

Research

## Limited Reproductive Success for California Clapper Rail in San Francisco Bay

By Steven E. Schwarzbach



*This study determined that the productivity of the federally endangered California clapper rail, whose distribution is restricted to San Francisco Bay, was much reduced over the natural potential. Photograph by Carmen Thomas, U.S. Fish and Wildlife Service.*



*On average, California clapper rails laid nearly 7 eggs per clutch, but only 2.4 chicks were produced per nesting attempt. Juvenile survival was not followed in this study, but the proportion of young to fledge was likely much less than 2.4 fledged per nest. Photograph by Carmen Thomas, U.S. Fish and Wildlife Service.*

The only breeding population of the federally endangered California clapper rail nests in the intertidal margins of San Francisco Bay. Present-day tidal-marsh habitat in the bay is about 15 percent of historical acreage, and remaining California clapper rail habitat is extremely fragmented. Understanding the causes of what appears to be baywide low fecundity of the clapper rail is important to support management and habitat-restoration efforts for its recovery. Contaminants and egg predation appear to be major factors limiting the reproductive success of California clapper rails in both the northern and southern reaches of the bay, according to a study in the January issue of *The Auk* by U.S. Geological Survey (USGS) scientist **Steven Schwarzbach** and coauthors **Joy Albertson** and **Carmen Thomas** of the U.S. Fish and Wildlife Service. The study's findings

indicate that strategies to increase the population will need to do more than provide new tidal-marsh habitats.

The study was conducted in six tidal marshes in San Francisco Bay—two in the North Bay (defined by the authors as north of the Golden Gate Bridge) and four in the South Bay (defined by the authors as south of the San Mateo Bridge)—during four breeding seasons (1991, 1992, 1998, 1999). The authors determined that the productivity of clapper rails was much reduced over the natural potential. Only 69 percent of clapper-rail eggs whose viability could be assessed were viable. Hatchability of eggs in North Bay and South Bay marshes was 65 and 70 percent, respectively. Only 45 percent of the nests successfully hatched at least one egg. Despite mean clutch sizes of 6.7 and 6.9 in the North and South bays, respectively,

*(Clapper Rail continued on page 2)*



*In the recent report, the part of San Francisco Bay north of the Golden Gate Bridge is referred to as the North Bay, and the part south of the San Mateo Bridge is referred to as the South Bay.*



*Steven Schwarzbach (formerly with the U.S. Fish and Wildlife Service) looks for nests of California clapper rail in Wildcat Marsh in the North Bay in 1999. Photograph by Steve Schwarzbach.*

## Sound Waves

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## Submission Guidelines

**Deadline:** The deadline for news items and publication lists for the August issue of *Sound Waves* is Wednesday, July 12.

**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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Need to find natural-science data or information? Visit the USGS Frequently Asked Questions (FAQ's) at URL <http://www.usgs.gov/search/faq.html>

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)

## Research, continued

(Clapper Rail continued from page 1)



*Remains of eggshells tell a story of predation. In successfully hatched nests, eggshell remains are removed by parents. Overall in the study, about one-third of all eggs were lost to predators. Rodents, particularly the Norway rat (*Rattus norvegicus*), accounted for 90 percent of the eggs lost to predation in South Bay marshes in 1992. Photograph by Carmen Thomas, U.S. Fish and Wildlife Service.*

clapper rails produced only 1.9 and 2.5 young per nesting attempt. Flooding was a minor factor, reducing the number of eggs available to hatch by only 2.3 percent; the loss that occurred was related to spring flood tides in the El Niño years of 1992 and 1998. Predation on eggs was a major factor affecting nest success, reducing productivity by a third.

Failed eggs were examined for abnormal development and contaminant concentrations. Contamination appeared to adversely influence clapper-rail reproductive success. Evidence included deformities; embryo hemorrhaging; embryo malpositions; a depressed rate of hatchability; concentrations of mercury, barium, and chromium greater than known avian embryotoxic thresholds; and a correlation of deformities with elevated concentrations of some trace elements in eggs that failed to hatch. Mercury was the only significant contaminant common to all marshes.

Predation and pollution effects might interact at many life stages. Such contaminants as mercury may slow growth or impair the ability of young to detect predators, impair the ability to fly or forage for food, and compromise the effectiveness of parental care for young. All of these contami-

nant-induced adverse effects would give an advantage in the wild to potential predators.

Among the authors' conclusions are the following management recommendations:

- For egg hatchability to improve, sufficiently protective sediment- and water-quality objectives, particularly for mercury, must be achieved within the San Francisco Bay habitat.
- To minimize flooding losses during the incubation phase, new tidal marshes from wetland-restoration efforts need to be designed to achieve appropriate elevations during spring, when clapper rails are constructing nests.
- New marshes will also require significant buffers from residential areas and active predator-control efforts to address predation of both nests and adult clapper rails.

The full citation of the new report is Schwarzbach, S.E., Albertson, J.D., and Thomas, C.M., 2006, Effects of predation, flooding, and contamination on the reproductive success of California Clapper Rails (*Rallus longirostris obsoletus*) in San Francisco Bay: *Auk*, v. 123, no. 1, p. 45–60. ❁



*Overall in the study, 31 percent of the eggs were nonviable. Note the shortened wings and extra toes in this late-stage rail embryo, which was collected as a fail-to-hatch egg from a nest at Wildcat Marsh in North Bay in 1998. Elevated chromium and barium are among the most likely trace elements responsible for such deformities at this marsh, but mercury may also have contributed to the occurrence of deformities. (The red area is not a deformity, but a yolk sac.) Photograph by Steve Schwarzbach.*

## USGS Study of Nearshore Habitats to Aid Puget Sound Recovery Attracts Media Attention

By John M. Clemens

Work by U.S. Geological Survey (USGS) scientists on Liberty Bay in Puget Sound was reported in the *Kitsap Sun* (Bremerton, Wash.) in two separate news stories, on April 28 and May 3, 2006. The scientists are looking for clues on how urbanization affects the health of the sound, which is the second-largest estuary in the Nation. (The largest is Chesapeake Bay.)

Puget Sound's health has degraded over time, largely as a result of changes in habitats along the nearshore, a biologically critical area. Extending from the high-water mark on the shore to the point in the sound where sunlight doesn't reach the bottom, the nearshore is one of the most biologically productive areas in the Sound.

In Liberty Bay, scientists from the USGS Biology, Geology, Geography, and Water Resources disciplines are

- measuring currents, salinity, and sediment grain size to understand physical processes operating in the bay;
- sampling water and sediment to analyze for evidence of pollution;
- sampling and analyzing plankton, fish, and shellfish to understand the food chain; and
- investigating the distribution and density of eelgrass, which stabilizes sediment and provides a rich habitat for wildlife (see related article in *Sound Waves*, September 2004, at URL <http://soundwaves.usgs.gov/2004/09/>).

