USGS

Sound Waves

Coastal Science and Research News from Across the USGS

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Fieldwork

USAID/USGS/Honduras Hurricane Mitch Program: Coral Reef Health in the Bay Islands of Honduras

By Chris Reich and Don Hickey

Our fifth and probably final visit to the Bay Islands of Honduras occurred from November 9 to 21. **Don Hickey** and **Chris Reich** spent 12 days visiting three of the four Bay Islands (Roatán, Cayos Cochinos, and Guanaja). The final site visit was scheduled because the USAID/USGS Hurricane Mitch Program came to a close on December 31. The program was created to provide information in support of hazard mitigation and reconstruction after Hurricane Mitch—a Category 5 hurricane and one of the most destructive ever recorded in the Western Hemisphere—struck Central America in 1998. Our part of the program focuses on coral-reef health in the Bay Islands. The results from all projects in the program will be placed on a clearinghouse Web site maintained by the EROS data center (Sioux Falls, SD). The Web site contains information on projects that range from landslide hazards and mapping (LIDAR surveys), stream gauging, and flood-hazard mapping to impacts on such coastal environments as mangroves, seagrasses, and coral reefs (see URL **http://mitchnts1.cr.usgs.gov/index.html)**.

Cayos Cochinos, which is located on the continental shelf approximately 9 miles (14.5 km) off the north coast of Honduras, is not a popular destination for tourists. Roatán and Guanaja, which are surrounded by deep water about 35 mi (56 km) north of Honduras, are popular with international tourists interested in scuba diving. The coral reefs around Cayos Cochinos are heavily impacted by what is taking place on the mainland. Runoff carries freshwater, sediment, pollution, and contamination to this region. Mainland runoff is generally not a problem for Roatán and Guanaja.

Honduras received its share of hurricane activity during the 2001 season, though nothing to compare with Hurricane Mitch. Hurricane Irís (early October) skirted the northern fringes of the Bay Islands, producing some rain and moderate winds out of the north but otherwise causing no widespread damage. Hurricane Michelle (late October), however, dropped copious amounts of rainfall on the mainland and throughout the Bay Islands. It also caused extensive land erosion to the sand islands around Cayos Cochinos and may have caused some physical damage (breakage) to branching corals, as was documented at our sites. Mainland river discharge carried garbage, large tree stumps, and logs out to the islands. Rainfall during both hurricanes was recorded at our two sites (Roatán and Cayos Cochinos), where the recording instruments are housed in 5 m of water (see graph, next page). Salinity, temperature, and photosynthetically active radiation (PAR) are recorded at 10-minute intervals. It is apparent from the data that this region is well into its rainy season and that there is sufficient oceanic mixing to get freshwater spikes at 5-m water depths out on the reef crest.

***Don Hickey** shooting video footage of a healthy reef in Roatán Marine Reserve, Honduras.*

Other accomplishments and observations:

- Water quality (that is, visibility) was poor at all three sites (Roatán, Cayos Cochinos, and Guanaja), most likely as a result of all the rain they have been receiving.
- Corals throughout the Bay Islands were infected with black-band disease in 1999, but since then very little black-band disease has been observed.
- Coral reefs at Roatán (see photograph, above) appear to be the healthiest (low occurrence of diseases, moderate algal cover, higher percentage of coral cover, and highest biodiversity).

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Sound Waves

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Submission Guidelines

Deadline: The deadline for news items and publication lists for the February issue of *Sound Waves* is Tuesday, January 22.
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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Fieldwork, continued

(Coral Reef Health continued from page 1)

• Encrusting sponges and tunicates were still present at all sites.

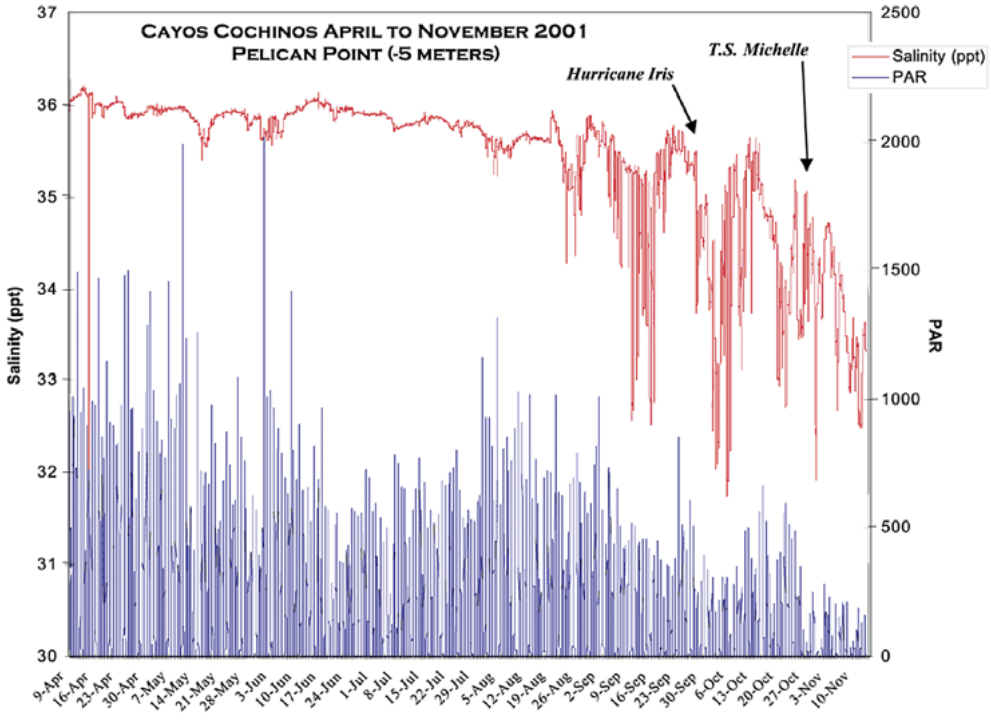
• Bleaching events are observed periodically, but they have not decimated these reefs as in other regions around the Caribbean.

