Alaska's Aleutian Islands plummeted over the past 15 years, bald eagles would be forced to change their diet?

That's right. Two top-level predators, one in the ocean and one on the land, are linked through a marine food web that includes sea urchins, kelp, and fish—an effect never documented before.

"It's like an ecological chain reaction, affecting many different species and many different levels of the food web," said **Jim Estes**, retired marine-mammal specialist from the U.S. Geological Survey (USGS) and one of the authors of the new study published in the journal *Ecology*. **Estes** suggests that the sea-otter decline is due to an increase in predation by killer whales.

Researchers conducted bald-eagle surveys with colleagues during the sea-otter breeding seasons in 1993-1994, when sea-otter populations were high, and then again in 2000-2002, when they were extremely low. Without the sea otter's presence to control sea-urchin populations, severe kelp deforestation occurred.

The sea otter is a keystone species in near-shore coastal environments because of the pivotal role it plays in maintaining a healthy balance in kelp forests. By eating sea urchins—the biggest threat to kelp forests—sea otters controlled sea-urchin numbers and kept the ecosystem in balance. This ensured that these underwater plants could thrive and reach their maximum height of 250 ft.

Kelp forests provide habitat, shelter, and a buffer from waves and currents for numerous aquatic species. This marine environment also provided the bald eagle with a diet of marine fishes and sea-otter pups.

When sea-otter numbers crashed during the 1990s, the kelp-forest ecosystem began to collapse as well. Eventually, a deforested underwater landscape and lack of sea-otter pups for food forced the bald eagles to change their diets.

"Bald eagles proved their extreme flexibility as a predator by simply shifting their diet to other available fish and sea-birds when the sea otters were no longer present," said **Robert Anthony**, a USGS



Bald Eagle. Photograph copyright © **Norman Smith**; used with permission.

researcher with the Oregon Cooperative Fish and Wildlife Research Unit and lead author of the study. "Bald eagles are opportunistic feeders. They defend foraging territories against other bald eagles along these coastlines, and the terrestrial environment provides very little prey for them. So they forage over open water for most of their prey."

Although the diet of these bald eagles changed with the decline of sea otters, the scientists discovered that the birds actually produced more eggs and young, a fact that **Anthony** suggests may be a result of high caloric content in the eagles' increasingly seabird-dominated diet.

**Anthony** cautioned that although bald eagles quickly adapt to necessary dietary

changes, other animals with more specialized diets might not be so adaptable. Therefore, said the authors, resource managers need to focus on entire ecosystems, not single species, when they develop management strategies.

Complete findings were published in the journal *Ecology* on October 10, 2008 (v. 89, no. 10), in an article titled "Bald Eagles and Sea Otters in the Aleutian Archipelago: Indirect Effects of Trophic Cascades" (p. 2725-2735). The authors are **Robert G. Anthony** (U.S. Geological Survey and Oregon Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oreg.), **James A. Estes** (Department of Ecology and Evolutionary Biology, Uni-

versity of California, Santa Cruz), **Mark A. Ricca** (U.S. Geological Survey, Western Ecological Research Center, University of California, Davis), **A. Keith Miles** (U.S. Geological Survey, Western Ecological Research Center, University of California, Davis), and **Eric D. Forsman** (U.S. Forest Service, Pacific Northwest Research Station, Corvallis, Oreg.). The article's abstract can be viewed online at URL <http://dx.doi.org/10.1890/07-1818.1>. ❁



Sea otter. Photograph courtesy of the U.S. Fish and Wildlife Service, Alaska Image Library.

