

Research

## Scientists Go Deep to Track Algae-Feeding Nitrogen in Washington State's Hood Canal

By John Clemens

Amid growing concern about fish kills, U.S. Geological Survey (USGS) scientists have been researching sources of nitrogen entering Hood Canal, a fiordlike inlet off Puget Sound in Washington State. Excess nitrogen causes algae blooms, and when the algae die and settle to the bottom, their decay uses up dissolved oxygen, causing lethally low oxygen levels that kill fish and other species. In a trio of publications released in May 2006, the USGS scientists report that seawater flowing from Puget Sound into Hood Canal contains at least 17 times more algae-feeding nitrogen than all the freshwater inputs combined. Exactly how the seawater circulates in Hood Canal is not yet well understood.

Three of the scientists—USGS Hood Canal project leader **Tony Paulson**, research oceanographer **Ed Josberger**, and hydrologist **Bill Simonds**—contributed to a radio segment called “A Science Mystery,” the second in a three-part series on Hood Canal that aired in late June on KPLU-FM, a National Public Radio affiliate in the Seattle-Tacoma area (see URL [http://www.kplu.org/news/hood\\_canal.html](http://www.kplu.org/news/hood_canal.html)).

Hood Canal isn't really a canal but a long, narrow body of water with a relatively shallow entrance on Puget Sound, where the water depth is about 45 m. Just south of the entrance, the canal deepens to 150 to 180 m. The “sill” at the entrance hinders the exchange of water between the canal and the sound during changing tides and seasons. The water of Hood Canal can be highly stratified, with an upper layer that is fresher and warmer than the saltier, colder deep layer. A low rate of exchange between the canal's upper and lower layers means that dissolved oxygen removed from



*Hood Canal is a natural, fiordlike inlet off Puget Sound.*

the lower layer by decaying algae will not be quickly replaced, putting deep-dwelling animals, such as rockfish, at risk. When strong southerly summer winds blow the oxygenated upper layer to the north, oxygen-depleted water rises from the lower layer to the surface, and many fish die.

In September 2002, it was observed that fish on the west side of Hood Canal near Hoodspout were under stress from low

*One of two instrumented tripods that sat on the floor of Hood Canal for 8 weeks in 2004, measuring such variables as current speed and direction in the canal's upper and lower layers, and near-bottom temperature, salinity, and water clarity. The second tripod (not shown) also held an instrument to measure near-bottom dissolved oxygen.*

concentrations of dissolved oxygen. This observation prompted the Washington Department of Fish and Wildlife to temporarily close parts of the canal to some types of fishing during the month of October. In 2003, low dissolved-oxygen conditions worsened, some fish kills were observed as early as June, and by October an estimated 30 percent of rockfish had perished. Although low concentrations of dissolved oxygen in Hood Canal have been observed during late summer and early fall as far back as the 1950s, available data suggest that concentrations vary from year to year but have been trending lower over time, with longer durations of low concentrations. The USGS was asked by Congress to collaborate with stakeholders in studying

*(Hood Canal continued on page 2)*

## Sound Waves

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## Contents

<b>Research</b>	<b>1</b>
<b>Outreach</b>	<b>7</b>
<b>Meetings</b>	<b>14</b>
<b>Awards</b>	<b>15</b>
<b>Staff and Center News</b>	<b>17</b>
<b>Publications</b>	<b>18</b>

## Submission Guidelines

**Deadline:** The deadline for news items and publication lists for the September issue of *Sound Waves* is Tuesday, August 15.

**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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## U.S. Geological Survey Earth Science Information Sources:

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

(Hood Canal continued from page 1)



**Seth Book** (left) and **Bill Simonds** measure vertical hydraulic gradients along the shoreline of Hood Canal.

the causes of low dissolved-oxygen concentrations in Hood Canal (see URL <http://wa.water.usgs.gov/projects/hoodcanal/>.)

In late summer and fall of 2004, USGS scientists examined both saltwater and freshwater pathways of nitrogen into Hood Canal, including streams, rivers, ground water, and seawater flowing in from Puget Sound. Water samples were analyzed for nitrogen compounds to determine how much nitrogen comes into Lynch Cove at the farthest reach of Hood Canal and by what pathways. Scientists measured currents, temperature, salinity, dissolved oxygen, and nitrogen isotopes in the upper and lower layers of the canal.

