USGS

Sound Waves

Coastal Science and Research News from Across the USGS

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Fieldwork

Gulf Coast Impacts of Hurricanes Gustav and Ike Documented by USGS Extreme-Storms Group

By Helen Gibbons

Three years after Hurricanes Katrina and Rita ravaged the U.S. Gulf Coast, the region was hit once again by a pair of large storms: Hurricane Gustav made landfall near Cocodrie, Louisiana, on September 1, 2008, as a strong Category 2 storm; and Hurricane Ike made landfall near Galveston, Texas, on September 13, 2008, also as a strong Category 2 storm. Major metropolitan areas were evacuated in the face of each hurricane: residents were

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*USGS scientists **Dennis Krohn** (left) and **Karen Morgan** gather aerial photographs and video footage of coastal areas after the landfall of a hurricane.*

*Hurricane Gustav making landfall, from data collected by the Moderate Resolution Imaging Spectroradiometer (MODIS) on the National Aeronautics and Space Administration (NASA)'s Terra satellite at 12:25 p.m. local time (17:25 UTC) on September 1, 2008. NASA image created by **Jesse Allen**, using data provided by the University of Wisconsin's Space Science and Engineering Center MODIS Direct Broadcast system.*

Five areas for which USGS scientists conducted pre- and post-landfall analyses and prepared maps depicting potential inundation by Hurricane Gustav. Line shows track of hurricane with dots color-coded for the storm's category at selected sites. Gustav made landfall as a Category 2 hurricane. Cat, category; TS, tropical storm; TD, tropical depression.

Sound Waves

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

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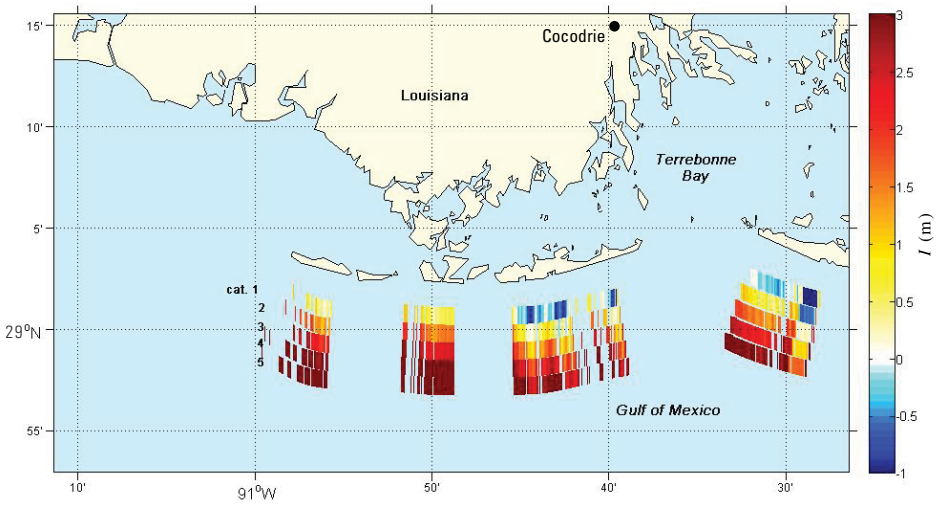
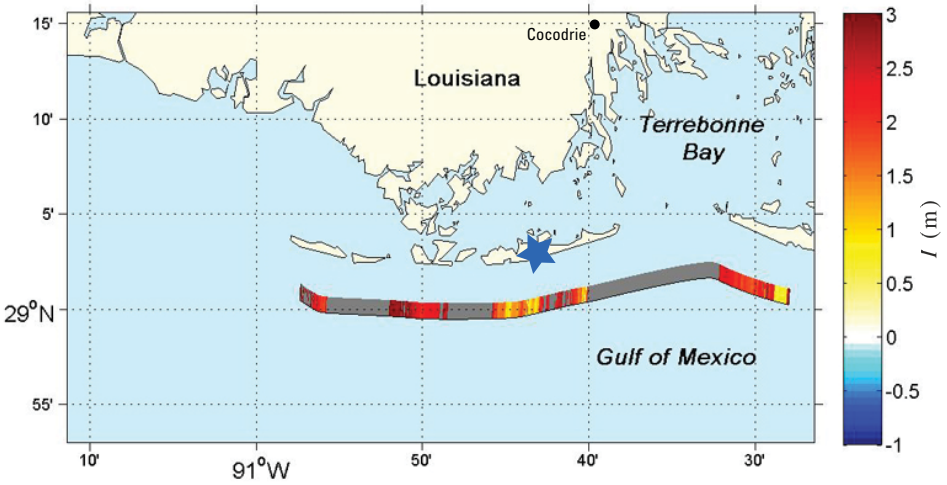


Before Hurricane Gustav made landfall, USGS scientists prepared this map of inundation potential (I, storm surge minus dune elevation) for the Isles Dernieres, Louisiana, for direct landfall of Category 1-5 hurricanes. Red shading, areas where modeled-surge elevation exceeds primary-dune elevation and potential is greater for inundation of beach system and severe coastal change; blue shading, areas where modeled-surge elevation is lower than dune crest and potential for severe coastal change is relatively lower.



Hurricane Gustav made landfall in this area, near Cocodrie, Louisiana, on the morning of September 1, 2008. USGS scientists used updated surge elevations, specific to the storm conditions and landfall location, to reassess inundation potential (I). Red, areas where updated surge levels indicate inundation and likelihood of extreme coastal change. Star, approximate location of before-and-after photographs on next page.

ordered to leave New Orleans as Gustav approached, and Ike triggered evacuations of Houston and Galveston.

Luckily, the 2008 hurricanes were not as deadly as Katrina, but the tolls were high enough: each storm caused more than 100 deaths in the Caribbean and the United States, with many billions of dollars of damage. (For comparison, Hurricane Katrina caused nearly 1,900 deaths and roughly $125 billion in damage.) Three days after Hurricane Ike made landfall, nearly 2 million residents of Texas were still without power, and many thousands were facing weeks in shelters. Meanwhile, the remnants of Ike had moved northeastward across the United States, causing flooding and power outages in the Midwest.