• Overfishing has historically been a problem for the Bay Islands, but now both Cayos Cochinos and Roatán have designated marine reserves that prohibit most fishing.

• Underwater still photography and digital video recordings were utilized in documenting the status of the coral-reef ecosystem at a particular period of time. Time-series archives of specific reefs will assist us in documenting the decline or improvement of those reefs affected by anthropogenic stresses and (or) natural environmental perturbations.

On the last full day of our field trip, we were invited to a local school on Guanaja to explain to the students what it was we were doing and why (see photograph). The students, ages 6 to 12, listened patiently to explanations of how corals grow, the differences between healthy and failing reefs, the biodiversity associated with coral reefs, and the impacts and recovery process due to such extreme weather conditions as hurricanes. During the PowerPoint presentation, the students also had an opportunity to view an underwater video of the local coral-reef environment recorded earlier in the week. Finally, the students were allowed to ask questions. It is amazing sometimes what the curious minds of children ponder.❁

Impromptu discussion with Lighthouse Christian Academy school children on the island of Guanaja, Honduras. ***Don Hickey*** *explains to the children why we study reefs, why they are important, and what happened to the reefs during Hurricane Mitch, while they take turns watching video footage shot earlier in the trip.*



Salinity data (upper data set, red) and photosynthetically active radiation (PAR) data (lower data set, blue) at Pelican Point in Cayos Cochinos, Honduras, showing onset of rainy season punctuated by Hurricanes Irís and Michelle (a tropical storm while over Honduras). Instrument is located in a water depth of 5 m. PAR decreases with higher influx of freshwater, which is linked to cloud cover and degradation in water quality. There was also some growth on the PAR sensor that led to a slow decline in the PAR value.

Fluvial Discharge of Black Carbon and Its Role in the Global Carbon Cycle

By Siddhartha Mitra

With escalating human influence on coastlines, coastal and estuarine environments are exposed to increasing amounts of combustion byproducts, such as polycyclic aromatic hydrocarbons (PAHs) and black carbon. Black carbon and PAHs result from the incomplete combustion of fossil fuels (for example, coal and petroleum) and biomass (for example, vegetation burned in forest fires and slash-and-burn agriculture). The impetus for studying the environmental cycling of black carbon results from its importance as (1) a "sink" for atmospheric carbon, (2) a tracer for recent and historical combustion processes, (3) a mediator of the Earth's radiative heat balance, and (4) a carrier of inorganic and organic pollutants. For example, the formation of airborne black-carbon particles and their subsequent deposition into soils and aquatic systems result in organic matter being shunted to the geosphere rather than to the atmosphere as carbon dioxide, a well-known greenhouse gas. On a global level, circumvention of greenhouse-gas formation via black-carbon production may be linked to essential climate issues. The importance of black carbon on a global scale is further evidenced by its presence in sediment in the central Pacific Ocean, where at one location black carbon was found to compose 12 to 31 percent of the sedimentary organic carbon. In contrast to black carbon, PAHs are typically detected at trace concentrations in the environment. Even at these trace concentrations, many PAHs are toxic and carcinogenic and so may have deleterious effects on organisms in coastal areas. In this study, PAHs are primarily being used to delineate sources of black carbon (see below).

Despite several decades of research dedicated to the global cycling of black carbon, the amount and source(s) of black carbon discharged into the ocean by rivers remain largely unknown. Black carbon may enter rivers and streams either directly from atmospheric deposition or indirectly from runoff. Characterizing the river discharge of black carbon (and PAHs) into the oceans will help us to quantify the abundance and source(s) of combustion byproducts to the river-coast-ocean transition zone (that is, coastal margins). Quantifying the fluvial discharge of black carbon is an essential step toward evaluating the role of anthropogenic and natural combustion processes on the global carbon cycle. For this reason, **Siddhartha Mitra**, a Mendenhall Postdoctoral Fellow with the Western Coastal and Marine Geology Team (WCMG), is examining black carbon and PAH discharge from three typical North American coastal-discharge systems: (1) a small mountainous West Coast river (the Eel River), which discharges directly into the ocean; (2) a deltaic river (the Mississippi River), which discharges into an active deltaic shelf; and (3) an estuary (Chesapeake Bay), where much of the discharge is stored within the estuary. The objectives of this research are (1) to quantify fluvial black carbon and PAH abundance and (2) to attempt to ascertain sources of these combustion byproducts within each coastal system by coupling the use of high-molecular-weight PAH isomer ratios with radiocarbon dating.

Collecting water samples for analyses of black carbon and polycyclic aromatic hydrocarbons (PAHs). Water samples were collected from the headwaters of the Eel River just east of Lake Pillsbury. In an effort to minimize black carbon and PAH sorption onto sampling containers, water samples were collected by using precleaned 40-L stainless-steel pressure vessels. Water samples were collected by carefully submersing the pressure vessels under the air-water interface. Water from the Eel was allowed to flow naturally into each pressure vessel; then, each vessel was capped and transported to a nearby hotel for water filtration.