From these studies, USGS scientists **Chris Konrad, Lonna Frans, Raegan Huffman, and Theresa Olsen** estimate that 92 percent of the total freshwater load of dissolved nitrogen comes to the upper layer of Hood Canal from surface- and ground-water sources; point-source and flow from shoreline septic systems contribute only 4 percent of the total freshwater load. In comparison, the nitrogen load in seawater flowing into Hood Canal from Puget Sound was at least 17 times the total freshwater input to the upper layer.

Similarities in nitrogen isotopic data from suspended matter in the upper and lower layers of the canal measured by **Carol Kendall's** group, in combination with high chlorophyll concentrations and other data collected where the upper and lower layers meet, strongly suggest that nitrogen-rich water from the lower layer mixes into the upper layer. A group headed by **Marlene Noble** observed that the near-bottom currents in the narrow strait connecting Lynch Cove to the rest of Hood Canal tended to flow toward the cove, pushing water in the lower layer into it. There was a tendency for water in the upper layer to flow out of Lynch Cove when near-bottom currents flowed into it, and vice versa.

"Seawater flowing into Hood Canal is a double-edged sword," said **Tony Paulson**, USGS research hydrologist and lead author of the main report. "Seawater currents flush out the system, but they also bring enormous amounts of nitrate into Lynch Cove. However, we really can't assess the human impact on Hood Canal until we can accurately model the very complicated movements of water, including complex effects caused by winds and by inflows of seawater from Puget Sound."

The USGS is working on Hood Canal with local groups and governments, agencies, tribes, and the University of Washington under the Hood Canal Dissolved Oxygen Program, enabled by funding secured by Congressman **Norm Dicks** (see URL <http://www.hoodcanal.washington.edu/>). Three reports by USGS scientists contributing to this effort were published in May 2006.

The report "Loads of Dissolved Inorganic Nitrogen to Hood Canal and Lynch Cove, Washington," by **Anthony J. Paulson, Christopher P. Konrad, Lonna M. Frans, Marlene Noble, Carol Kendall, Edward G. Josberger, Raegan Huffman, and Theresa Olsen**, was published as USGS Scientific Investigations Report 2006-5106 and is posted online at URL <http://pubs.water.usgs.gov/sir20065106/>. A limited number of printed copies are still available as of July 2006; to request one, send an e-mail to [jlemens@usgs.gov](mailto:jlemens@usgs.gov).

(Hood Canal continued on page 3)

(Hood Canal continued from page 2)

The report "Surface-Water Quality in Rivers and Drainage Basins Discharging to the Southern Part of Hood Canal, Mason and Kitsap Counties, Washington, 2004," by **L.M. Frans, A.J. Paulson, R.L. Huffman, and S.N. Osbourne,** was

published as USGS Scientific Investigations Report 2006-5073 and is posted online at URL <http://pubs.water.usgs.gov/sir20065073/>.

The report "Transport Pathways in the Lower Reaches of Hood Canal," by **Mar-**

**lene A. Noble, Anne L. Gartner, Anthony J. Paulson, Jingping Xu, Edward G. Josberger, and Christopher Curran,** was published as USGS Open-File Report 2006-1001 and is posted online at URL <http://pubs.usgs.gov/of/2006/1001/>. ❄

## Biologists Count Parasites to Assess Health of Marsh

By **Christina S. Johnson, California Sea Grant**

Is that salt marsh healthy? To answer this question, a biologist at the U.S. Geological Survey (USGS) and colleagues at the University of California (UC) are cracking open common marsh snails and counting parasitic worms. Their claim: the more parasites, the healthier the marsh.

While the parasite hypothesis may conflict with conventional ideas about infectious disease and human health (malaria, for example, is caused by a parasite), the worms the scientists are investigating aren't just any type of parasite.

For one thing, these worms, known as trematodes, must sequentially infect certain hosts to complete their lifecycle. Snails to crabs to birds might be a typical sequence for one species, snails to fish to birds for another. These trematodes also stand apart from other parasites in that they cause negligible disease for their

highest trophic-level hosts, commonly birds. The worms' lifecycle thus typically begins in a snail and ends in a bird, with the intermediate host animals being the primary variables among worm species.

Intrigued by the prospects of developing a new tool for monitoring changes in wetland ecology, the National Oceanic and Atmospheric Administration (NOAA)'s California Sea Grant recently awarded support to parasite mavens **Armand Kuris** of the Department of Ecology, Evolution and Marine Biology at UC Santa Barbara and **Kevin Lafferty** of the USGS Biological Resources Discipline to collect California horn snails from more than 30 coastal salt marshes between Marin County and Imperial Beach at the United States-Mexican border.