The Liberty Bay investigation is one of three focus studies in the USGS Coastal Habitats In Puget Sound (CHIPS) program. Enabled through funding secured by U.S. Representative **Norm Dicks** (D-Wash.), the USGS CHIPS program will provide scientific information needed to restore and preserve the sound and to support the goals of the Puget Sound Partnership (see URL <http://www.governor.wa.gov/news/news-view.asp?pressRelease=218&newsType=1>), recently convened

by Washington Governor **Christine Gregoire**. The USGS has scientific expertise and experience in large-scale recovery efforts, notably the restoration of Chesapeake Bay and the Great Lakes.

To read the *Kitsap Sun* stories about the USGS Liberty Bay work, visit URLs [http://www1.kitsapsun.com/bsun/local/article/0,2403,BSUN\\_19088\\_4657450,00.html](http://www1.kitsapsun.com/bsun/local/article/0,2403,BSUN_19088_4657450,00.html) and [http://www1.kitsapsun.com/bsun/local/article/0,2403,BSUN\\_19088\\_4669525,00.html](http://www1.kitsapsun.com/bsun/local/article/0,2403,BSUN_19088_4669525,00.html). ☼



*Lisa Gee and Collin Smith, biologists with the USGS Western Fisheries Research Center, empty the contents of a plankton net into a sample vial for later analysis.*

## Outreach

### USGS Scientist Interviewed About Threats to Coral Reefs

On February 22, 2006, U.S. Geological Survey (USGS) researcher **Curt Storlazzi** participated in a press conference on “Threats to Coral Reefs” at the 13th Ocean Sciences Meeting in Honolulu, Hawaii—a meeting sponsored jointly by the American Geophysical Union (AGU), The Oceanography Society (TOS), and the American

Society of Limnology and Oceanography (ASLO). AGU organized the press conference, which brought together three scientists to give short summaries of the talks they presented at the meeting and to answer reporters’ questions about coral-reef health.

**Brian Lapointe** (Harbor Branch Oceanographic Institute, Fort Pierce, Fla.)

presented “Nutrient Availability, Macroalgal HABs, and Coral Reef Development in Southeast Florida: Changes in Latitudes, Changes in Attitudes.” **Guy Marion** (University of Queensland, Australia) spoke about “Coral Isotopic Records of Unprecedented Land-Use Stress in Great

*(Press Conference continued on page 4)*

(Press Conference continued from page 3)

Barrier Reef Coastal Communities.” **Curt Storlazzi** (USGS, Santa Cruz, Calif.) discussed “The Influence of Sea-Level Rise on Fringing Reef Hydrodynamics: Insights from Southern Molokai, Hawaii.”

Scheduled for 1 hour, the press conference ended up running almost 2 hours, as reporters questioned the participants in further detail after their presentations. **Curt’s** part of the press conference focused on preliminary work being carried out by the USGS Coral Reef Project (see URL <http://coralreefs.wr.usgs.gov/>) on the influence of predicted sea-level rise on coral reefs. The Intergovernmental Panel on Climate Change (URL <http://www.ipcc.ch/>) conservatively predicts that sea level will rise 0.5 m (approx 1.5 ft) over the next 100 years. USGS scientists have combined field observations, theoretical calculations, and numerical modeling to better constrain how such sea-level rise might change the hydrodynamics around coral reefs and to determine the resulting impact on physical processes and sediment transport over a fringing reef. Their results suggest that an increase in water depth of 0.5 m will not only drastically change physical processes on the shallower parts of the reef, but will also likely affect the deeper parts.

Associated Press writer **Tara Godvin**, who attended the session and interviewed **Curt** for some time afterward, wrote an article titled “Scientists Say Rising Sea



(Left to right) **Curt Storlazzi** (USGS), **Guy Marion** (University of Queensland), and **Brian Lapointe** (Harbor Branch Oceanographic Institute) presented information on threats to coral reefs at a press conference held February 2006 at the Ocean Sciences Meeting in Honolulu, Hawaii.

Threatens Coral,” which was picked up and printed by the Seattle *Post-Intelligencer* (Feb. 23), the Orange County *Register* (Feb. 25; URL [http://www.ocregister.com/ocregister/healthscience/atoz/article\\_1017141.php](http://www.ocregister.com/ocregister/healthscience/atoz/article_1017141.php)), the San Diego *Union-Tribune* (Mar. 3), and the Casper (Wyo.) *Star-Tribune* (Mar. 3). The Honolulu *Star-Bulletin*, one of Hawaii’s largest newspapers, published two articles on the results presented at the press conference, including “Oceans Still Hold Vast Secrets” (Feb. 26; URL <http://starbulletin.com/2006/02/26/business/story02.html>)

and “Rising Sea Levels Threaten Coral Reefs” (Mar. 6; URL <http://starbulletin.com/2006/03/06/news/story06.html>).

AGU holds press conferences to disseminate the results of their members’ work beyond the professional colleagues who attend their sessions. The mass media, ranging from daily newspapers through radio and TV to specialized magazines and the Internet, have proved an effective means of informing the public about advances in geophysical sciences. ❁

## Diverse Offering from USGS at 2006 Marine Quest in Florida

By **Ann B. Tihansky**

On April 22, coincident with Earth Day festivities, the Florida Fish and Wildlife Research Institute held their annual public open house, called “Marine Quest,” at Bayboro Harbor in downtown St. Petersburg, Fla. The U.S. Geological Survey (USGS) participated in the event with a booth highlighting the many scientific activities taking place within USGS Florida Integrated Science Center offices throughout Florida. Eight USGS volunteers participated in the

event by helping to design the activities, create the materials, and set up, take down, or staff the booth. These included **Nancy Dewitt, Katie Frische, Chris Kellogg, Victor Levesque, Marci Marot, Stacy Merriweather, Ann Tihansky, and Laurinda Travers.**

The USGS booth highlighted coastal hazards and research, water quality, biological resources, and geologic mapping. The day was windy, and assorted

rock samples came in handy for holding down the many materials on display. Hands-on activities included a guessing game called “What Kind of Water Is It?” in which visitors could try their luck at identifying eight water samples by visual analysis alone. The water samples came from eight different sources, including a lake, a river (the Withlacoochee River), an estuary (Tampa Bay), a swimming

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(*Marine Quest continued from page 4*)

pool, the tap, a retention pond, and rain. A short discussion before the guessing began gave hints at ways the water types might vary in appearance. It was surprising how many people found that they were likely to drink their swimming-pool water! Those who wanted to get more involved were encouraged to get their hands wet by pretending that they were scientists working underwater. They could then write or color on special paper in a large tub filled with water that

simulated conditions shown in looping video footage of scientific divers recording information as they worked underwater in a coral-reef environment.

Booth visitors could also pick from a wide range of take-home materials: buttons, bookmarks, fact sheets, extra waterproof paper, and the new Florida Integrated Science Center poster “Learn About the Science Around You,” which was created to generate interest in USGS Web resources. ❁



**Nancy Dewitt** rolls up another poster for a visitor to take home.



**Nancy Dewitt** and **Katie Frische** look on as two players try their skill at guessing “What Kind of Water Is It?”



A typical sample of Florida karst rock attracts an inquisitive youngster.