Hurricane Ike's enormous size made it unusually destructive for a Category 2

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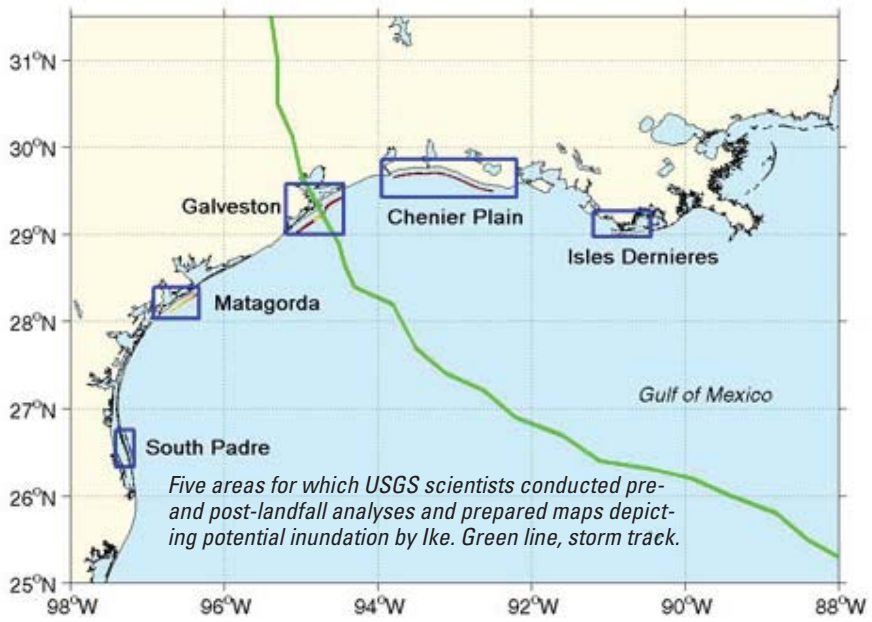
Aerial photographs of Trinity Island in the Isles Dernieres, Louisiana; yellow crosses mark same location in all three. Between top two photographs, Hurricanes Lili (October 3, 2002) and Rita (September 24, 2005) affected the coast and contributed to its changes; between bottom two photographs, Hurricane Gustav made landfall just east of the Isles Dernieres. In general, coastal changes during Gustav do not appear extensive along this coast, even though it was swept by the right-front quadrant, and the strongest winds, of the storm. Visit URL ***http://coastal.er.usgs.gov/hurricanes/gustav/*** *to view additional aerial photographs and lidar images.*

Hurricane Ike sprawls over much of the Gulf of Mexico in this image taken by the Moderate Resolution Imaging Spectroradiometer (MODIS) on the National Aeronautics and Space Administration (NASA)'s Terra satellite at 12:25 p.m. EDT (16:25 UTC) on September 11, 2008, about a day and a half before Ike's landfall in Texas. Vast size is Ike's most notable feature in this image; its southern fringes touch Mexico's Yucatán Peninsula, while the northern fringes hang over Louisiana. NASA image created by ***Jesse Allen****, using data provided by the MODIS Rapid Response team.*



storm. With tropical-storm-force winds spread more than 500 mi across as it approached the U.S. Gulf Coast, Ike was about 70 percent larger than an average hurricane, and it damaged the coast from Texas to eastern Louisiana. The winds of the large hurricane whipped up an unusually large storm surge—the mound of water pushed ashore by the storm—estimated at about 10 to 15 ft above normal tides. Many areas along the Gulf Coast were severely affected by Ike's surge. Particularly hard hit was the Bolivar Peninsula, a barrier island northeast of Galveston. Storm surge and waves covered the island, destroying an estimated 80 percent of the homes. "The Bolivar Peninsula was in or near the eyewall of Hurricane Ike when the storm made land-

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fall," said U.S. Geological Survey (USGS) oceanographer **Abby Sallenger**, leader of the USGS Hurricanes and Extreme Storms Research Group. "This was the location of the strongest winds and where we observed the greatest impacts to the coast."

The extreme-storms group, which is part of the USGS National Assessment of Coastal Change Hazards Program, was busy before and after each storm. As Hurricanes Gustav and Ike approached, the group prepared maps showing the likelihood of inundation (complete submergence of the beach system) and extreme coastal change for Gulf Coast areas expected to be affected by hurricane landfall. The scientists compared measured elevations of primary dunes and beach berms (the "first line of defense") with modeled elevations of storm surge for Category 1, 2, 3, 4, and 5 hurricanes and plotted the results. The higher the predicted storm surge relative to local beach topography, the greater the likelihood of inundation, which produces the most extreme coastal change.

"These maps describe the potential coastal changes that could occur, threatening communities and critical wildlife habitats," said **Sallenger**. Hurricane landfall and associated elevated water levels, waves, and currents can lead to severe coastal change through erosion and redeposition. The combination of a growing population living along the coastline and the cumulative effects of previous storms makes the northern Gulf of Mexico region particularly vulnerable.

After each hurricane, the USGS research group quickly mobilized to investigate coastal changes along the Gulf Coast's sandy beaches. Just 3 days after Gustav made landfall and 2 days after Ike, they began collecting aerial video and still photography of post-storm beach conditions. Approximately 4 days after landfall, airborne lidar (light detection and ranging) surveys of post-storm topography were collected. The aerial photographs, including before-and-after sets, were posted online just a few days after each storm, and data from the lidar surveys were posted a couple of weeks after each storm. (See URLs **http://coastal.er.usgs.**