## International Coastal Cleanup—Stories About the Impacts of Marine Debris Kick Off Community Cleanup Along Florida’s Tampa Bay

By Ann Tihansky

**Kameran Onley** shared a moving story about baby goony birds living in a remote region of the Pacific Ocean, which were fed plastic marine debris gathered by their well-intentioned parents. **Onley**, the Acting Assistant Secretary for Water and Science with the U.S. Department of the Interior, wanted to show how marine debris can travel far and wide and have far-reaching effects: “Debris can go anywhere. It can make its way to even the most remote, protected areas and is very harmful to many kinds of marine life. When I visited the new Papahānaumokuākea Marine National Monument [URL <http://hawaiiireef.noaa.gov/>], located in a remote part of the Pacific Ocean, I saw all kinds of trash labeled in languages that showed it had come from all over the world. What was most appalling to me was that these baby birds had died, and inside their decaying bodies you could see the bits of plastic that their parents had fed them. It’s hard to hear about such atrocious things, but seeing the plastic through the skin of the dead baby birds was a life-changing experience for me. We humans have far greater impact on our world than we could ever imagine.” She shared this story with a group of volunteers preparing to participate in the annual International Coastal Cleanup on the shore of Florida’s Tampa Bay on Saturday, September 20, 2008.

Another story, from **David White**, Director of Ocean Conservancy’s Southeast Atlantic and Gulf of Mexico Region, told about a concerned citizen in Texas who organized a small group in 1986 to conduct a coastal cleanup on Padre Island—a local community effort that over the past 20 years has evolved into a worldwide International Coastal Cleanup (URL <http://www.coastalcleanup.org/main.cfm>). **White** used this story to emphasize how community efforts “can also have positive far-reaching effects.”

**Onley** made the trip to the Tampa Bay area to participate in the cleanup within Pinellas National Wildlife Refuge, part of



Partners working on a common goal, (left to right) **Barbara Howard** (Friends of Chassahowitzka National Wildlife Refuge Complex), **Kameran Onley** (U.S. Department of the Interior), and **Keith Ramos** (U.S. Fish and Wildlife Service) prepare to head out and participate in cleanup activities.

Chassahowitzka National Wildlife Refuge Complex (URL <http://www.fcnr.org/>). **Keith Ramos**, U.S. Fish and Wildlife Service (USFWS) Deputy Refuge Manager of Chassahowitzka National Wildlife Refuge, echoed the thoughts of **Onley** and **White**

and was proud to take part in the local cleanup activity, which is “vital to protecting these important wildlife preserves.”

The volunteers also watched a 30-second public-service announcement, created by  
(Coastal Cleanup continued on page 8)



(Left to right) **Peter Clark** (Tampa Bay Watch), **Kameran Onley** (U.S. Department of the Interior), and **Keith Ramos** (U.S. Fish and Wildlife Service), armed with boathooks and keen eyes, are ready to retrieve fishing line from the mangrove trees of Little Bird Key. This rookery island, part of Pinellas National Wildlife Refuge, is normally off limits to human activity to reduce disturbance to the nesting birds.



## Outreach, continued

(Coastal Cleanup continued from page 7)

the AdCouncil, that features Walt Disney Pictures' Ariel, the Little Mermaid, and stresses that "No matter where you live, life in the ocean depends on you... To help protect our ocean, recycle and dispose of your trash properly." (View the announcement at URL <http://www.keepeceansclean.org/ads/>).

**Martha Garcia** of Tampa Bay Watch, a nonprofit organization dedicated to restoring Tampa Bay (URL <http://tampabaywatch.org/>), provided materials, logistical information, and safety tips to the volunteers before they headed out to various sites throughout the refuge and nearby Fort De Soto Park.

**Peter Clark**, Director of Tampa Bay Watch, hosted the event at Tampa Bay Watch's facility in Tierra Verde, Florida. His organization provided boats and equipment that enabled special groups to get to areas farther into the refuge, ordinarily beyond the access of boats and humans.

**Onley, White, Ramos, and Ann Tihansky** (U.S. Geological Survey [USGS]) worked with Clark to remove monofilament from nesting areas on Little Bird Key, a rookery island normally off limits to human activity. "We think a lot of this fishing line is brought here by the birds that have gotten tangled up in fishing areas," said **Clark**. "Other birds land here and get tangled and trapped. **Keith** and I selected this area so that we could get in here and clean up the fishing line, to prevent more birds from getting entangled. This area also illustrates why it's so important to educate fisherman to properly dispose of fishing line and remove it from the birds when they're caught accidentally."