**Nancy Dewitt** and **Stacy Merriweather** survive the windy conditions at another fun Marine Quest.

## High-School Geography Team Visits USGS in Woods Hole, Massachusetts

By Chris Polloni

The Essex Agricultural and Technical High School geography team, led by their teacher **Ann Witzig**, stopped by the U.S. Geological Survey (USGS) Woods Hole Science Center for a short visit to show their newly created maps of the Gulf of Maine. They had generated the maps from USGS Open-File Report 99-439, *A Marine GIS Library for Massachusetts Bay*, by **Bradford Butman**. The team got to “fly” the center’s Geowall system, a tool for three-dimensional visualization, and received a briefing from team chief scientist **Bill Schwab** and operations manager **David Nichols**. The students were on their way to Woods Hole village and tours of

the National Oceanic and Atmospheric Administration (NOAA) ship *Delaware II* and the Woods Hole Science Aquarium (URL <http://aquarium.nefsc.noaa.gov/>). ❁

*Members of the Essex Agricultural and Technical High School geography team display maps they created from USGS Open-File Report 99-439, A Marine GIS Library for Massachusetts Bay.*



## USGS Participates in Two Career Fairs at Massachusetts Institute of Technology

By Chris Polloni

In February 2006, personnel from the U.S. Geological Survey (USGS) Woods Hole Science Center took part in two career fairs at the Massachusetts Institute of Technology (MIT): the Impact 2006 Career Expo on February 13 and 14, and the Civil and Environmental Engineering Students Association (CEESA) Career Fair on February 28. The invitation to attend was the result of correspondence to MIT alumni **Bradford Butman** and **Richard Signell**.

Impact 2006 was a 2-day event that focused on social and environmental concerns and was designed for students who want to leverage their education in science, engineering, and the humanities to make a positive impact on society (see URL <http://web.mit.edu/impact/>). The

first evening, USGS scientists **Dave Foster** and **Chris Polloni** attended an evening presentation by faculty and students. The students expressed interest in entrepreneurial experiences, or at least some freedom to define their path to success in any given project. The evening also included a forum of five panelists who described their paths to success in environmentally sensitive businesses. It culminated with a student-employer networking session attended by **Herman Karl**, a former member of the USGS Coastal and Marine Geology Program and now codirector (with MIT professor **Lawrence Susskind**) of the MIT-USGS Science Impact Collaborative (MUSIC; see URL <http://web.mit.edu/dusp/epg/music/>).

The second day consisted of an afternoon job fair, at which employers conversed with students and gave them a sense of the types of activity available. **Ellen Mecray**, **Chris Polloni**, and **Herman Karl**, assisted by some of **Karl's** MUSIC students, provided information about USGS coastal and marine research and the MUSIC activities at MIT.

On February 28, **Chris Polloni** spent the afternoon at the CEESA Career Fair, providing literature and describing research being performed by USGS Coastal and Marine Geology Program (CMGP) scientists. He also provided information on where to look for CMGP jobs that are related to environmental engineering. ☼

## USGS Scientist Accompanies High-School Alma Mater on Annual Field Trip for the 20th Year

By Ann Tihansky

**Dave Zawada**, a U.S. Geological Survey (USGS) scientist in the Florida Integrated Science Center, St. Petersburg, Fla., participated for the 20th time in a field trip to the Florida Keys with students from his old high school in Munster, Ind. During the annual field trip, the students learn

about an environment that is strikingly different but also quite similar to that back home. For 10 days, the students immerse themselves in comparing the two worlds.

The Environmental Science Project was founded in 1975 by **John Edington** and **Art Haverstock**, two biology teachers at Munster High School, in an effort to give students a hands-on learning experience in the field. **Dave Franklin**, chairman of the high school's science department, now leads the course, with assistance from teacher emeritus **Edington**. This year marks the 31st consecutive year for the course, and **Edington** has been a part of each year's course. **Dave Zawada** is an alumnus

of the 8th "Project Biology" trip, a popular moniker for this novel class.

Project Biology is a special elective, extracurricular class in which students apply for one of 30 spots and show up an hour early to school each day to learn about the floral and faunal similarities between the Indiana Dunes and the Florida Keys. Geologically, both settings were affected by the end of the Wisconsin glacial period.

On a chilly March afternoon, this year's group boarded a bus in Munster, Ind. (located near Chicago, Ill.), leaving winter behind as they traveled to Big Pine Key, Fla., their temporary home for the week. On the way down, they visited the Okeefe-nokee Swamp and the Everglades.

**Dave Zawada** continues to join the field trip every year, helping with logistics and teaching about the area: "One of the main reasons I continue to go is that I remember what an impression this trip made on me. I believe that I am in my present field of study because of things I learned on this trip more than 20 years ago."

*(Field Trip continued on page 7)*



**Ann Tihansky** delivers a talk about sinkholes and karst in Florida to Munster High School students and **Dave Zawada** (back left) in the fresh air of the Florida Keys during their evening program.

## Outreach, continued

(Field Trip continued from page 6)

This year, **Dave** convinced USGS hydrologist **Ann Tihansky** to present a talk about Florida's hydrogeology and karst to the students for an evening program. "I am always pleased to share this kind of information with students," says **Ann**. "Understanding the ecosystems of Florida is so tied to understanding the basic interplay of water and the geologic framework. I wanted the students to get a good appreciation of what karst is and how it can affect water availability and living systems. **Dave Franklin** had planned a lot of field activities that would give them the opportunity to see these things firsthand. These students really understood that, and they had a lot of thought-provoking questions, too."

While in the keys, the students visit several types of habitat and participate in field activities and experiments that give them firsthand experience with data collection in the field. They hike around Big Pine Key, where they visit Blue Hole, a freshwater sinkhole, Watson's Hammock,

and a shallow nearshore karst terrace called Coupon Bight. They also boat several miles offshore for a snorkeling and diving trip to a carbonate reef known as Looe Key. On all of these visits, the students discuss ecological and environmental issues affecting the Florida Keys area.

The kids also pitch in with domestic duties. They camp in tents, which they set up themselves, and they also take turns assisting with cooking and cleaning up. **Dave** still helps with all of these duties too. In fact, he's known to the students for his famous garlic bread. ☼

***Dave Zawada**, USGS scientist and Munster High alumnus, compiles field data collected by the students.*



*Students conduct sampling as part of a multiyear experiment looking at size distributions of *Cassiopeia xamachana*, a.k.a. the "upside-down jellyfish," in Coupon Bight.*



## National Ocean Sciences Bowl Competitors Tour Laboratories in Woods Hole, Massachusetts

By **Chris Polloni** and **Brian Buczkowski**

Three teams that represented Lincoln-Sudbury Regional High School in a regional round of the National Ocean Sciences Bowl received a special tour of marine laboratories in Woods Hole, Mass., on April 5, 2006. The school's Team A had won the regional event, called the "Blue Lobster Bowl," on March 4, and they went on to take first place in the 9th Annual National Ocean Sciences Bowl (NOSB) at Pacific Grove, Calif., on May 13-15. The national event challenged competitors with questions related to ocean biology, chemistry, geology, physics, navigation,

*National Ocean Sciences Bowl students get to see what life is like inside the manned submersible Alvin while visiting the WHOI Exhibit Center. Photograph by **Nancy Soderberg**.*



geography, related history, literature, and more. (Learn more about NOSB at URL <http://www.nosb.org/>.)