Filtration of water samples from the Eel River. Water samples were filtered for polycyclic aromatic hydrocarbons (PAHs) by pressurizing the sample vessels with ultra-high-purity nitrogen. The exit line of the pressure vessel was connected to a 142-mm-diameter stainless-steel filter holder housing a precleaned glass-fiber filter. Additional water samples were simultaneously filtered for black carbon.

Typically, the radiocarbon age of black carbon is used to infer its source. Black carbon derived from biomass burning will have a modern ^{14}C age, whereas black carbon derived from combustion of fossil fuel will have an ancient ^{14}C age (depleted in radiocarbon). Because black carbon in coastal environments originates from a mixture of biomass and fossil-fuel combustion processes and is transported across various distances, applying mixing models of apparent radiocarbon ages to black carbon in coastal environments may be fraught with uncertainties. These uncer-

(Fluvial Discharge continued on page 4)

(Fluvial Discharge continued from page 3)

tainties can be reduced by using source-specific markers of natural organic-matter combustion, such as PAHs. Black carbon and PAHs are cogenerated during combustion of such organic matter as biomass or fossil fuels. Therefore, PAHs can offer useful information about anthropogenic versus naturally derived sources of black carbon.

In October 2001, **Siddhartha Mitra** and **Tom Lorenson** (WCMG), as part of the Marine Organic Geochemistry Project, conducted fieldwork in the Eel River of northern California. Suspended sediment was collected at two stations, one near the headwaters of the river and the other near its mouth. During water collection, care was taken to avoid the influence of lumbermills and agricultural areas. Water was filtered in the field to obtain samples for analysis of black carbon and PAHs. These filter samples were frozen and transported to the WCMG organic-geochemistry laboratory directed by **Keith Kvenvolden** and **Bob Rosenbauer** for subsequent chemical analyses. Similar field investigations have already been conducted in the Chesapeake Bay with assistance from **Bill Orem's** geochemistry research group in Reston (consisting of **Margo Corum**, **Antonio Mannino**, **Sarah Kleckner**, and **Harry Lerch**), and in the Mississippi River with assistance from **Pete Swarzenski** (St. Petersburg).

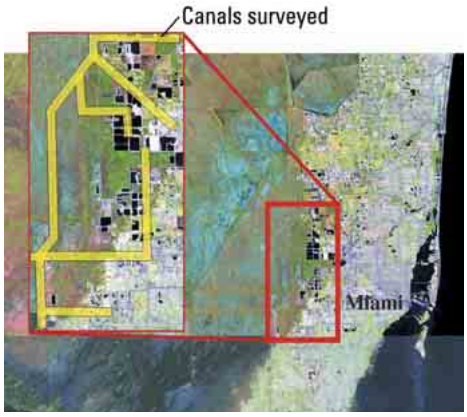
On a global scale, few rivers have been sampled for black-carbon discharge. One recent study estimated that in 1999 the Mississippi River discharged approximately 5 percent of the world's annual black carbon discharged to the ocean. Furthermore, much of this discharge was derived from the combustion of fossil fuel (coal). Thus, accurate quantification of the fluvial discharge of combustion byproducts from a composite of coastal discharge systems, as in this study, will help to constrain the societal implications of combustion on the global carbon cycle.❁

Seismic Surveys in Canals of Miami

By Jack Kindinger

A cooperative study on a project to conduct a high-resolution seismic-reflection survey of the area around several Comprehensive Everglades Restoration Program (CERP) projects was begun on November 13 and continued on December 3. Participants include **Jack Kindinger, Chandra Dreher, Dana Wiese,** and **Jim Flocks** (St. Petersburg), **Kevin Cunningham** (WRD, Miami), and **Cynthia Gerfvert** and **Steve Kupa** of the South Florida Water Management District (SFWMD). The CERP projects are focused on the surficial aquifer and ground-water flow through the area located in the eastern part of Everglades National Park west of Miami. The objective of the survey is to image and map the limestone stratigraphy of the subsurface to 60 m. This is not the first time we have collected boomer data from a 16-ft Jon boat (a flat-bottomed boat designed for shallow inland waterways), but it is our first attempt to acquire data from canals dug in limestone. This cooperative study evolved from other successful cooperative studies conducted in central and northeastern Florida (for previous studies, see URL **http://coastal.er.usgs.gov/publications/ofr/00-180/index.html**).

The field operation presented a series of unique logistic challenges because many of the canals are narrow and difficult to access and the geology is limestone. SFWMD personnel were crucial in providing help with gate keys and lifts for getting the Jon boat into and out of the canals. Preliminary review of the seismic-reflection profiles indicates that the data are usable but data quality vary widely. Indications are that some acquisition methods need modification to improve data quality. Stay tuned for future updates.❁



Satellite image of Miami and the Everglades. Inset shows location of canals surveyed or proposed for surveying (yellow).

***Jack Kindinger** (left) and **Bob Renkin** (center, WRD, Miami) assist in lifting Jon boat from trailer and lowering it into a canal. Photograph by **Chandra Dreher**.*

***Dana Wiese** (left) and **Jack Kindinger** set up boomer acquisition system after boat is in the water. Photograph by **Chandra Dreher**.*

***Jack Kindinger** (left) and **Dana Wiese** (right) collect boomer data from the Miami Canal. Photograph by **Chandra Dreher**.*

Woods Hole Field Center Diving Team Completes Deployments for Water Investigations

By Rick Rendigs

The Woods Hole Field Center dive team—including **Dann Blackwood**, **Ken Parolski**, **Barry Irwin**, and **Chuck Worley**—successfully completed a series of deployments and recoveries of passive-vapor-diffusion samplers in three local lakes on Cape Cod during the late summer months of 2001. This project was a cooperative effort conducted with team leader **Denis Leblanc** of the USGS Water Resources (WRD) office in Northborough, MA.