"The horn snail is a mobile data recorder," **Lafferty** said. "It's a hub for more than 20 trematode species." If any one requisite intermediate host is missing, the parasite cannot reproduce and so will be underrepresented in the resident snail population, he explained.



California horn snails are gently cracked open with a hammer. Photograph by **Ryan Hechinger, UCSB.**

A survey of the trematode population in resident snails thus becomes a clever means of reconstructing the food web in the area, because the trematodes reflect the predator-prey relationships that must be occurring to support their reproductive lifecycle.

"Trematodes require all of the pieces of the puzzle to complete their lifecycle," **Lafferty** said. "When we see a lot of parasites in an estuary, we know it's in good shape. For example, an estuary with high infection rates tells you that it's visited by many birds, and many types of birds."

The goal of the California Sea Grant project is to establish a baseline snail-

(Snail Parasites continued on page 4)



UC Santa Barbara graduate student **Ryan Hechinger** collects clams and shrimp from Carpinteria salt marsh in Santa Barbara. Photograph by **Kevin Lafferty, USGS.**



An infected horn snail (removed from its shell). The worm is most of the tissue on the right-hand side of the photograph. In an infected snail, the parasite typically represents about 25 percent of the snail's soft-tissue weight. Scientists call the worm "the hand inside the puppet." Photograph by **Ryan Hechinger, UCSB.**

(Snail Parasites continued from page 3)

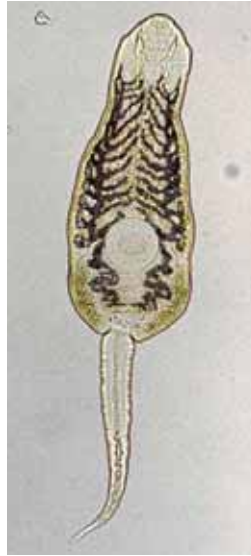
trematode count in marshes, particularly those slated for restoration. By comparing worm statistics before and after a restoration project, which could include such activities as digging channels or removing nonnative plants, the biologists believe that wetlands managers will have a tool for gauging restoration success and its gaps.

If, for example, a certain trematode species is missing, it could indicate that its hosts lack appropriate habitats. “The trematode information provides a novel way to see what we need to alter to improve habitats,” **Kuris** said.

The feasibility of the snail-as-datalogger idea was established at a case-study site at the Carpinteria salt marsh in Santa Barbara. There, the biologists showed that the trematode community did indeed become measurably more vibrant after restoration, because of an increase in the number of birds foraging on infected fish and benthic invertebrates.



**Kevin Lafferty** of the USGS. Photograph courtesy of USGS.



Once inside a snail, a trematode clones itself, producing tiny, free-swimming worms that go on to infect other organisms. The total length of this specimen (body plus tail) is 660  $\mu\text{m}$  (approx 0.03 in.). A trematode can shed hundreds, even tens of thousands, of these larvae per day. Photograph copyright © **Todd Huspeni**, University of Wisconsin, Stevens Point.

To further validate the method, UCSB graduate student **Ryan Hechinger** conducted four 1-month-long bird surveys at the study site, using video cameras to capture images of as many birds as possible. The results proved encouraging: the video-based estimates of the bird community agree closely with those from the snail-trematode analysis. “The more birds there were at a site, the more parasites,” **Hechinger** said. “The more types of birds, the more types of trematodes, just as we predicted.”

**Hechinger** hopes to produce a sort of manual for resource managers

that will explain how to collect snails, identify the trematodes inside them, and then translate those data into information about resident populations of birds, fishes, and benthic invertebrates.

“We think counting trematodes is an effective tool for assessing the biodiversity of salt marshes in California,” **Lafferty** said. “We’re interested in developing similar techniques for other ecosystems, such as coral reefs and kelp forests.”

**About the author:** Article author **Christina S. Johnson** holds a bachelor’s degree in mathematics from Washington University in St. Louis, Mo., and a master’s degree in physical oceanography from Scripps Institution of Oceanography in La Jolla, Calif. She is currently a science writer at NOAA’s California Sea Grant at Scripps Institution of Oceanography. ☼

UCSB professor **Armand Kuris** and the students and staff who work in his laboratory at their field station in Bahía San Quintín, Baja California, México. Photograph by **Josh Smith**, UCSB.