The tour for the Lincoln-Sudbury Regional High School students, their coach **Doug Grant**, and their chaperones was sponsored by the U.S. Geological Survey (USGS) and the Woods Hole Oceanographic Institution (WHOI). The visitors were inquisitive and curious throughout the day-long tour, which was facilitated by USGS scientist **Chris Polloni**. The tour began at the WHOI dock, where **Marga McElroy** of WHOI's Applied Ocean Physics and Engineering Department led the visitors aboard WHOI's research vessel *Atlantis*, which supports the manned

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(Ocean Bowl Tour continued from page 7)

submersible *Alvin* and other deep-submergence vessels, and then to dockside laboratories housing *REMUS* (Remote Environmental Monitoring Units), *ABE* (Autonomous Benthic Explorer), and other autonomous underwater vehicles (AUVs) and accessories.

Next was WHOI's Quissett Campus, which houses numerous facilities, including the USGS Woods Hole Science Center. USGS scientist **Brian Buczkowski** joined WHOI's **Ellen Roosen** and **Jim Broda** to give the visitors an overview of the campus' expanded core facilities and sampling laboratories. Then the students visited the USGS center, where half of them "flew" through three-dimensional depictions of the sea floor around Puerto Rico at the USGS Geowall exhibit and spoke with geologist **Uri ten Brink** about his studies of earthquake and tsunami hazards in the Caribbean region. The rest of the students met with USGS scientists **Bill Waite**, **Ra-**

**chel Horwitz**, and **Sandy Baldwin**, who introduced them to USGS research on gas hydrates and the center's GHASTLI (Gas Hydrate and Sediment Testing Laboratory Instrument) laboratory.

**Kate Madin**, Curriculum Coordinator for WHOI's Academic Programs Office, picked up the group at the USGS and took them up to WHOI biologist **Darlene Ketten's** new necropsy laboratory, where **Scott Cramer** explained what had been done with a beaked whale that had just been brought in and processed.

The team had lunch at the Buttery in Fenno House, where they met **John Far- rington**, Scientist Emeritus and former Dean of WHOI, and **James Yoder**, WHOI Vice President for Academic Programs and current Dean, who welcomed the team to the campus and congratulated them on their competition in the NOSB.

After lunch, the team went to the WHOI Visitors Center, where **Kathy Patterson**

hosted them and gave them the option to take home some special ocean-related gifts.

The tour ended where it had begun, with USGS scientist **Kathy Scanlon** leading the group back to the dock area for a special guided tour of the unmanned submersible *Alvin*. WHOI engineer **Rod Cat- anach** briefed the teams on the operational aspects of the submersible and answered detailed questions.

According to **Doug Grant**, the stu- dents' advisor, the teams chatted about the visit all the way home. **Grant** expressed sincere appreciation for everyone's efforts to make the visit a memorable experience on short notice.

The NOSB is sponsored by the Con- sortium for Oceanographic Research and Education (CORE), which seeks to expand students' interest in ocean sciences as a college and career possibility (see URL <http://www.coreocean.org/>).✻

## WHSTEP Science and Math Safari Explores the Use of Sound in Ocean Research

By Chris Polloni and Brian Buczkowski

The Woods Hole Science and Technology Education Partnership (WHSTEP) is a partnership of schools, scientific institutions, businesses, and community resources on upper Cape Cod



Science teachers receive guidance from USGS scientists (left to right) **Dann Blackwood**, **Brian Buczkowski**, and **Nancy Soderberg** on how to navigate the USGS warehouse! Photograph by **Chris Polloni**.

whose mission is to promote and expand science and technology education and scientific literacy among the participating groups and communities. Science and Math Safaris are one of the programs organized by the WHSTEP for science teachers in Bourne, Mashpee, and Falmouth, Mass.

On March 30, a Science and Math Safari was held at the U.S. Geological Survey (USGS)'s Woods Hole Science Center. The aim of this Safari was to bring local teachers to the USGS, teach them about oceanographic techniques, and help them take what they learn back into their classrooms by giving them lesson plans and teaching resources.

The theme of this year's Science and Math Safari was "Bouncing Sound and Mapping with Math in the Oceans." The Safari began at the USGS Geowall display, a tool for three-dimensional visualization, which was used by **Chris Polloni** to guide participating teachers in

a virtual fly-through tour of the Puerto Rico Trench, the deepest trench in the Atlantic Ocean. The fly-through brought to life the bathymetry and sidescan-sonar data collected by using the sound and reflection methods that were the focus of the 2006 Safari. Participants got a brief tour of selected USGS research facilities and an overview of the USGS Coastal and Marine Geology Program by **Nancy Soderberg**, **Dann Blackwood**, and **Brian Buczkowski**.

The Safari then moved to the USGS Marine Operations Facility (MOF) for an introduction to instruments that use sonar to explore the depths of marine realms. This Safari had been designed with a focus on math problems for grades 4 through 6, but the group included many junior-high- and high-school teachers who were curious about how sound is used to explore the ocean. The exhibits at MOF covered most of the equipment used to

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## Outreach, continued

(Safari continued from page 8)

map the sea floor and to collect samples and imagery for ground-truthing the soundings. The exhibits were organized in numerical order, and it was up to the teachers to match each numbered instrument to a description printed on the Safari guide. Most of the teachers had

never seen these types of instrument, even though many are manufactured in the Falmouth area. A lot of coaching went on as the teachers worked through the exhibit, and all ended up with perfect scores, smiles, and new insights into how sound is used in ocean exploration.

The USGS team thanks our WHSTEP partners, especially **Donald Estes** for initiating this event, **Pat Harcourt** and **Liese Siemann** for coordinating the subject material, and the participating teachers for their enthusiasm. ❁

## Meetings

# USGS and Integrated Science at First International Symposium on Mangroves as Fish Habitat

By **Ann B. Tihansky**

The U.S. Geological Survey (USGS) cosponsored and participated in the First International Symposium on Mangroves as Fish Habitat held in Miami, Fla., April 19-21, 2006. This symposium, organized by **Joseph Serafy** and **Shauna Slingsby** of the National Oceanic and Atmospheric Administration (NOAA), **Rafael Araujo** of the University of Miami, and **Doreen DiCarlo** of the Florida Center for Environmental Studies, was designed to bring together scientists of different backgrounds and disciplines to exchange ideas, approaches, and methods for studying mangroves and their function as fish habitat. Held at the Miami Rosenstiel School of Marine and Atmospheric Science (see URL <http://www.rsmas.miami.edu/>), the symposium drew 150 scientists from 25 countries.