The project is part of an ongoing study by WRD to evaluate the spatial distribution, concentrations, and ultimate fate of organic pollutants discharged years ago by the Massachusetts Military Reservation. Pollutants have seeped into the main unconfined ground-water aquifer, which currently supplies many Upper Cape Cod towns and communities with potable water. Owing to the cape's unique glacial history, the top of the ground water, or water table, is generally indicated by the surfaces of local lakes or ponds. WRD has enlisted the expertise of the WHFC scientific dive team for planning, logistical, and field support of the lake studies in an effort to better understand the migration of pollutants in the ground water of the Upper Cape Cod water supply.

Diffusion samplers were intermittently installed and recovered from the surface sediment of Snake Pond in Sandwich, MA, along 11 subsurface transects from August 10 through October 17, 2001. Scientists from the Environmental Protection Agency (EPA), using a mobile gas chromatograph, accomplished onsite analysis of components associated with explosives from a nearby artillery range on Greenway Road.

A total of 10 sub-bottom transects of samplers were also emplaced and recovered from the sediments in Moody Pond in Mashpee, MA, during the weeks of September 6 and 26, 2001. These samples were likewise analyzed onsite by the EPA for ethylene dibromide (EDB), which is considered a carcinogen at low concentrations.

Additional samples were also collected from Ashumet Pond in Mashpee as a followup to a 1998 USGS study delineating the area and nature of volatile organic compounds discharging into the lake. Results of these analyses will soon be integrated into current knowledge of the transport and fate of dissolved organic compounds within the ground-water supply of Upper Cape Cod and so will assist ongoing remediation efforts.❁

Lectures on African Dust

By Barbara Lidz

Between October 18 and 30, **Gene Shinn** (St. Petersburg) gave lectures on the health effects of African dust at Rice University (Houston) and the American Academy of Environmental Medicine (Colorado Springs). **Gene** organized and chaired a USGS symposium on dust for a meeting of the American Association of Public Health held in Atlanta. **Gene** and **Dale Griffin** (USGS, St. Petersburg), **Geoffrey Plumlee**, **Mark Bultman**, and **Gregory Meeker** (USGS, Denver) gave dust-related presentations at the meeting. **Gene** and **Dale** then traveled to Research Triangle Park in North Carolina, where they made a teleconferenced presentation to the Long Distance Transport Group of the Environmental Protection Agency. On November 6, PBS broadcast a video of **Gene** and **Alan Alda** of M*A*S*H fame on **Alan's** "Scientific American Frontiers" show. The video concerned the effects of dust on Caribbean coral reefs. Also in November, **Gene** made presentations on the environmental effects of dust to students at the University of South Florida Marine Science Center, to researchers at NOAA's National Marine Fisheries office, and to a public and academic audience at the Miami Aquarium Society.❁

Beth Schwarzman Gives Lesson on Rock Stories

By Beth Schwarzman

Beth Schwarzman (Woods Hole Field Center) made the rounds of the five first-grade classes at Mullen Hall School in Falmouth, MA, working with each one to help them understand "The Stories Rocks Have to Tell." This annual visit, which has touched 10 groups of first-graders, is part of a year-long curriculum. It includes three field trips to nearby Beebe Woods, where the students put their hands-on classroom work to the test in the field.❁

Woods Hole Field Center Members Volunteer in Falmouth, MA, Public Schools

By Becky Deusser

In November, several Woods Hole Field Center employees (**VeeAnn Cross**, **Mark Capone**, **Becky Deusser**, and **Jill Rozycki**) started a 6-week program, called Project Inquire, to work one-on-one with gifted students looking for challenges. Each mentor helps a 4th-, 5th-, or 6th-grade student select a topic of interest that covers material outside of the regular classroom studies. The pair then creates a project to show work and accomplishments. Projects range from chemistry experiments to learning Italian. This year, **Becky's** student is running mineral-identification experiments. **VeeAnn's** student wants to dissect poison ivy! The others have not yet decided on a final topic.❁

Coral Reef Workshop Held on Moloka'i, Hawai'i

By Susan A. Cochran

On November 9 and 10, 2001, the USGS convened a workshop at the Moloka'i Education Center to present findings specific to the south shore of Moloka'i and to discuss the future direction of mapping the coral reefs in Hawai'i. Project scientists from the USGS (Santa Cruz, St. Petersburg, Flagstaff, Woods Hole, Honolulu, Menlo Park, and Denver), the University of Hawai'i, the University of Washington, the University of California, and the University of Colorado presented talks on the past year's scientific findings. The talks were followed by lively discussion periods. Additional participants included guests from the local Hawai'i offices of NOAA (National Oceanic and Atmospheric Administration), the EPA (Environmental Protection Agency), the USDA (U.S. Department of Agriculture), the Oceanic Institute, Bishop Museum, the Hawai'i Department of Aquatic Resources, the Nature Conservancy, and Moloka'i community members.

***Mike Field** (USGS, Santa Cruz) welcomes approximately 50 scientists and guests to a workshop held in Moloka'i on November 9 and 10. Participants discussed scientific findings and progress of the Moloka'i Coral Reef Project.*

Presentations encompassed a range of topics, including historical changes to the island and coast, erosion modeling, physical factors controlling the Moloka'i reef, benthic-habitat distribution, sedimentation and transport issues, and mapping techniques. Posters were hung on available wallspace during the 2-day event, and the evenings found the diverse group of participants poring over maps and seismic lines well after dinner was over. A field trip the day after the workshop (Nov. 11) gave some guests the opportunity to see the reef by snorkel and to view firsthand many of the factors influencing the south coast of Moloka'i.