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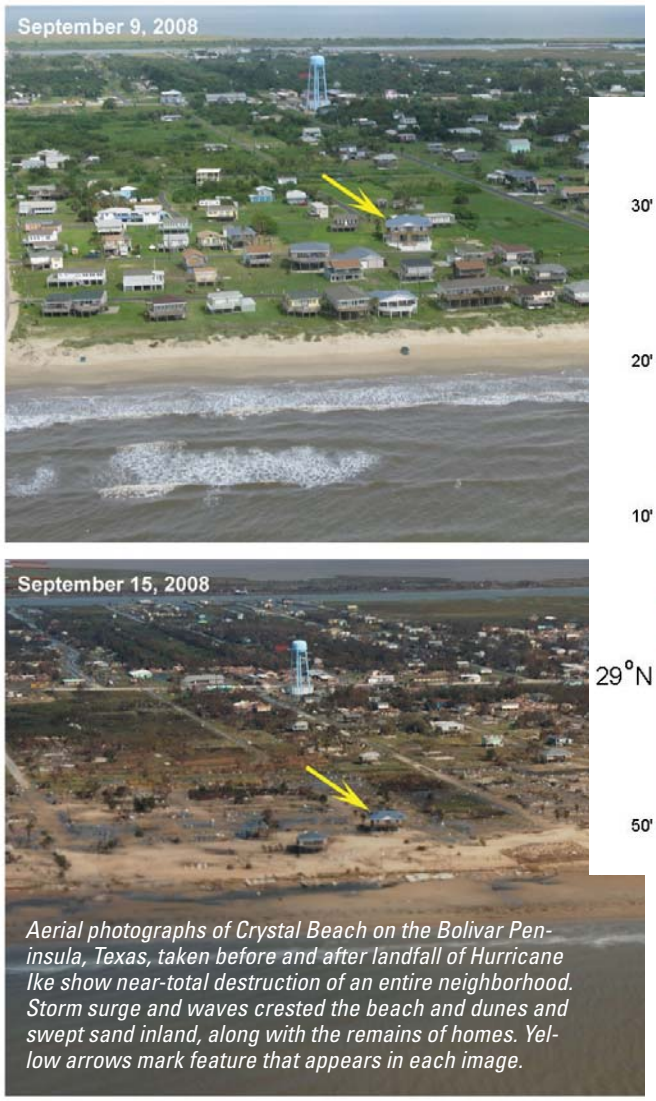
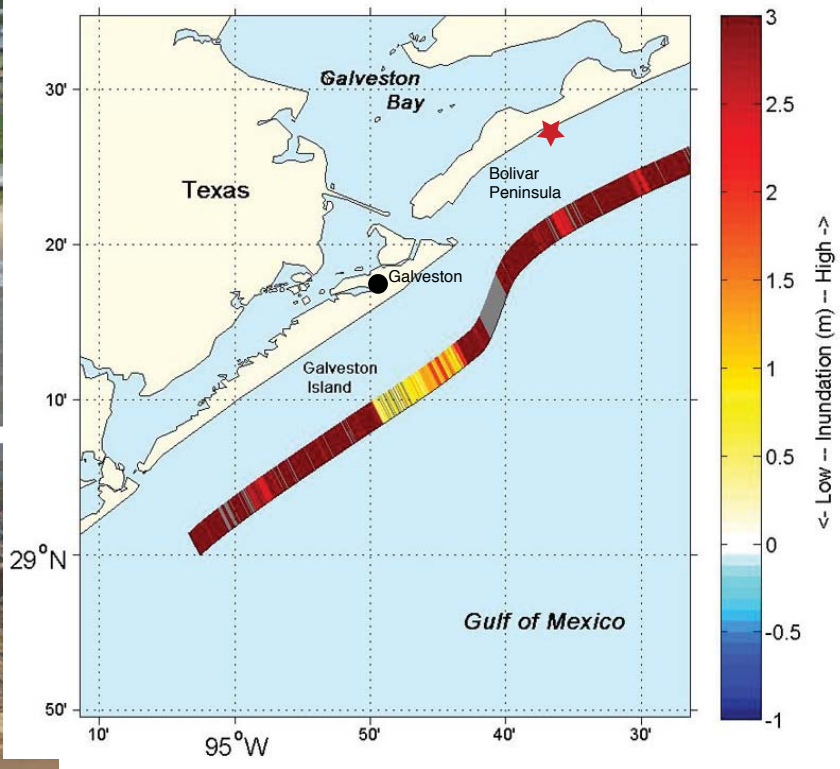


Aerial photographs of Crystal Beach on the Bolivar Peninsula, Texas, taken before and after landfall of Hurricane Ike show near-total destruction of an entire neighborhood. Storm surge and waves crested the beach and dunes and swept sand inland, along with the remains of homes. Yellow arrows mark feature that appears in each image.



Updated assessment of inundation potential (storm surge minus dune elevation) for Galveston and the Bolivar Peninsula, Texas, using modeled storm surge based on Hurricane Ike storm conditions and landfall location. In most areas, severe inundation (red shades) and coastal change are expected because updated surge estimates exceed elevations of primary dunes and beach berms. Star, approximate location of before-and-after photograph pair at left. See URL ***http://coastal.er.usgs.gov/hurricanes/ike/*** *for additional photographs and lidar images.*

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gov/hurricanes/gustav/ and **http://coastal.er.usgs.gov/hurricanes/ike/**.)

Comparisons of the post-storm data with earlier data reveal the characteristics, magnitude, and spatial variability of such coastal changes as beach erosion, overwash deposition, and island breaching. Post-storm data are also being compared with the maps the group prepared as each storm approached, to help them further refine predictive models of coastal impacts from severe storms—tools that can benefit coastal-zone managers, emergency planners, and residents. The group worked quickly to make their data available online to local, State, and Federal agencies to aid post-storm disaster recovery and future erosion mitigation.

New York Times science editor **Cornelia Dean** flew with **Sallenger** and his extreme-storms group during post-Ike flights and produced an article (URL **http://www.nytimes.com/2008/09/23/science/23islands.html**), a narrated slide show (URL **http://www.nytimes.com/interactive/2008/09/22/science/earth/0823-barrierislands/**), and a poster about the gradual disappearance of barrier islands (**http://www.nytimes.com/imagepages/2008/09/23/science/23islands.ready.html**), based on USGS aerial photographs.

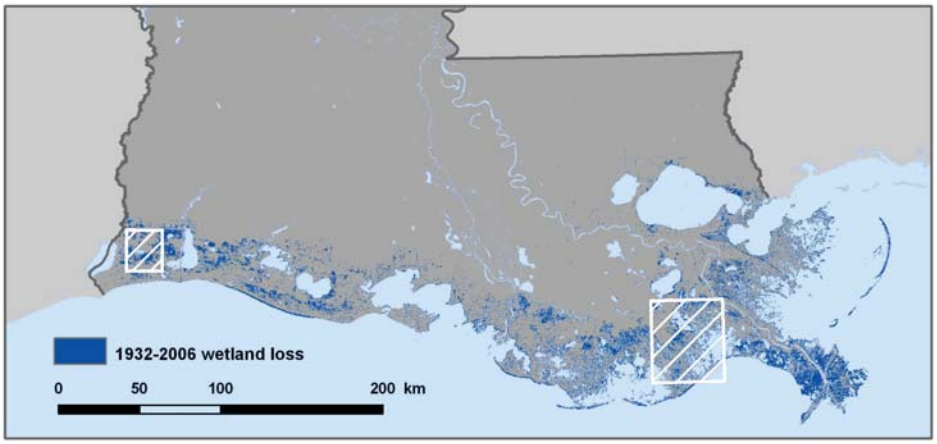
Visit the USGS Hurricanes and Extreme Storms Web site at URL **http://coastal.er.usgs.gov/hurricanes/** to learn more about the extreme-storms group's research and to view their aerial photographs (including before-and-after pairs), inundation maps, and lidar images. Additional information about hurricane research conducted by the USGS is posted at URL **http://www.usgs.gov/hazards/hurricanes/**.