**Carole McIvor**, USGS research biologist and wetlands task leader for the USGS Tampa Bay Study, was heavily involved in this symposium. Her research group from the USGS Florida Integrated Science Center (FISC) contributed four talks and one poster, and she coauthored two additional contributions with non-USGS colleagues. **Carole** also moderated a session focused on the topic of community ecology and connectivity. The topics presented by her research group covered the long-term effects of hurricanes on mangrove habitats used by fish and terrapins, aquatic food webs in various mangrove community



**Kristen Hart** (second from left) discusses her work on diamondback terrapins in mangrove habitat during her poster session at the symposium.

types, the effects of flow modifications on fish and juvenile blue crabs, and the use of hydrological techniques to better quantify fish. Papers and posters presented included work done by research-group members **Adam Brame**, **Kristen Hart**, **Justin Krebs**, **Victor Levesque**, **Noah Silverman**, and **Lauren Yeager**. **Bill Loftus**, also of FISC, attended the symposium as well.

**Carole** was excited to participate and recognized the opportunity to expose her research group to internationally known scientists, as well as to new ways of thinking. “This symposium allowed us to widen our horizons beyond our Florida study sites to mangrove environments in other parts of the world, where the geomorphologic, hydrologic, and cultural settings

may be quite different.” The symposium crossed the narrow boundaries of conventional scientific disciplines, highlighting the use of hydroacoustics to track tidal migrations of fish, the use of microchemistry of fish otoliths (ear bones) to infer nursery habitats, and the use of stable isotopes to infer food-web linkages. Other contributions ranged from the population biology of single species to landscape-level integration of mangrove with adjacent habitats, such as seagrass beds and coral reefs. “The USGS was proud to be able to sponsor this event,” said **Carole**. “Symposiums that integrate across scientific disciplines like this ensure that science programs have increased value to natural-resource managers and the public.” ❁

## Coastal and Marine Science at the USGS GIS 2006 Workshop

By Florence Wong, Karynna Calderon, VeeAnn Cross, Shawn Dadisman, Amy Foxgrover, Amar Nayegandhi, and Hilary Stockdon

For the second time in a row, members of the U.S. Geological Survey (USGS)'s Coastal and Marine Geology Program (CMGP) won the "You Make Us Proud to Be Geeks" poster prize at the biennial USGS GIS (Geographic Information System) Workshop in Denver, which convened during the week of April 24-28, 2006. The winning poster—"Integrated Lidar and Bathymetric Surveys of the South San Francisco Bay Region: New Data for Salt Pond Restoration" by **Amy Foxgrover** and **Bruce Jaffe** (Santa Cruz, Calif.)—featured baseline elevation mapping contracted by the USGS in advance of efforts to restore intertidal wetland habitats from salt ponds that have been impounded for as many as 100 years (see URL <http://pubs.usgs.gov/of/2005/1284/>). Amy also gave a talk at a session on lidar (light detection and ranging) elevation data, covering the complex process of establishing ground controls for both aerial and shipborne parts of the data collection, as well as the processing of data into a coherent map product. CMGP attendees from Woods Hole, Mass., won the award at the previous workshop in 2004 (see URL <http://soundwaves.usgs.gov/2004/04/meetings.html>).

A poster by **VeeAnn Cross** (Woods Hole) entitled "Integration of Continuous Resistivity Profiling and Seismic-Reflection Data in the Nearshore Environment" highlighted resistivity profiling, a new data-collection tool now available within the Coastal and Marine Geology Program. Resistivity data integrated with seismic-reflection data enabled a three-dimensional representation of the ground-water system of outer Cape Cod and its relation to subsurface geology in the sub-sea-floor environment. Resistivity data are key to the ongoing USGS-National Park Service exploration of fresh/brackish-water dynamics at Cape Cod National Seashore (see related article in *Sound Waves*, October 2005, at URL <http://soundwaves.usgs.gov/2005/10/fieldwork3.html>).

A poster by **Shawn Dadisman** and **Karynna Calderon** (St. Petersburg, Fla.),



(Clockwise from top left) **Karynna Calderon**, **Shawn Dadisman**, **Amy Foxgrover**, **Florence Wong**, and **VeeAnn Cross** were among the Coastal and Marine Geology Program members who attended the 2006 USGS GIS workshop in Denver.

entitled "The Geodatabase Solution to Data Management: Examples from LASED and XSTORMS," presented the leap in organization and accessibility achieved by loading project seismic-reflection and sediment-core data and coastal oblique aerial photographs and videos into a geodatabase structure.

**Amar Nayegandhi** (St. Petersburg) presented his research on "Deriving Vegetation Metrics Using Lidar," which uses data from a unique waveform-resolving, green-wavelength lidar system to derive such parameters as canopy height, relative canopy cover, and bare-earth elevation. **Amar** also gave a talk and poster on "Visualizing Spatial Data with Google Earth," in which he described how to convert spatial data sets for use with the popular three-dimensional mapping application.

A talk by **Hilary Stockdon** (St. Petersburg), entitled "Examining the Coastal Response to Hurricane Katrina Using a Storm-Impact Scaling Model," addressed the strikingly different impacts of the 2005 storm on the barrier islands of Louisiana, Mississippi, and Alabama.

**Florence Wong** (Menlo Park, Calif.) gave a talk and presented a related poster about "Probabilistic Tsunami Hazard Mapping, Seaside, Oregon," a cooperative pilot project by the USGS, the National Oceanic and Atmospheric Administration (NOAA), and the Federal Emergency Management Agency (FEMA) to help FEMA modernize its Flood Insurance Rate Maps (see URL <http://gis.esri.com/library/userconf/proc05/papers/pap2000.pdf>).

The workshop provided opportunities for about 200 USGS GIS users from across the Nation to share information about new (or useful old) techniques in spatial analysis and data publication and to discuss the merits of different visualization applications (Google Earth, NASA's World Wind, and ESRI's ArcGlobe, for example). Training sessions conducted by USGS staff and outside vendors and specialists covered such topics as basic mapmaking, finding data on the Internet, image- and vector-processing tools, and metadata. The scheduling of many talks and several plenary presentations on health and hazard applications of GIS emphasized the importance of these topics for future USGS programs and collaborations. The proceedings of the 2006 workshop can be viewed or downloaded from URL <http://md.water.usgs.gov/publications/sir-2006-5094/>. ❁



**Jennifer Sieverling** of the USGS Geospatial Information Office presents **Amy Foxgrover** with the "You Make Us Proud To Be Geeks" award for her poster about elevation mapping in south San Francisco Bay.

## USGS Biologist Contributes Technical Expertise to a Multiagency Diving-Rescue Class

By Ann B. Tihansky

As a biologist, **Marc Blouin** studies sturgeon in the cold, murky waters of the Great Lakes. He also shares his technical expertise with other scientists by advancing in-place data-collection methods for other disciplines of study via scuba diving. Most recently, **Marc** has been helping develop methods to mount and deploy instrumentation that is used to study water quality and circulation for beach-health projects. He is the U.S. Geological Survey (USGS) Scuba Dive Program Manager and is a member of the USGS dive-safety board, where he serves as the dive-safety officer. **Marc** also teaches water-related safety courses for USGS employees. He coordinates open-water checkout dives for research teams, teaches specialized scuba training, serves as an instructor for the Department of the Interior's Motorboat Operations Certification Course (MOCC), and teaches the USGS "Over-the-Water" safety training class. Through his efforts, he helps spread the word about technical methods and safety near and in the water, both within and outside the USGS. **Marc** is currently serving on the board of directors for the American Academy of Underwater Sciences (AAUS), an organization of diving scientists and safety officers committed to the advancement of



◀ USGS biologist **Marc Blouin** at work in the murky, cold water of Lake Michigan.