*From left to right: **Bill Steiner** (BRD, Honolulu), **Mimi D'Iorio** (University of California, Santa Cruz), and **Gordon Tribble** (WRD, Honolulu) view three-dimensional images of Moloka'i's coral reef. The images were created by **Pat Chavez's** remote-sensing team in Flagstaff, AZ.*

Forum on Sea-Level Rise and Coastal Disasters

By Jeff Williams (USGS, Woods Hole, MA) and Virginia Burkett (USGS, National Wetlands Research Center, Lafayette, LA)

The late Quaternary geologic record from various sources shows that sea level has fluctuated by more than 100 m over the past 20,000 years in response to climate warming and cooling caused by complex and largely unknown factors. In general, sea level has been rising, but at highly variable rates temporally and spatially. This worldwide, eustatic sea-level rise results from such factors as melting of continental glaciers and ice sheets and expansion of ocean waters heated by global warming. In addition to climate, sea level is influenced by the constant vertical motion of the Earth's crust due to tectonic stresses and isostatic adjustments to differential loading and unloading from massive glaciers during the most recent Pleistocene glacial period. The combination of eustatic sea-level changes and crustal elevation changes yields relative sea level. Changes in long-term sea level are responsible for driving the Holocene marine transgression, in which coastal landforms have been inundated and eroded by waves and currents, resulting in landward migration of coastal barrier islands and wetlands and yielding the present coastal geomorphology.

Such historical data as tide-gauge records, corrected for change in land elevation, show that eustatic sea level has risen an average of about 20 cm over the past century. Relative sea-level rise has averaged about 30 cm, but regions undergoing subsidence (mostly natural, some anthropogenic), such as the Mississippi River delta in Louisiana and parts of Chesapeake Bay, are undergoing relative sea-level-rise rates of more than 10 mm/yr. The combination of rising sea level and increasing human population density and development along the coasts is cause for growing concern. In addition, there is scientific consensus that sea level will continue to rise into the next century and its rise is likely to accelerate. Models suggest various rates of rise over the next 100 years, but the'"best midrange estimate" based on the 2001 Intergovernmental Panel on Climate Change (IPCC) report is a sea-level rise of approximately 50 cm over the next century. Sea-level rise of this magnitude has grave implications for all ocean-coast regions of the United States and especially for deltaic regions and island nations around the world.

To facilitate communication and exchange of ideas between scientists,

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planners, and policy makers on potential natural-disaster issues, such as sea-level rise, the National Academy of Sciences (NAS) hosts open and public forums several times a year. The most recent meeting was held in Washington, D.C., on October 25, 2001, where **Virginia Burkett** (USGS, National Wetlands Research Center, Lafayette, LA) and **Jeff Williams** (USGS, Woods Hole, MA) were invited speakers and participants. **Virginia** gave a case study of the alarming situation facing New Orleans: much of the city is as much as 4 m below sea level. It is protected to a limited degree by dikes ringing the city but is highly vulnerable to continued subsidence, accelerating sea-level rise, and storm surges as high as 5 m. **Jeff** spoke as part of a panel of Federal- and State-agency scientists on the processes and factors affecting coastal change and the public-policy options available for dealing with coastal change, and he summarized ongoing and planned USGS research aimed at providing coastal-science information for knowledge-based public policy. Information on this and other NAS Natural Disaster Forums are available on the NAS Web site at URL **http://nationalacademies.org/naturaldisasters/**. Information on USGS coastal research is available at URLs **http://marine.usgs.gov/** and **http://www.nwrc.usgs.gov/**.