## Researcher Follows Trail of Dust to Investigate Its Effects on Human and Coral Health

By **Ann B. Tihansky**

U.S. Geological Survey (USGS) scientist **Virginia Garrison**—or **Ginger**, as she’s known to folks in the USGS Florida Integrated Science Center office in St. Petersburg, Fla.—suspects that there is something in the air. She suspects that there is something in the dust that is in the air. **Garrison**

has been working within the USGS Earth Surface Dynamics and Ecosystems Programs to study the relations between dust and the health of humans and ecosystems. In particular, she’s looking at the atmospheric transport of dust and the many assorted constituents that travel with it.

A poster titled “African and Asian Dust, Coral Reefs, and Human Health” summarizes the work of the team of scientists studying dust from African and Asian deserts and its effects on human and ecosystem

(Trail of Dust continued on page 5)

*(Trail of Dust continued from page 4)*

health (see URL [http://coastal.er.usgs.gov/african\\_dust/poster.html](http://coastal.er.usgs.gov/african_dust/poster.html)). Two of the major global atmospheric systems were studied: one originating in the Sahara and Sahel regions of Africa and the other in the Gobi and Taklimakan Deserts in Asia. **Garrison** and her numerous collaborators from around the world are looking at how human-related changes in the desert source regions affect the quantity and quality of particulate matter in downwind regions as the dusty winds move about the globe.

Although these global atmospheric systems have been in place for hundreds of thousands of years, the quantity of dust is known to have increased, and the composition of the dust is believed to have changed because of human activity. Modern human activities, such as the burning of biomass and waste, pharmaceutical and pesticide use, and increased industrialization, introduce new compounds into the dust mix, which can be transported across continents and oceans.

In a quote from an article in the March 12, 2006, issue of *West Hawaii Today* (URL <http://www.westhawaii.com/articles/2006/03/12/local/local01.txt>), **Garrison** describes her sampling methods and the strange sampling set up she's using to collect air samples. "It kind of looks like R2D2," she says. "It's basically an aluminum tripod equipped with a filter holder, filters, and a blower. It allows us to sample the air." But in many parts of the world, sampling the air isn't easy. Some of the remote regions where sampling needs to be done have no power to operate the equipment, and if you bring in a generator, you produce air pollution that may contaminate your samples.



By land, **Ginger Garrison** has been instrumental in deploying equipment and training local partners to assist with data collection. Here, she conducts a site visit on Sal Island in Cape Verde, where she is collaborating with scientists from the National Institute of Meteorology and Geophysics.



By sea, **Garrison** (left) researches the atmospheric effects on coral health. In Hawai'i, she is collaborating with scientists from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service, the National Park Service, and the Hawai'i Division of Aquatic Resources.

**Garrison** has set up sampling stations and trained people in remote areas to operate and service the equipment. She has created private and public partnerships in Cape Verde, Mali, Trinidad, the U.S. Virgin Islands, and Hawai'i to sample the air (or water) and discover what's carried with the dust that may affect residents and ecosystems.

In Trinidad, scientists with the University of the West Indies (UWI) are investi-

gating the possible cause-and-effect relation between African dust in the air and emergency admissions of children with acute asthma. The UWI scientists and graduate students run a station at the top of a lighthouse on the northeast tip of Trinidad, where they can sample air coming from Africa before it moves over the island and picks up particles or contaminants from Trinidad. Part of their work involves studying how pollen can be used as an air-mass tracer—to confirm, for example, that a particular air mass came from Africa.

The USGS supplied the equipment and training for running the station, which provides information on the concentrations of airborne dust, metals, persistent organic pollutants, and microorganisms coming across the Atlantic. These data provide background information for comparison with air-quality data from the industrialized areas of Trinidad. **Garrison** and her collaborators in Trinidad hope to separate the effect of particulates, persistent organic pollutants (POPs), metals, and microbes from Africa from the effect of locally generated pollutants on emergency admissions for asthma. These data will be compared with similar data from Cape Verde, a group of islands off Africa's west coast.

The difficulty of locating places to conduct air sampling and identifying trained personnel to maintain sampling stations has led to numerous collaborators. **Garrison** began working 8 years ago to establish a network for studying African dust that is finally in place for sampling dust, chemical constituents, and microorganisms at four sites: Mali (in the source region in Africa), Cape Verde (off the west coast of Africa), Trinidad (in the very southeastern

*(Trail of Dust continued on page 6)*

(Trail of Dust continued from page 5)

Caribbean), and the U.S. Virgin Islands (in the northeastern Caribbean). She has also established a station in Hawai‘i (for studying dust from Asia).