▼ **Marc Blouin** (with snorkel) conducting a water session with students in the rescue-diver class.

underwater science and dive safety. He also is a member of the Watercraft Safety Committee for USGS.

In April, **Marc** participated as an instructor in a multiagency training workshop for "Scuba Lifesaving and Accident Management (SLAM)." This collaborative effort shared resources and expertise among the USGS, the U.S. Coast Guard, the Florida Wildlife Research Institute (FWRI), the University of South Florida, and the Scuba Scouts. The class taught students from the different agencies how to handle a scuba-diving accident, starting from an underwater rescue and ending with an air evacuation. Many of the students depend



on diving skills as part of their daily jobs. To strengthen their skills, the SLAM class staged a mock scuba-diving accident that simulated an emergency in the open waters of Tampa Bay. The rescue procedures involved for air evacuation allowed the divers, boat crews, and helicopter pilots to practice their skills and gave everyone firsthand experience in a drill that could

save their lives. Classroom training and pool sessions began April 8 at the FWRI in St. Petersburg, Fla., which prepared the participants for the open-water training exercise held on Saturday, April 29. According to **Marc**, there is no substitute for hands-on training: "This type of training exercise is one of the best ways to prepare all of the agencies involved for dealing with the event of a real accident." ❁



During the open-water accident simulation, the "victim" has been prepared for airlift.



U.S. Coast Guard partners provide support on the water and in the air during the accident-simulation training.

## USGS Employee Honored by Fish and Wildlife Service

By Hannah Hamilton

U.S. Geological Survey (USGS) scientist **Helen Light** was honored by the U.S. Fish and Wildlife Service (USFWS) at its annual Partnership Luncheon on April 27 in Panama City, Fla. **Light** was one of 35 individuals from various agencies and organizations honored by the USFWS.

A botanist who works in the USGS Hydrologic Studies Section in Tallahassee, Fla., **Light** was recognized for her outstanding and lengthy history of commitment to conservation of the Apalachicola and other Florida rivers. The Apalachicola is a coastal-plain river that begins at the confluence of the Chatahoochee and Flint Rivers at the Florida State line and flows 106 mi (about 70 mi as the crow flies) to the Gulf of Mexico, where it empties into Apalachicola Bay. **Light** has developed a complete and quantitative description of the flood-plain connectivity that allows evaluation of how changes in flow may affect flood-plain ecology; she has provided much of the technical data that led to the discontinuation of dredging; and she has coor-

ordinated substantial data collection and analyses of the changing geomorphology of the Apalachicola River. In an upcoming USGS Scientific Investigations Report, she discusses water-level decline in the Apalachicola, which is Florida's largest river in terms of discharge.

Although the award was primarily for her work on the Apalachicola River, it also recognized **Light's** work on other rivers. She has conducted research on the Suwannee River, for example, in flood-plain forests all the way down the treeline, where forests give way to marshes about 2 km from the coast. She and her coworker **Melanie Darst** are authoring a chapter on the Suwannee River tidal freshwater forests in an upcoming book titled *Ecology of Tidal Freshwater Swamps of the Southeastern United States*, due to be published early next year.

**Light** has been working at the USGS office in Tallahassee since 1979, conducting research on forested river flood plains in north Florida. ❁



**Helen Light** holding a very tall tupelo "knee" in a flood-plain swamp of the Apalachicola River in north Florida. Roots of tupelo trees will occasionally grow in a vertical direction in response to water-level fluctuations, similar to the more commonly occurring knees of cypress trees. Tupelo knees generally form short stool-like knobs, less than 0.5 m high. This arching tupelo root is unusual in that it exceeds 1.5 m in height. Photograph by **Melanie Darst**.

## Staff and Center News

## New Oceanographic Data System Manager in Woods Hole

By Rich Signell



**Ellyn Montgomery**, new Oceanographic Data System Manager at the USGS Woods Hole Science Center. Photograph by **Dann Blackwood**.

The U.S. Geological Survey (USGS)'s Woods Hole Science Center (WHSC) recently welcomed **Ellyn Montgomery** as the center's new Oceanographic Data System Manager. **Ellyn** is responsible for managing the development and maintenance of the Oceanographic Data System and Oceanographic Data Archive at WHSC, maintaining and extending the system components, consulting with staff

members to see that project needs are met, and ensuring that data are accessible to other USGS scientists, collaborators, and the public.

**Ellyn**, who was previously a research specialist in the Physical Oceanography Department at the Woods Hole Oceanographic Institution, has more than 20 years of experience working with oceanographic instruments, software development, and data systems. Her skills will be greatly appreciated at the WHSC. Along with her academic interests, **Ellyn** enjoys sea kayaking, backpacking, fly fishing, cross-country skiing, and any activity that gets her into the wilderness.