USGS Chesapeake Bay Conference

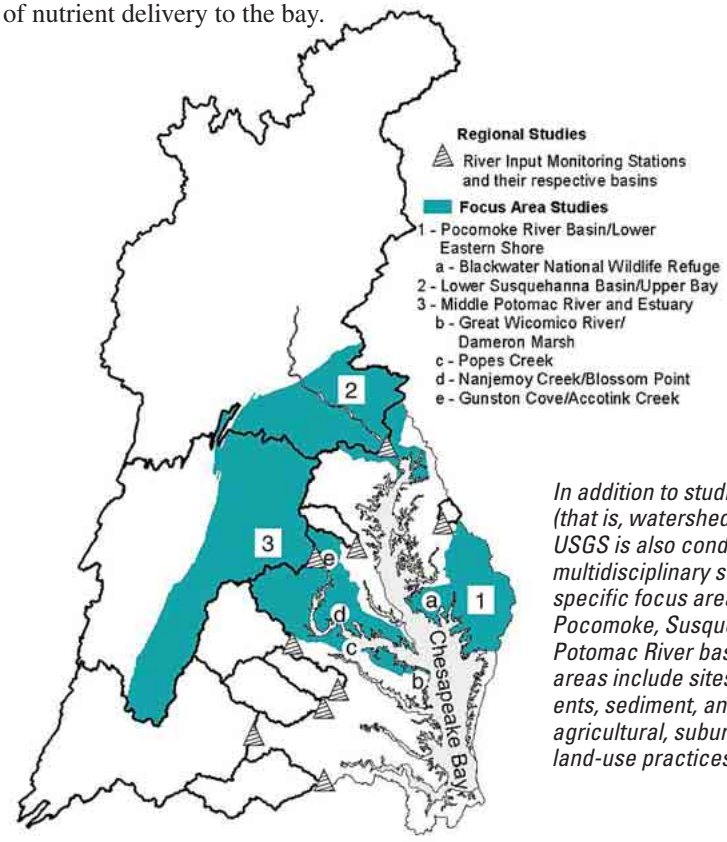
By Tonya Clayton

On November 28 and 29, approximately 100 USGS scientists (and at least as many geese) gathered on the foggy shores of St. Michaels, MD, to attend the USGS Chesapeake Bay Conference. The purpose of this meeting, organized by **Scott Phillips**, USGS Chesapeake Bay Coordinator, was to update USGS scientists and managers on the new science needs and activities arising from the "Chesapeake 2000" restoration agreement. This agreement among the partners of the Chesapeake Bay Program (Maryland, Virginia, Pennsylvania, the District of Columbia, several Federal agencies, and the Chesapeake Bay Commission) establishes ambitious new restoration goals for the bay and its watershed during the next decade. Despite nearly 2 decades of coordinated restoration efforts, Chesapeake Bay was designated in 1999 as an "impaired water body" under the Clean Water Act. One aim of this new agreement is to reduce concentrations of the excess nutrients and sediment that led to that "impaired" designation.

Reflecting the multiagency interest and involvement in USGS bay science, the lead speaker at the conference was **Rich Batiuk** of the Environmental Protection Agency (EPA)'s Chesapeake Bay Program Office. Attending from the USGS in St. Petersburg were **John Brock**, **Tonya Clayton,** and **Chuck Holmes**. They presented posters discussing potential remote-sensing applications in the bay (**Brock** and **Clayton**) and results from a recent study of short-lived isotopes in the Pocomoke River watershed (**Holmes**). Presenters from USGS in Woods Hole included **John Bratton**, who is documenting long-term changes in dissolved oxygen, and **John Warner**, who is working on the Community Sediment Transport Model. **Tom Gross** of the National Oceanic and Atmospheric Administration (NOAA) and **Courtney Harris** (Virginia Institute of Marine Science), collaborators on this modeling project, were present as well for their multimedia poster presentation. In all, more than 20 talks and 20 posters were presented, reflecting the full range of the USGS Chesapeake Bay science goals:

- Improve land-cover and land-use data to understand changes in water quality and living resources.
- Understand the impact of sediment on water clarity and biota.
- Enhance the prediction and monitoring of nutrient delivery to the bay.
- Assess the occurrence of toxic constituents and emerging contaminants.
- Assess the factors affecting the health of submerged aquatic vegetation, fish, and waterbirds.
- Disseminate information and enhance decision-support systems.

For more information about USGS contributions to Chesapeake Bay efforts, see USGS Fact Sheet FS 125-01, "The U.S. Geological Survey Chesapeake Bay Science Program," and the accompanying Web site at URL **http://chesapeake.usgs.gov/**. For more information about the Chesapeake Bay Program, see the program's Web site at URL **http://www.chesapeakebay.net/**.



In addition to studies of regional (that is, watershed) scope, the USGS is also conducting intensive, multidisciplinary studies in three specific focus areas: the Pocomoke, Susquehanna, and Potomac River basins. These focus areas include sites of high nutrients, sediment, and toxins due to agricultural, suburban, and urban land-use practices.

USGS Eastern Region Workshop on Emerging Issues in Water Quality

By Christina Kellogg

Nearly 100 people attended the Workshop on Emerging Issues in Water Quality, which was sponsored by the USGS Eastern Region and held in Orlando, FL, November 26 to 30. The conference was intended for technical personnel of the USGS who are actively pursuing programs involving emerging issues in water quality. The purpose of the workshop was threefold: (1) to bring together experts working on these issues with project personnel, scientists, and managers; (2) to exchange ideas and experiences; and (3) to develop plans for potential collaborative studies between disciplines and programs that address emerging issues in water quality.

Ed Oaksford (Assistant District Chief, Tallahassee), **Lisa Robbins** (Chief Scientist, Center for Coastal Studies, St. Petersburg) and **Mike Meyer** (Supervisory Geochemist, Water Quality Laboratory, Ocala) gave opening comments. Experts from within the USGS, as well as from the Centers for Disease Control (CDC), the Environmental Protection Agency (EPA), and several universities, presented keynote speeches. **Dale Griffin** (USGS, St. Petersburg), one of the keynote speakers, spoke on "A Microbiological Survey of Florida's Waters." **Christina Kellogg** and **Chris Reich** (USGS, St. Petersburg) also presented papers. **Christina** spoke on "Marine Recreational Waters: A Bacterial Indicator Study of Pinellas County, Florida, Beaches." (St. Petersburg is located in Pinellas County.) **Chris Reich's** talk was titled "Sources and Transport of Potentially Contaminated Ground Water to Coral Reef Environments, Florida Keys and Biscayne National Park." Highlights were talks by international water-quality authority **Joan Rose** from the University of South Florida's St. Petersburg campus and toxic-algae expert **JoAnn Burkholder** from the Center for Applied Aquatic Ecology in the Biology Department at North Carolina State University, Raleigh.

The keynote speeches and research presentations covered a range of environmental contaminants: pathogens, algal toxins, pharmaceuticals, pesticides and their degradates, hormones, and metals. Breakout groups discussed analytical methods, occurrence and fate of these contaminants, source tracking, hydrologic and ecologic effects, and strategies for developing partnerships with stakeholders. These discussions were distilled into content for a Web site, intended to be a crucial resource for both the public and scientists working on water-quality issues.

For more information, please visit the conference Web site at **http://owqrl.er.usgs.gov/contaminants** or contact Mike Meyer (mmeyer@usgs.gov).