Slowing of Coastal Subsidence Is Good News for Restoration of Louisiana's Wetlands

By Matthew Cimitile and Helen Gibbons

Every year, volunteers use thousands of discarded Christmas trees to build brush fences in the coastal waters of Louisiana. The fences slow down waves and trap sediment, allowing aquatic vegetation to take root in the still water and stimulating the growth of new marsh. This is one of many efforts to counteract wetland loss (the loss of saline, brackish, intermediate, and freshwater marshes) that has plagued coastal Louisiana since the mid-20th century. U.S. Geological Survey (USGS) scientists recently announced good news for Louisiana's coastal-restoration projects: using a combination of historical and recently released data, they discovered that subsidence of coastal land in the Mississippi River delta plain appears to have slowed considerably since the 1990s. This discovery means that new marshlands created by the Christmas tree program and other restoration projects may persist—that is, stay above sea level—longer than previously thought.

USGS geologists **Robert Morton** and **Julie Bernier** constructed new subsidence histories by integrating data sets from the National Oceanic and Atmospheric Administration (NOAA), including National Ocean Service tide-gauge records, National Geodetic Survey releveling data (elevation surveys repeated periodically at established bench marks), and Global Positioning System (GPS) elevations at Continuously Operating Reference Stations. (These "CORS" continuously record extremely accurate positional data; the first staion in the southern Mississippi River delta plain was set up in 2002.) **Bernier** announced their results at the Geological Society of America Annual Meeting held October 5-9, 2008, in Houston, Texas.



Extensive wetland losses (dark blue) along the Louisiana coast over the past 75 years. Striped boxes, areas of USGS field research described in this article: western box, area of fieldwork conducted in June 2008; eastern box, area of numerous fieldwork efforts dating from 1999 to August 2008.

Wetland loss is a natural part of coastal-delta cycles and has occurred for thousands of years in Louisiana, but until recently land losses have been counterbalanced by various wetland-building processes. Beginning in the 20th century, however, coastal land has been disappearing much faster than it is being replaced. Among the contributing factors are dams and levees on the Mississippi River, which prevent coastal wetlands from receiving the river water, nutrients, and sediment needed to nourish wetland vegetation and counteract long-term natural subsidence.

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Wetland loss degrades animal habitats, depletes fisheries, decreases such ecological services as water filtration and nutrient cycling, and increases the vulnerability of coastal areas to rising sea level and storms. Accelerated wetland disappearance in the Mississippi River delta plain allowed storm surge and flooding from Hurricane Katrina (August 2005) to move farther inland and persist longer than if healthy wetlands had been in place.

Led by **Morton**, scientists with the USGS Florida Integrated Science Center (FISC), St. Petersburg, began investigating wetland loss in Louisiana's Mississippi River delta plain in 1999. They initially focused on five study sites, with the aim of quantifying the difference between land loss caused by subsidence and land loss caused by erosion. Using water-level measurements, core samples, isotopic analyses, aerial photographs, and satellite imagery, they documented areas and rates of wetland loss and identified subsidence—the gradual settling or sudden sinking of the Earth's surface relative to sea level—as the main cause of wetland loss in the studied areas. What's more, they showed that the highest rates of wetland loss correlate significantly with periods of peak extraction of subsurface oil, gas, and water from below ground: their results document a rapid increase in land loss in the late 1960s and early 1970s, followed by a decrease in land-loss rates from the 1980s to the 1990s. This pattern corresponds to the region's history of underground-fluid extraction, which also peaked in the late 1960s and early 1970s and subsequently declined. (See "Rapid Subsidence and Historical Wetland Loss in the Mississippi Delta Plain: Likely Causes and Future Implications," USGS Open-File Report 2005-1216, URL **http://pubs.usgs.gov/of/2005/1216/**.)

"It's well known that what occurs below the surface can lead to surface subsidence," said **Morton**. "The extraction of oil, gas, and associated formation water in the Mississippi Delta region caused reduced subsurface pressures in the hydrocarbon reserves, leading to reservoir compaction and fault reactivation that contributed to land-surface subsidence and wetland loss."

Land subsidence from natural processes, such as sediment compaction, and from human activities, such as extraction of water and hydrocarbons, occurs throughout the United States. More than 38,000 km^2 of land from California to the Florida Everglades has undergone some form of subsidence. Over the past 70 years, the Mississippi River delta ecosystem has lost more than 4,000 km^2 of wetland as land areas have been submerged. The calculated natural rate of subsidence for the delta plain over the past 5,000 years is 1 to 5 mm per year. The average subsidence rate in recent decades has been 8 to 12 mm per year, nearly double the natural background rate. Peak wetland loss occurred in the 1970s, when onshore activities such as oil drilling and hydrocarbon production also peaked. Subsidence rates and wetland losses have slowed in recent years, as extraction activities have declined or moved offshore. "It is pretty striking how closely parallel wetland loss and extraction are," said **Morton**. "With less subsurface extraction taking place, we should see the subsidence rate and wetland losses slowing down, which is happening."