When all the volunteers reconvened after 3 hours of cleaning up, they had gathered more than 1,200 lb of trash. Nearly 300 in number, the volunteers included participants from the Friends of the Tampa Bay National Wildlife Refuges, USFWS, USGS, Tampa Bay Watch, Ocean Conservancy, U.S. Coast Guard, and public citizens—all of whom turned out to spend the day along the shores of Tampa Bay, watching wildlife up close and helping to make their world a better place.

International Coastal Cleanup is coordinated by Ocean Conservancy (URL



**David White** (Ocean Conservancy) demonstrates the invisible threat that fishing line poses when it becomes tangled in the vegetation of natural areas.

<http://www.oceanconservancy.org/>), which also publishes annual reports about cleanup activities and the types and amounts of trash collected; learn more at URL [http://www.oceanconservancy.org/site/PageServer?pagename=press\\_icc](http://www.oceanconservancy.org/site/PageServer?pagename=press_icc).

Local efforts are coordinated by such community-based groups as Keep Pinellas

Beautiful, which promotes litter removal, recycling, and litter-prevention education (URL <http://keepinellasbeautiful.org/>); and Friends of the Tampa Bay National Wildlife Refuges, which supports the refuges in Tampa Bay through community outreach and interaction (URL <http://tampabayrefuges.org/>). ❁



**Keith Ramos**, Deputy Refuge Manager for Chassahowitzka National Wildlife Refuge, uses a boat-hook and clippers to retrieve fishing line from mangroves on Little Bird Key.



## Debbie Norling Receives USGS Central Region Diversity Award

**Debbie Norling**, branch secretary at the U.S. Geological Survey (USGS)'s National Wetlands Research Center in Lafayette, Louisiana, received the 2008 Central Region Diversity Award, Individual category, during award ceremonies at the USGS Regional Office in Denver, Colorado, on September 22. She was nominated by individuals both within and outside the National Wetlands Research Center for her invaluable contributions to diversity within the Department of the Interior during the past 15 years, according to center director **Gregory Smith**.

**Norling** has been involved in the U.S. Fish and Wildlife Service's Federal Women's Program, the USGS Central Region's Special Emphasis Program Advisory Committee, and the USGS Central Region's Diversity Council. As a member and cochair of the Special Emphasis Program, she worked to gather, synthesize, and report data related to employment, training, and retention. She also organized diversity training for USGS managers, supervisors, and employees and served on the committee to create the bylaws and operating procedures for the Diversity Council when it was formed.

At the National Wetlands Research Center, **Norling** organized several programs for Black History Month and Women's History Month, featuring speakers that included local dignitaries and mayors, au-



Presenting the USGS Central Region Diversity award to **Debbie Norling** of the USGS National Wetlands Research Center are **David Applegate**, Acting Central Regional Director (left), and **Randy Updike**, USGS Regional Executive for the Rocky Mountain Area.

thors, **Lindy Boggs** (former U.S. Ambassador to the Vatican and Louisiana Congresswoman who served nearly 2 decades in the U.S. House of Representatives), and **Mary Landrieu** (U.S. Senator from Louisiana).

In March 2008, **Norling** chaired a group of women who turned the National Wetlands Research Center into an art gallery to celebrate "Women's Art: Women's Vision of the Natural World." She worked with dozens of local artists and the media to promote the event. (See article in *Sound Waves*, August 2008, URL <http://soundwaves.usgs.gov/2008/08/outreach2.html>.)

In 2006, **Norling** was named a Woman of Excellence for Public Service by the

Lafayette Commission on the Needs of Women in recognition of her volunteer work at the National Wetlands Research Center and in the community after Hurricanes Katrina and Rita (see article in *Sound Waves*, October 2006, URL <http://soundwaves.usgs.gov/2006/10/awards.html>). This work, in addition to boat rescues and geoaddressing 911 calls, was one of the reasons that the center shared in a Service to America Medal (see article in *Sound Waves*, November/December 2006, URL <http://soundwaves.usgs.gov/2006/11/awards.html>). **Norling** continues to champion the cause of diversity at the center and in her local community, **Smith** said. ☼

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