Conference on Restoring Louisiana's Coastal Barrier-Island and Wetlands Ecosystems

By Jeff Williams

Over the past decade and more, field studies by the USGS, working in partnership with State universities, have documented rapid and regionally pervasive coastal erosion and wetland loss along the Mississippi River delta plain in south-central Louisiana. Land-loss rates vary widely both spatially and temporally, owing to a complex combination of natural geologic conditions and processes (for example, storms, subsidence, sea-level rise, sediment starvation) and increasingly important human alterations (for example, river channelization, flood control, canals, fluid withdrawal, navigation channels). Barrier-island-erosion rates are as great as 10 m/yr averaged over the past century, and wetland loss is about 70 km^2/yr. As high as these rates are, scientific consensus is that climate change over the next century could cause relative sea level to rise about 1.3 m (compared with approximately 1 m of rise over the past century) and large hurricanes could become more frequent. This increased risk has grave implications for New Orleans, as well as the rest of the delta plain. For various social, economic, and environmental reasons, a Federal-State task force is in the process of implementing a series of plans (Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), Coast-2050) intended to reduce land loss and to restore the degraded ecosystem. The current cost of restoration is $50 million/yr, but the estimated total cost could be $15 billion.

To get advice on plans and actions to date to restore the Louisiana coast and to learn how Louisiana's land-loss situation compares to that of other regions of the Nation, the Louisiana Governor's Office of Coastal Activities sponsored a half-day conference on November 16, 2001, hosted by the University of New Orleans. The conference was titled "Getting the Louisiana Land Loss Message Out to the Nation." Attended by about 250 people, the conference featured two panels: the first consisted of three local science journalists (**Mike Dunne**, **Bob Thomas**, **Mark Schleifstein**), and the second consisted of **Jeff Williams** (USGS, Woods Hole), **Don Boesch** (University of Maryland), and **Chris Hallowell** (author of *Holding Back the Sea: The Struggle for America's Natural Legacy on the Gulf Coast*, HarperCollins; see related article in October 2001 *Sound Waves*). **Jeff's** talk focused on Louisiana's erosion land loss in a national context, discussed large-scale restoration efforts in several other regions (South Florida/Everglades, Chesapeake Bay, San Francisco Bay, Cape Cod Military Base, Massachusetts Bay/Boston Harbor) and listed several things that these other restoration projects had in common:

- The public and State and national officials recognize the long-term value of the threatened ecosystem and are willing to protect and restore it.
- Degradation of ecosystems has been a long-term process; restoration will take time and sizable resources.
- Restoration projects require cost-share partnerships between Federal, State, and local governments.
- Credible science must guide and underlie restoration plans, and scientific monitoring during and following restoration is important.

The panel talks were followed by a discussion with the audience and a wrapup talk given by **Len Bahr**, Director of the Louisiana Governor's Office of Coastal Activities.

Woods Hole Field Center Members Attend Session on Migration to ArcGIS 8.1

By Glynn Williams

On October 23, 2001, ESRI (Environmental Systems Research Institute) held its first, free "Migration to ArcGIS 8.1" seminar in Cambridge, MA. Attending the seminar were several Geographic Information Systems (GIS) users from the Woods Hole Field Center (WHFC)—**Tammie Middleton**, **Jill Rozycki**, **Kara Hass**, and **Glynn Williams**—along with **Jessica Baker**, a former intern at WHFC and co-winner of the ESRI 2001 communication/cartography map award. Associates from the Woods Hole Oceanographic Institution also attended.

The meeting consisted of two sessions. The morning session covered general concepts of ArcGIS 8.1, mainly by a PowerPoint graphic presentation geared toward compacting and delivering complex information to a professional audience of GIS users and potential users. The presentation covered a great deal of information, and a question-and-answer session followed.

The afternoon session delved into the hands-on aspect of the meeting. The session covered early and current versions of ESRI ArcView products, as well as the three main components of ArcGIS 8.1: ArcCatalog, ArcMap, and ArcTool Box. Detailed information on these products and their new extensions can be found at ESRI's Web site at URL **http://www.esri.com/**.

It was quite an impressive seminar overall, but it presented too much complex information about this powerful product for most of the audience to fully grasp in a few hours. However, the number of audience questions showed that a conceptual understanding was achieved. A single session of Migrating to ArcGIS is well worth attending for the professional or beginning GIS user. The consensus of the USGS group was to consider a longer, formally instructed training course in order to get a working knowledge of this improved product.

Marine Technology Meeting

By Chris Polloni

The Marine Technology Society (MTS)'s New England Section kicked off its 2002 program on November 14, 2001, at the Slater Center for Ocean Technology on the University of Rhode Island campus in South Kingston, RI, with presentations describing three new product developments: Chris Warfel of Entech Engineering presented a solar-powered shellfish upweller, a system for increasing nutrient-rich saltwater flow in shellfish farms; Al Hanson of SubChem Systems presented a real-time chemical analyzer; and Paul Mathias of Polaris Imaging presented the Artemis II, a system for gathering and displaying high-resolution data from sonar and magnetic sensors.

The New England Section of MTS has a full program for 2002 listed on its Web site at URL **http://www.mtsociety.org/sections/new_england/index.html**, which is getting some help from **Chris Polloni**, the newly elected section secretary/webmaster. Other members from the Woods Hole Field Center include **Marinna Martini**, **Ken Parolski**, and **Chuck Worley**.

Western Coastal and Marine Geology Team Welcomes Two New Postdocs

By David Rubin

In October, the Western Coastal and Marine Geology team was joined by two new postdocs. They will be working with **David Rubin** on sediment studies along the Pacific coast.

Noah Snyder is a new postdoctoral scientist from the Massachusetts Institute of Technology (MIT).