The connection between wetland loss and subsurface extraction has significant implications for future coastal-restoration projects. "If high subsidence rates are caused entirely by natural processes, then high rates of wetland loss should continue into the future, and restoration would be extremely difficult to support if the end result is going to be submerged wetlands. But if much of the subsidence and wetland loss was induced, then, as extraction in the area declines and subsidence largely slows

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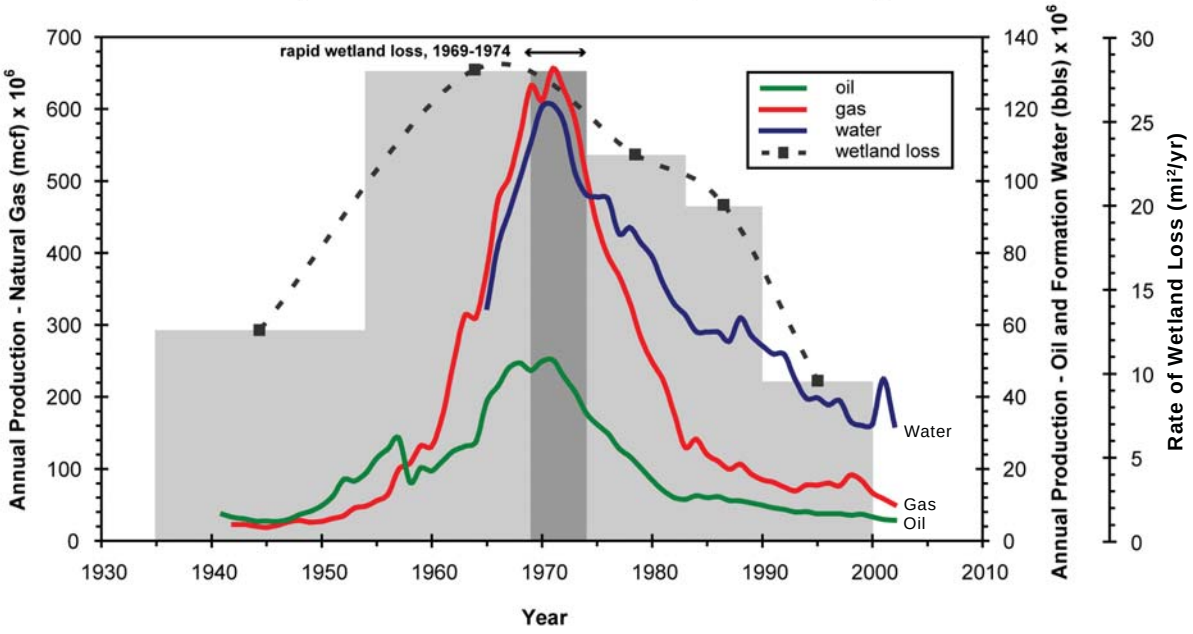
Annual fluid production vs. rate of wetland loss, Louisiana delta plain



*Annual oil and gas production superposed on a histogram of wetlands loss in the Louisiana delta plain, showing how periods of greatest wetlands loss correlate with the highest subsurface extraction of oil, gas, and water in the area. As extraction has declined in recent years, so has the rate of wetlands loss. (From USGS Open-File Report 2005-1216, URL **http://pubs.usgs.gov/of/2005/1216/**, figure 25.)*

(Louisiana Wetlands continued from page 6)

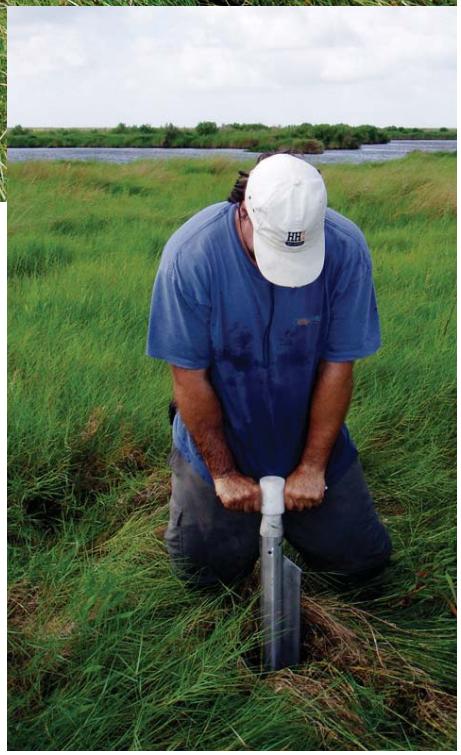
down, you can begin to restore what was lost," said **Morton**. "Coastal-restoration strategies vary depending on whether the cause of wetland loss is subsidence or erosion; and in the past, most coastal-restoration projects were designed to counter the effects of erosion," said **Bernier**. The correlation between wetland loss, subsidence, and subsurface-resource extraction will help restoration projects target areas where conservation techniques will be most effective. The researchers' discovery that subsidence rates have slowed since the 1990s supports their theory that accelerated subsidence in the 1960s and 1970s was caused by subsurface-resource extraction. And if the slower rates persist, coastal-restoration projects will have a better chance for long-term success.

In June 2008, the USGS group expanded their studies to a new area, the Louisiana chenier plain, which backs the western third of the State's coastline. Here, mud and marsh sediments lie between shore-parallel ridges—"cheniers"—of sand and shell fragments, named for the oak trees ("chênes" in French) that commonly inhabit them. **Morton**, **Bernier**, **Gary Hill** (biological science technician), and contractor **Kyle Kelso** (geologist) of the USGS FISC office in St. Petersburg and **Gregg Snedden** (ecologist) of the USGS National Wetlands Research Center's Coastal Restoration Field Station in Baton Rouge, Louisiana, spent a week in Sabine National Wildlife Refuge on the western chenier plain, where they collected sediment cores and water-level readings along transects across areas that have undergone historical wetland loss. The team will analyze the core samples to determine whether the uppermost peat deposits have been removed by erosion or are still present but have subsided relative to the emergent marsh.

In August 2008, **Kelso** and geologist **Nancy DeWitt** (USGS, FISC, St. Petersburg) returned to the Mississippi River delta plain to take a bathymetric survey of study sites that once were land, as shown in historical aerial photos, but have since become submerged. Some study sites that once were emergent are now a meter below water. Bathymetric data obtained from the survey, geologic cores, and satellite images of the region will help the team map out the next areas most likely to sink below sea level.