**Ellyn's** office is located in Room 18 in the Gosnold Building—stop by and say hello! ❁

## Recently Published Articles

- Baldwin, W.E., Morton, R.A., Putney, T.R., Katuna, M.P., Harris, M.S., Gayes, P.T., Driscoll, N.W., Denny, J.F., and Schwab, W.C., 2006, Migration of the Pee Dee River system inferred from ancestral paleochannels underlying the South Carolina Grand Strand and Long Bay inner shelf: *Geological Society of America Bulletin*, v. 118, no. 5-6, p. 533-549 [URL <http://www.gsa-journals.org/gsaonline/?request=index-html>].
- Cross, V.A., Twichell, D.C., Halley, R.B., Ciembronowicz, K.T., Jarrett, B.D., Hammar-Klose, E.S., Hine, A.C., Locker, S.D., and Naar, D.F., 2006, GIS compilation of data collected from the Pulley Ridge deep coral reef region: U.S. Geological Survey Open-File Report 2005-1089 (DVD-ROM) [URL <http://woodshole.er.usgs.gov/pubs/of2005-1089/>].
- Embley, R.W., Chadwick, W.W., Jr., Baker, E.T., Butterfield, D.A., Resing, J.A., de Ronde, C.E.J., Tunnicliffe, V., Lupton, J.E., Juniper, S.K., Rubin, K.H., Stern, R.J., Lebon, G.T., Nakamura, K.-I., Merle, S.G., Hein, J.R., Wiens, D.A., and Tamura, Y., 2006, Long-term eruptive activity at a submarine arc volcano: *Nature*, v. 441, no. 7092, p. 494-497 [URL <http://www.nature.com/nature/journal/v441/n7092/>].
- Eshleman, Jodi, Ruggiero, Peter, Kingsley, Etienne, Gelfenbaum, Guy, and George, Doug, 2006, Capitol Lake, Washington, 2004 data summary: U.S. Geological Survey Data Series 180 [URL <http://pubs.usgs.gov/ds/2006/180/>].
- Geist, E.L., 2005, Rapid tsunami models and earthquake source parameters; far-field and local applications: *ISSET Journal of Earthquake Technology*, paper 460, v. 42, no. 4, p. 127-136 [URL <http://home.iitk.ac.in/~vinaykg/issue18.html>].
- Greenwood, W.J., Kruse, S., and Swarzenski, P., 2006, Extending electromagnetic methods to map coastal pore-water salinities: *Ground Water*, v. 44, no. 2, p. 292-299, doi:10.1111/j.1745-6584.2005.00137.x [URL <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1745-6584.2005.00137.x>].
- Hutchinson, D.R., and Rowland, R.W., 2006, USGS analysis of the Australian UNCLOS submission: U.S. Geological Survey Open-File Report 2006-1073 [URL <http://pubs.usgs.gov/of/2006/1073/>].
- Jaffe, L.A., Hilton, D.R., Porcelli, D., Swarzenski, P.W., Baskaran, M., and Kulongoski, J.T., 2005, U-Th-Ra-Rn-He relationships in Mojave River Basin groundwaters [abs.]: Annual Goldschmidt Conference, 15th, Moscow, Idaho, May 20-25, 2005 [URL [http://www.the-conference.com/2005/gold2005/web\\_pdfs/G11.pdf](http://www.the-conference.com/2005/gold2005/web_pdfs/G11.pdf)].
- Kellogg, C.A., Lisle, J.T., 2006, Microbiology and public beach safety; integrated science for the protection of public health: U.S. Geological Survey Fact Sheet 2006-3045, 2 p. [URL <http://pubs.usgs.gov/fs/2006/3045/>].
- Landerman, L.A., Sherwood, C.R., Gelfenbaum, Guy, Lacy, Jessica, Ruggiero, Peter, Wilson, Doug, Chisholm, Tom, and Kurrus, Keith, 2004, Data files from the Grays Harbor sediment transport experiment spring 2001: U.S. Geological Survey Data Series DS-98, 2 DVD-ROMs [URL <http://pubs.usgs.gov/ds/98/>].
- Lisle, J.T., and Reich, C., Microbial ecology in reef sediments of Biscayne National Park: U.S. Geological Survey Fact Sheet 2006-3052, 4 p. [URL <http://pubs.usgs.gov/fs/2006/3052/>].
- Morton, R.A., and Peterson, R.L., 2006, South Texas Coastal Classification Maps, Mansfield Channel to the Rio Grande: U.S. Geological Survey Open-File Report 2006-1133, 47 p. [URL <http://pubs.usgs.gov/of/2006/1133/>].
- Noble, M.A., Gartner, A.L., Paulson, A.J., Xu, Jingping, Josberger, E.G., and Curran, Christopher, 2006, Transport pathways in the lower reaches of Hood Canal: U.S. Geological Survey Open-File Report 2006-1001 [URL <http://pubs.usgs.gov/of/2006/1001/>].
- Raabe, E.A., and Katz, B.G., 2004, Suwannee River Basin and Estuary Initiative; executive summary: U.S. Geological Survey Open-File Report 2004-1198, 6 p. [URL <http://gulfs.usgs.gov/suwannee/reports/>].
- Swarzenski, P., Kroeger, K., Reich, C., Blake-Collins, B., and Greenwood, J., 2005, Submarine ground-water discharge (SGD) and associated nutrient fluxes to the coastal ocean, in *USGS Science in Florida; Proceedings of Florida Integrated Science Center Meeting, Orlando, Florida, May 3-5, 2005*: U.S. Geological Survey Open-File Report 2005-1213 [URL <http://pubs.usgs.gov/of/2005/1213/>].
- Waite, W.F., Ruppel, C.D., and Kirby, S.H., 2006, Comments on "Thermal and visual time-series at a seafloor gas hydrate deposit on the Gulf of Mexico slope," by I.R. MacDonald, L.C. Bender, M. Vardaro, B. Bernard, and J.M. Brooks, 2005, *Earth and Planetary Science Letters*, v. 233, p. 49-59; *Earth and Planetary Science Letters*, v. 245, no. 1-2, p. 481-482, doi:10.1016/j.epsl.2005.11.062.
- Wong, F.L., Geist, E.L., and Venturato, A.J., 2005, Probabilistic tsunami hazard maps and GIS: 2005 ESRI International User Conference, San Diego, Calif., July 25-29, 2005, *Proceedings*, paper 2000, 11 p. [URL <http://gis.esri.com/library/userconf/proc05/papers/pap2000.pdf>].

## Publications Submitted for Director's Approval

- Anima, R.J., Chin, J.L., Conrad, J.E., and Golden, N.E., Benthic habitat and geologic mapping of the outer continental shelf of north-central California: U.S. Geological Survey Open-File Report [abs.]: Coastal Sediments Conference, New Orleans, La., May 13-17, 2007.
- Barnard, P.L., Hansen, J.E., Hanes, D.M., Eshleman, Jodi, and Reiss, Thomas, Development of a simple empirical model for predicting morphological response on a high-energy beach, San Francisco, CA [abs.]: Coastal Sediments Conference, New Orleans, La., May 13-17, 2007.
- Brock, J.C., Day, O., and Thompson, P., Validation of Along Track Reef Imaging (*Publications Submitted continued on page 14*)

## Publications, continued

(Publications Submitted continued from page 13)