Noah's thesis research was on bedrock-river response and processes in coastal northern California. He has had field experience in Alaska and Death Valley and on ground-water studies in Utah. **Noah** is based in Santa Cruz and will be working on two projects: studies evaluating the possible removal of Englebright Dam from the Yuba River in the foothills of the Sierra Nevada, and sediment studies in San Francisco Bay.

Jodi Harney is a new Mendenhall postdoctoral scientist from the University of Hawaii. **Jodi's** thesis research was on ecosystems and carbonate sediment budgets in Hawaii. **Jodi** has had experience in coastal sedimentology, diving, multispectral mapping, and integrated geologic and biologic studies. She is based in Santa Cruz and will be studying the impact of sediment dynamics on benthic communities in the Monterey Bay National Marine Sanctuary.

Student and Visiting Scientist Join Western Coastal and Marine Geology Team

Charlene Tetlak has joined the Western Coastal and Marine Geology team (WCMG) as an undergraduate-student intern to help **Mike Torresan** and **Simon Barber** in the sediment lab. **Charlene** currently is a geology student at San Francisco State University. She is diligently learning the various analytical procedures and pitfalls of grain-size analysis. **Charlene** is stationed in Menlo Park.

Don Woodrow has joined WCMG as a volunteer Visiting Scientist. **Don** recently retired from the faculty of Hobart and William Smith Colleges, where he was a professor of geology. He continues to work on research in the eastern part of Lake Ontario to determine the origin, fate, and year-to-year disposition of an offshore, beach, and dune-sand complex. He also will work with **John Chin** on compiling and synthesizing geologic information about San Francisco Bay as part of the Central California Regional Synthesis Project. **Don** is stationed in Menlo Park.

New Hire in GIS and Data Management

By Clint Steele

Gerry Hatcher has joined the Western Coastal and Marine Geology team as a Physical Scientist doing Geographic Information Systems (GIS) and data management. Gerry has an M.S. degree in Ocean Engineering from the University of Rhode Island and previously was the project manager for the Mapping/GIS Project at the Monterey Bay Aquarium Research Institute (MBARI). **Gerry** has a thorough knowledge of GIS software and has designed GIS software products that enhance the functionality of the basic off-the-shelf product. He has designed projects and worked at sea with the latest technologies, including multibeam systems such as the EM300, and processed and published the resulting data. His contributions may be considered among the pioneer efforts in the relatively young science of marine GIS.

Gerry is a licensed instructor for ArcView and has taught classes for many public and private organizations.

Gerry and his wife **Ronda** live in Ben Lomond, CA, and are the proud parents of a new daughter named **Abigail**, who will be about 2 months old when this article appears (you may be able to glimpse her in the computer screen nearest **Gerry** in the photogrph). **Gerry** is stationed in Santa Cruz, CA.

Gerry Hatcher** in temporary quarters at Menlo Park. Look at the computer screen nearest to him for a glimpse of his new daughter, **Abigail.

Woods Hole Field Center Visitors

Dave Twichell hosted several visitors after the Geological Society of America meeting in Boston this November. Visitors included **Harry Jol** (University of Wisconsin, Eau-Claire), **George Kaminsky** (Washington State Department of Ecology), **Jim Phipps** (Grays Harbor Community College), and **Sandy Vanderburgh** (University College of the Frasier Valley). The group came to Woods Hole to visit the USGS and go on a field trip looking at Cape Cod geology along with **VeeAnn Cross**. All four visitors have been involved in the Southwest Washington Coastal Erosion Project. They found the Cape Cod geology and beaches a striking contrast to the southwest Washington coast.

Barbara Poore (National Mapping, Reston) visited the Woods Hole Field Center (WHFC) on October 31 to learn how the Center handles information. **Barbara** is a liaison for her office in coastal studies. She was greeted by several WHFC members dressed in elaborate Halloween costumes. Her itinerary included meetings with groups involved with GIS (Geographic Information Systems) activities, sea-floor mapping, gas hydrates, habitat mapping, coastal processes, and urban contamination. **Barbara** also met with groups working on the Marine Realms Information Bank, the National Knowledge Bank, and other information activities.

***Dave Twichell** hosts a field trip to teach visitors about Cape Cod Geology. From left to right: **George Kaminsky** (Washington State Department of Ecology), **VeeAnn Cross** (USGS), **Dave Twichell** (USGS), **Harry Jol** (University of Wisconsin, Eau-Claire), and **Sandy Vanderburgh** (University College of the Frasier Valley).*

Richie Williams Places in the Cape Cod Marathon

By Richie Williams

On October 28, 2001, the five-member Veteran Team (older than 60), including **Richie Williams** (Woods Hole Field Center), won first place in the Cape Cod Marathon Relay in the mixed Veteran Category. Their combined time was 3 hours 26 minutes.

We encourage news items from across the Bureau.

The New Woods Hole Field Center Web Site

By Greg Miller

The Woods Hole Field Center's public Web site has recently been redesigned; it is now online at URL **http://woodshole.er.usgs.gov/index.html**. The new design simplifies the navigation to our available information, highlighting our current research programs and recent publications. New sections have been added to provide greater access to our online resources and offline research materials. There is an online searchable database of photographs taken during research operations and outreach events. A new search engine for USGS information, called MRIB, is now connected and available. We have also created a series of pages that highlight our Information archives, and a search engine to display the various online and offline resources that are associated with the many field activities occurring at our center. Our publications since 1990 have been entered into a bibliographic database that can now be searched. Also check out our ARC/IMS server, which serves Geographic Information Systems (GIS) data sets from the entire Coastal and Marine Geology Program.

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