(Left to right) ***Julie Bernier***, ***Gary Hill***, *and* ***Kyle Kelso*** *used an airboat to travel through wetland areas in the western part of coastal Louisiana's chenier plain. On site within Sabine National Wildlife Refuge in Louisiana, they prepare to collect core samples.*

To learn more about wetland loss in Louisiana, visit the USGS National Wetlands Research Center's "Louisiana Coastal Land Loss" page at URL **http://www.nwrc.usgs.gov/special/landloss.htm**. Information about coastal-restoration projects in Louisiana, plus additional information about the State's coastal land loss, is posted at URL **http://www.lacoast.gov/**, a Web site dedicated to the implementation of the Coastal Wetlands Planning, Protection and Restoration Act in Louisiana. To explore the varied wetlands of coastal Louisiana, Mississippi, and the Pearl and Atchafalaya River basins, visit the USGS Northern Gulf of Mexico Project's Web page at URL **http://ngom.usgs.gov/phototours/**, where several sets of photographs from aerial and boat surveys provide a virtual tour. To learn more about Louisiana's Christmas tree program, visit URL **http://dnr.louisiana.gov/crm/coastres/pcwrp/history.asp**.



Kyle Kelso *plunges a Russian peat corer into the ground at Sabine National Wildlife Refuge to recover a core sample. Core data are being used to determine whether specific wetland areas have eroded or subsided relative to sea level.*

About the author: *Lead author* ***Matthew Cimitile*** *holds a B.A. in history from the University of Tampa and is obtaining an M.A. in environmental journalism from Michigan State University. He spent part of summer 2008 gaining experience in science communications by working with* ***Ann Tihansky*** *at the USGS Florida Integrated Science Center office in St. Petersburg.* ❁

Study Shows Parasites Outweigh Predators

By Andrea Estrada,
University of California, Santa Barbara

In a study of parasitic and free-living (non-parasitic) species in three estuaries on the Pacific coast of California and Baja California, a team of researchers from the University of California, Santa Barbara (UCSB), the U.S. Geological Survey (USGS), and Princeton University determined that parasite biomass in those habitats exceeds that of top predators, in some cases by a factor of 20. Their findings, which could have significant biomedical and ecological implications, appeared in the July 24 issue of the science journal *Nature* (URL **http://dx.doi.org/10.1038/nature06970**).

According to **Armand Kuris**, professor of zoology in UCSB's Department of Ecology, Evolution, and Marine Biology and a lead author of the paper, the study's findings have a potential impact on the perceived role of parasites in an ecosystem. From an ecological perspective, parasites serve both as regulators to prevent species from becoming numerically dominant and as indicators of the health of a particular ecosystem. The study shows for the first time that parasites might drive the flow of energy in ecosystems.

"The total amount of energy flow in ecosystems due to infectious processes must be enormous—even greater than we'd expect, given the large parasite biomass," **Kuris** said. "I expect the amount of energy going into host-tissue repair and replenishment is also huge. An implication of our study is that we should pay more attention to the energetics of disease."

Biomass is the amount of living matter that exists in a given habitat, expressed

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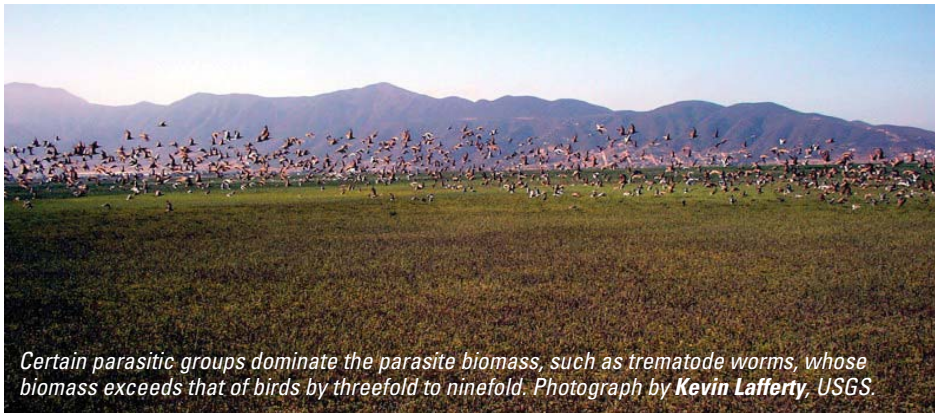
*Tidal habitats of San Quintín (Baja California, Mexico), one of three estuaries where researchers quantified parasitic and free-living biomass, finding that parasites have far more biomass than is typically thought. Photograph by **Kevin Lafferty**, USGS.*



*Certain parasitic groups dominate the parasite biomass, such as trematode worms, whose biomass exceeds that of birds by threefold to ninefold. Photograph by **Kevin Lafferty**, USGS.*

The snail Cerithidea californica *is commonly parasitized by larval trematodes that castrate their hosts; the trematodes average 22 percent of the total soft-tissue weight of individual infected snails.* C. californica *and its larval trematode parasitic castrators were considerable components of animal biomass in the three estuaries. Photograph by **Kevin Lafferty**, USGS.*

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*UCSB researcher **Ryan Hechinger** examines specimens under a microscope to identify parasites. Photograph by **Kevin Lafferty**, USGS.*

either as the weight of organisms per unit area or as the volume of organisms per unit volume of habitat. Until now, scientists have believed that because parasites are microscopic in size, they make up a small fraction of biomass in a habitat, while free-living organisms such as fish, birds, and other predators make up the vast majority.

The researchers quantified the biomass of free-living and parasitic species in the three estuaries and demonstrated that parasites have substantial biomass in these ecosystems. "Parasites have as much, or even more, biomass than other important groups of animals—like birds, fishes, and crabs," said **Ryan Hechinger**, a researcher at UCSB's Marine Science Institute and co-lead author of the paper.

The article grew out of a 5-year study supported by a $2.2-million grant from the National Science Foundation and the National Institutes of Health through the agencies' joint Ecology of Infectious Diseases program. In addition to **Kuris**, principal investigators include **Kevin Lafferty**, a marine ecologist with the USGS; and **Andrew Dobson**, a professor of ecology and evolutionary biology at Princeton University. Other important collaborators included **Leopoldina Aguirre-Macedo**, of the Centro de Investigación y Estudios Avanzados Unidad Mérida, and **Mark Torchin**, a staff scientist with the Smithsonian Tropical Research Institute.

> *"If you could see the trematodes with binoculars, you might not bother bird watching."*

The researchers quantified parasites and free-living organisms in the Carpinteria Salt Marsh in California (United States) and in the Bahia San Quintín and Estero de Punta Banda estuaries in Baja California (Mexico). Their study included 199 species of free-living animals, 15 species of free-living vascular plants, and 138 species of parasites.

"The reason we wanted to complete this study is because a lot of work we've done has suggested that parasites are important in ecosystems. But no one's actually looked at them as a group throughout an ecosystem," said **Lafferty**. "Also, no one's considered parasites from the perspective of how much they weigh because it's always been assumed they weigh almost nothing. Now we know that's not true.