- System (ATRIS) image quality and vessel navigation on the coral reefs of Tobago, West Indies [abs.]: International Society for Reef Studies European Meeting, Bremen, Germany, September 19-22, 2006.
- Brock, J.C., Morton, Robert, Wright, Wayne, Nayegandhi, Amar, and Segura, Martha, Remote sensing investigation of north central Gulf of Mexico barrier island change [abs.]: Coastal Sediments Conference, New Orleans, La., May 13-17, 2007.
- Butman, B., Twichell, D.C., Rona, P.A., Tucholke, B.E., Middleton, T.J., and Robb, J.M., Shaded relief, backscatter intensity, and sea floor topography of the Hudson Canyon region offshore of New York and New Jersey: U.S. Geological Survey Open-File Report 2004-1441 (CD-ROM).
- Calhoun, R.S., and Field, M.E., Sand origin and transport history on a fringing coral reef, Molokai, Hawaii: Journal of Coastal Research.
- Cochrane, G.R., Geology and habitat mapping in California State waters [abs.]: Circum-Pacific Council Workshop on Marine Benthic Habitats, Wellington, New Zealand, March 30-31, 2006.
- Cochrane, G.R., USGS geologic and habitat mapping and GIS [abs.]: California and the World Ocean, Long Beach, Calif., September 17-20, 2006.
- Collins, B.D., and Kayen, Robert, Terrestrial topographic lidar mapping for scientific change detection studies: U.S. Geological Survey Fact Sheet.
- Collins, B.D., Sitar, Nicholas, Patrick, Pamela, Puzio, Ann Marie, Kayen, Robert, Short- and long-term prediction of coastal cliff landslides in marine terrace deposits, California, USA [abs.]: International Conference on "Climate Change and Landslides—Challenges and Solutions," Ventnor, Isle of Wight, UK, May 21-24, 2007.
- Dartnell, Peter, Edwards, B.D., Saucedo, G.J., and Wills, Chris, Huntington Beach 1:24,000 scale coastal mapping; integrating bathymetry, topography, and geology [abs.]: California and the World Ocean, Long Beach, Calif., September 17-20, 2006.
- Farnsworth, K.L., and Warrick, J.A., Storm timing and dispersal of fine sediment into the California coastal ocean [abs.]: California and the World Ocean, Long Beach, Calif., September 17-20, 2006.
- Flocks, J., 2006, Revisiting Frazier's subdeltas; enhancing datasets with dimensionality to better understand geologic systems [extended abs.]: Gulf Coast Association of Geological Societies (GCAGS) Convention, Lafayette, La., September 25-27, 2006.
- Foxgrover, A.C., and Jaffe, B.E., Historic bathymetric change in south San Francisco Bay; is there enough sediment available to restore the salt ponds? [abs.]: Biennial CALFED Science Conference, 4th, Sacramento, Calif., October 23-25, 2006.
- Fregoso, Theresa, Foxgrover, Amy, Tomlin, V., and Jaffe, Bruce, Sediment deposition, erosion, and bathymetric change in central San Francisco Bay, 1855-1983 [abs.]: Biennial CALFED Science Conference, 4th, Sacramento, Calif., October 23-25, 2006.
- Fregoso, Theresa, Jaffe, Bruce, Rathwell, G., Collins, W., Rhynas, K., Sullivan, S., Tomlin, V., Thompson, Janet, and Parchaso, Francis, Mapping south San Francisco Bay's seabed diversity for use in restoration planning [abs.]: South Bay Science Symposium, "South Bay Salt Ponds, Bay and Watershed Research," San Jose, Calif., June 6, 2006.
- Geist, E.L., Titov, V.V., Arcas, Diego, Pollitz, F.F., and Bilek, S.L. Implications of the December 26, 2004 Sumatra-Andaman earthquake on tsunami forecast and assessment models for great subduction zone earthquakes: Seismological Society of America Bulletin.
- Gelfenbaum, Guy, George, D.A., Lesser, G.R., and Stevens, Andrew, Long-term hydrodynamic and morphological modeling for the Deschutes River Estuary Feasibility Study [abs.]: National Conference on Coastal and Estuarine Habitat Restoration, 3rd, New Orleans, La., December 9-13, 2006.
- George, D.A., Gelfenbaum, Guy, Lesser, G.R., Stevens, Andrew, Morrison, Steven, and Tanner, Curtis, Application of hydrodynamic and morphological modeling for the Deschutes River Estuary Feasibility Study [abs.]: National Conference on Coastal and Estuarine Habitat Restoration, 3rd, New Orleans, December 9-13, 2006.
- Griffin, D.W., 2006, Desert dust, microbiology, and human health [abs.]: Annual Force Health Protection Conference, Albuquerque, N.Mex., August 8-11, 2006.
- Hall, D.K., Williams, R.S., Jr., and Casey, K.A., Satellite derived, melt-season surface temperature of the Greenland Ice Sheet (2000-2005) and its relationship to mass balance: Geophysical Research Letters.
- Jaffe, B.E., and Foxgrover, A.F., What does the past tell us about whether there will be enough sediment to restore south San Francisco Bay salt ponds? [abs.]: South Bay Science Symposium, "South Bay Salt Ponds, Bay and Watershed Research," San Jose, Calif., June 6, 2006.
- Jaffe, Bruce, Hutzel, A., Ritchie, S., Foxgrover, Amy, Takekawa, J., Athearn, N., Hubbard, J., Samant, M., Martin, C., Hovis, G., Sullivan, S., Vickers, C., and Newby, S., Baseline data for salt pond restoration planning; the new integrated LIDAR and bathymetric surveys of the south San Francisco Bay region [abs.]: South Bay Science Symposium, "South Bay Salt Ponds, Bay and Watershed Research," San Jose, Calif., June 6, 2006.
- Lee, Homa, Noble, Marlene, Xu, Jingping, Warrick, Jonathan, Barnard, Patrick, Edwards, Brian, Normark, William, Rosenbauer, Robert, McGann, Mary, and Hein, James, Sediment and contaminant transport in the California urban ocean [abs.]: California and the World Ocean, Long Beach, Calif., September 17-20, 2006.
- Meckel, T.A., ten Brink, U.S., and Williams, S.J., Sediment compaction rates in deltaic plains—numerical constraints and stratigraphic influences: Basin Research.
- Meunier, T.K., Geography of Antarctica: U.S. Geological Survey Open-File Report 2006-1115.

(Publications Submitted continued on page 15)

## Publications, continued

(Publications Submitted continued from page 14)

- Phillips, Eleyne, Storlazzi, Curt, Dartnell, Peter, and Edwards, Brian, Exploring rippled scour depressions offshore of Huntington Beach, CA [abs.]: Coastal Sediments Conference, New Orleans, La., May 13-17, 2007.
- Rubin, D.M., and Carter, C.L., Cross-bedding, bedforms, and paleocurrents animated eBook: SEPM Concepts in Sedimentology and Paleontology 9.
- Schupp, C.A., McNinch, J.E., and List, J.H., Nearshore shore-oblique bars, gravel outcrops, and their correlation to shoreline change: Marine Geology.
- Smith, T.J., III, Meyers, J.M., Langtimm, C.A., and Pendault-Willet, K., Wildlife and habitat damage assessment from Hurricane Charley; recommendations for recovery of the J.N. "Ding" Darling National Wildlife Refuge complex: U.S. Geological Survey Open-File Report 2006-1126, 89 p.
- Swarzenski, P.W., U/Th-series radionuclides as coastal groundwater tracers: Chemical Reviews.
- Williams, S.J., Gutierrez, B.T., and Thieler, E.R., Assessing the potential impacts of sea-level rise to U.S. coastal regions [abs.]: Association of Environmental and Engineering Geologists Annual Meeting, 49th, Boston, Mass., October 30-November 4, 2006.
- Woodrow, D.L., Fregoso, Theresa, Wong, Florence, and Jaffe, Bruce, Holocene sedimentation in south San Francisco Bay—geologic framework for salt pond restoration [abs.]: South Bay Science Symposium, "South Bay Salt Ponds, Bay and Watershed Research," San Jose, Calif., June 6, 2006.
- Xu, Jingping, Liu, James, Paull, Charlie, and Nittrouer, Chuck, Studies of sediment transport through submarine canyons—promises and challenges [abs.]: Western Pacific Geophysics Meeting, Beijing, July 24-27, 2006.
- Yates, K.K., and Halley, R.B.,  $\text{CO}_3^{2-}$  concentration and p $\text{CO}_2$  thresholds for calcification and dissolution on the Molokai reef flat, Hawaii: Biogeosciences Discussions. ☼