"For example, in an estuary there are more kilograms of trematode worms—parasites—than kilograms of birds," he noted. "If you could see the trematodes with binoculars, you might not bother bird watching."

Said **Hechinger**: "No one debates whether it's important for ensuring human welfare to understand how ecosystems work. How can we possibly understand something without accounting for its major parts? Because our findings indicate that parasites control a massive amount of biomass, it would seem future research can't ignore them."

According to **Kuris**, understanding the enormity of parasite biomass and the burden it places on available hosts could lead to new strategies in the management of infectious diseases. Treatment protocols might put greater emphasis on enhancing the host's ability to defend itself against parasitic disease and slow the rate of energy uptake by the parasites and pathogens.

The full citation for the article is: Kuris, A.M., Hechinger, R.F., Shaw, J.C., Whitney, K.L., Aguirre-Macedo, Leopoldina, Boch, C.A., Dobson, A.P., Dunham, E.J., Fredensborg, B.L., Huspeni, T.C., Lorda, Julio, Mababa, Luzviminda, Mancini, F.T., Mora, A.B., Pickering, Maria, Talhouk, N.L., Torchin, M.E., and Lafferty, K.D., 2008, Ecosystem energetic implications of parasite and free-living biomass in three estuaries: Nature, v. 454, no. 7203, p. 515-518, doi:10.1038/nature06970 [URL **http://dx.doi.org/10.1038/nature06970**].

***About the author: Andrea Estrada** is a writer in the Office of Public Affairs at the University of California, Santa Barbara.* ❁

Scientific and Environmental Organizations Meet to Share Resources, Collaborate, and Communicate on Issues Affecting the Tampa Bay Region, Florida

By Matt Cimitile

People will be facing many critical issues in the coming years, including climate change, population pressures, and water scarcity. The complex and changing environment will require crucial policy decisions and planning grounded in sound science to ensure the safety and well-being of the public and the natural environment.

The Tampa Bay Science Education Leadership Group (TBSELG) was formed out of the vision of connecting science-education groups in the Tampa Bay area to pool resources, share expertise and knowledge, and address issues of shared concern for public education. On February 15, 2008, the TBSELG held its inaugural "Share-a-Thon" at the University of South Florida (USF)'s St. Petersburg College of Marine Science. Participants included representatives from more than 35 local, State, and Federal Government agencies; science and environmental-education organizations; universities; and community-based groups. "I was really impressed with the turnout and networking that went on," said **Ann Tihansky**, hydrologist and science communicator for the USGS Florida Integrated Science Center (FISC) office in St. Petersburg. "We had a wide variety of participants who were eager to meet and want to continue this dialogue."

The Tampa Bay region has well-established and strong scientific and environmental organizations that carry out research and educate the public on everything from coral reefs and fish populations to water quality and sea-level rise. "Some of us conduct research, some of us teach the science in an educational and understandable way, and some do a combination of both," said **Erica Moulton** of the Pier Aquarium.

*Image mosaic from the home page of the Tampa Bay Science Education Leadership Group (TBSELG)'s Web site (**http://www.tampabayscience.org/**).*

Meeting of the Tampa Bay Science Education Leadership Group (TBSELG), held August 27, 2008, in Tierra Verde, Florida.

Although their missions and the ways they go about achieving desired goals may differ, many of these organizations share common interests and are looking for solutions to similar problems. "Many groups are working to address related, if not overlapping, issues: coastal resiliency, habitat protection and restoration, invasive species, and many more," explained **Ali Hudon**, education and outreach coordinator for the USF St. Petersburg College of Marine Science. "It makes sense to encourage and promote collaboration among these groups, not only to increase communication among colleagues in the same field, but also to enable resources to be shared and built upon."

More than 2.3 million people live in the Tampa Bay area. Population is expected to grow by 19 percent by 2015, adding an additional 500,000 people to the region.

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More people will bring about more extensive land-use changes and increasing pressure on the water supply. Tampa Bay's scientific and environmental organizations play a vital role in understanding natural processes to help predict future scenarios; they also have a responsibility to communicate what they have learned to the public and policymakers who can use the science for future planning. "Today, however, government and nonprofit groups are limited by funding and staffing," said environmental-education coordinator **Phyllis Kolianos** of Weedon Island Preserve's Cultural and Natural History Center, "so it's extremely important for organizations to collaborate and partner in like causes and programs to help offset those limitations."

The TBSELG hopes to facilitate additional opportunities in which Tampa Bay scientific and environmental-education groups can meet to discuss many of the questions and concerns they have, including topics that will affect the Tampa Bay region now and in the future. "Ideally, TBSELG partners will use the group and its meetings to identify specific areas of collaboration (for example, grant writing) and to develop action items and a timeline in which to achieve various goals," said **Hudon**.

The second TBSELG meeting was held August 27, 2008, at the Tampa Bay Watch facilities on Boca Ciega Bay. Participants continued the dialogue and began to chart long-term plans and goals. One of the big ideas being tossed around includes a public event focused on science and technology. "I would like to see our group work on organizing a science-themed weekend where science, research, industry, and technology come together for a street fair to get the public aware and excited about these topics that affect their everyday lives in many ways they may not even know," said **Tihansky**.

TBSELG is a regional hub of the national Coalition on the Public Understanding of Science (COPUS) network (URL **http://www.copusproject.org/**), a grassroots effort whose goal is to engage sectors of the public in science to increase their understanding of the nature of science and its value to society. **Sheri Potter**, a COPUS network project manager, presented an overview of COPUS at the August TBSELG meeting. She discussed examples of how other communities around the Nation are using creative ways to get science into mainstream society. She also offered TBSELG the use of the Tampa Bay hub of COPUS' Web site. The Web site (URL **http://www.tampabayscience.org/**) is expected to provide quick access to all TBSELG organizations and help the COPUS group and the TBSELG team work toward common goals. Currently, organizations including the Southwest Florida Water Management District, the Pinellas County Environmental Lands Division, and the National Oceanic and Atmospheric Administration (NOAA) have registered as part of the growing support for COPUS and its activities. The TBSELG looks forward to supporting COPUS in the Tampa Bay region and around the State. Watch for news about the TBSELG online in the next few months at URL **http://www.tampabayscience.org/**.

USGS National Wetlands Research Center Staff Receive Awards

In August, the U.S. Geological Survey (USGS)'s National Wetlands Research Center in Lafayette, Louisiana, recognized several staff members for awards they have received from both the USGS and outside organizations during Federal Fiscal Year 2008 (FY08, October 2007 through September 2008). Presenting the awards were **Gregory Smith**, center director; **Dave Applegate**, acting USGS Central Regional Director, from Denver, Colorado; and **Stanley Ponce**, USGS South Central Area Executive, from Columbia, Missouri.

Scientific Awards

Former staff member **Virginia Burkett** was recognized for her contribution to the Intergovernmental Panel on Climate Change, whose members shared in the

(NWRC Awards continued on page 12)

Employees of the USGS National Wetlands Research Center recently recognized for their awards from the USGS and from outside groups are (left to right) ***Scott Wilson, Karen McKee, Larry Handley, Leslie Holland, Gaye Farris, Christina Boudreaux, Craig Conzelmann,*** *and* ***Wylie Barrow****.*

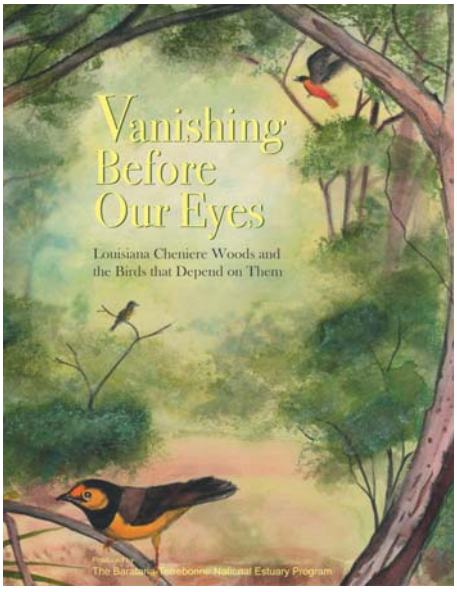
(NWRC Awards continued from page 11)

***Stanley Ponce**, USGS South Central Area Executive, addresses an all-hands meeting at the USGS National Wetlands Research Center.*

Nobel Peace Prize. She also received the Southeastern Regional Director's Conservation Award from the U.S. Fish and Wildlife Service for her work on climate change and for helping natural-resource managers understand and anticipate potential impacts in the Southeastern United States.

Karen McKee was selected as a 2008 Society of Wetland Scientists Honor Fellow for her 30-year contributions to wetland science. This is the highest recognition of membership bestowed by the society; only a third of 1 percent of members receive this recognition.

Wylie Barrow was coauthor of the publication "Vanishing Before Our Eyes: Louisiana Cheniere Woods and the Birds that Depend on Them," which received an award of excellence from the Houston chapter of the Society for Technical Communication and an international award of distinction from the Society.



*Cover of award-winning publication coauthored by **Wylie Barrow**. Illustration by **Diane K. Baker**. (A 2.0-MB PDF file of the publication can be downloaded at URL **http://birds.btnep.org/client_files/topic_files/Chenier16.pdf**.)*

*Ecologist **Larry Allain** (left) receives the Leading from Any Chair Award from **Dave Applegate**, acting USGS Central Regional Director, for his leadership in the Louisiana Native Plant Initiative, a multi-State and Federal partnership for coastal wetland and prairie restoration. The award features a cypress "knee," a distinctive root structure commonly seen in swamps (visit URL **http://soundwaves.usgs.gov/2006/06/awards.html** to see a photograph of an unusually tall tupelo knee).*

Craig Conzelmann received a Wings Across the Americas Award from the U.S. Forest Service for his creation of a computer application for the lower Mississippi Valley and Central Hardwoods Joint Ventures. The program allows scientists who develop computer models of habitat for 40 priority bird species to run model replicates in 2 days rather than 60.

Scott Wilson was recognized by the University of Louisiana, Lafayette, for his work as project leader of Team Cajunbot in the 2004, 2005, and 2007 Grand Challenges of robotic cars, sponsored by the Defense Advanced Research Projects Agency (DARPA) of the U.S. Department of Defense.

Carroll Cordes, recently retired USGS branch chief, received the Lower Mississippi Valley Joint Venture's Conservation Service Award for his contributions and service as a member of the Joint Venture's Management Board.

Larry Allain received the center's Leading from Any Chair Award for his leadership in the Louisiana Native Plant Initiative, a multi-State and Federal agency partnership to expand the quality and diversity of native seed stock for coastal wetland and prairie restoration. **Allain** also donates a great deal of time teaching about wetlands to Boy Scouts in the Eagle Scout Program and to graduate students in education at the University of Louisiana, Lafayette.

Other Awards

Leslie Holland received the 2007 Reserve Affairs Family Readiness Award from the Department of Defense for Military Support for her volunteer work as a family-support coordinator for the U.S. Coast Guard Reserve's Port Security Unit 308. Only one such award per year is given to each of the service branches.

Gaye Farris was honored for winning a USGS Shoemaker award, presented in September in Denver, for her speech, "Communicating During a Disaster: The Professional and Personal." The speech also received a first-place award from the National Association of Government Communicators (NAGC), which has named its annual communications scholarship for **Farris**, a former NAGC president. **Farris** was named a Gulf Guardian by the U.S.

(NWRC continued on page 13)

*USGS National Wetlands Research Center Director **Gregory Smith** (right) shakes hands with **Larry Handley**, in recognition for his 30 years of service to the Department of the Interior.*

(NWRC Awards continued from page 12)

Environmental Protection Agency's Gulf of Mexico Program for service in communicating about the Gulf of Mexico.

Christina Boudreaux received a first-place award from the National Association of Government Communicators for her design of conference materials for the USGS International Delta Roundtable meeting held in November 2007 in Lafayette, Louisiana. She also received the center's Exemplary Service Award for her outstanding work as a graphics artist.

Geographer **Larry Handley** was recognized for his 30 years of Federal Government service.

Former USGS contractor **Susan Horton** has been named a 2008 Woman of Excellence for Public Service by the Lafayette Commission on the Needs of Women, for her tireless service and zeal for wetland education. **Horton** was an education and outreach coordinator at the center for 12 years before she left in July to study theology at a seminary in Austin, Texas.

Congratulations to all the award winners!❁

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