Although setting up collaborations takes a great deal of time, there always has been significant interest at each location. For one thing, many local citizens and departments of health are concerned about air

quality and its effects on human health. Many locals recognize the relation between dust storms and observed increases in human health problems. They want to see whether something in the air triggers asthma and other illnesses. Similarly, **Garrison** is interested in how dust-carrying air masses may affect coral-reef organisms in dust-impacted locations.

Collaborators want to share this work with others. UWI invited **Garrison** to be the featured speaker in their annual Research Days, held April 5-7, 2006, during which the university highlighted ongoing research and facilities. The theme of this year’s event was “Your Wealth, Your Health, Your Safety, Your Future” (see URL <http://sta.uwi.edu/researchday/>).

## Water Temperature Appears to Restrict Distribution of Juvenile Coho Salmon in Redwood Creek, California

By **Mary Ann Madej**

The distribution of juvenile coho salmon in Redwood Creek, Calif., appears to be restricted to the lower reach of the river by water temperature, according to a recent publication by U.S. Geological Survey (USGS) and National Park Service (NPS) scientists.

Water temperature is an important physical factor influencing salmonid egg development, juvenile appetite and growth, and fish distribution. Juvenile coho salmon, like most salmonids, require cool water to survive and grow and are susceptible to increased summer water temperatures because they rear in freshwater for at least a year. Historically, coho salmon occurred throughout most of the 108-km-long mainstem of Redwood Creek in Humboldt County, northern coastal California; however, juvenile coho salmon distribution is

currently limited to the downstream-most 20 km of Redwood Creek and tributaries entering that reach.

Redwood Creek is currently listed as temperature and sediment impaired (with warmer and muddier water than normal) under the Clean Water Act because of past timber harvest, removal of riparian vegetation, widespread streamside landsliding, and buildup of sediment in the channel. The upstream reach of the creek is beginning to recover from past damage, with an increased frequency of deep pools, extensive shading from alders, a moderate (0.5 percent) channel gradient, and gravel size adequate for spawning; nevertheless, juvenile coho salmon are absent. In the June issue of the *Canadian Journal of Fisheries and Aquatic Sciences*, USGS scientists **Mary Ann Madej**, **Christopher Currens**, and **Julie Yee**, along with NPS colleagues **Vicki Ozaki** and **David Anderson**, hypothesize that elevated stream temperatures in the middle river reach constitute a thermal restriction for juvenile coho rearing. The scientists used 7 years of in-stream temperature monitoring in conjunction



Adult coho salmon, held by **Mike Sparkman**, California Department of Fish and Game. Photograph from the California Department of Fish and Game.

with thermal-infrared data collected during a July 2003 helicopter survey to identify warm reaches of Redwood Creek and to compare temperature regimes in coho-bearing river reaches with those in non-coho-bearing reaches. Their report presents detailed discussions of the trends in maximum and minimum stream temperature and the duration of high temperatures along the length of Redwood Creek.

Among the authors’ conclusions are the following: Redwood Creek, unlike many rivers reported in the literature, reaches its maximum temperature in the middle basin



Juvenile coho salmon from the Redwood Creek watershed. Photograph from the Redwood National Park collection.

(Coho Salmon continued on page 7)

## Research, continued

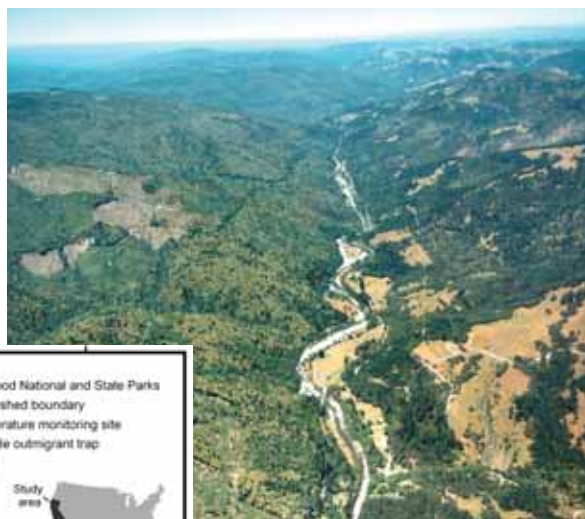
(Coho Salmon continued from page 6)

and becomes cooler farther downstream. Coastal fog and old-growth redwood trees in the riparian zone of the lower basin contribute to the cooling trend there. In the upper part of the creek, the thermal regime has largely recovered from past hot temperatures, and the temperature regime in this non-coho-bearing reach is similar to that in the downstream coho-bearing reach. In the intervening 50-km-long middle reach, however, summer water temperatures remain significantly warmer than the temperatures recommended for coho salmon.

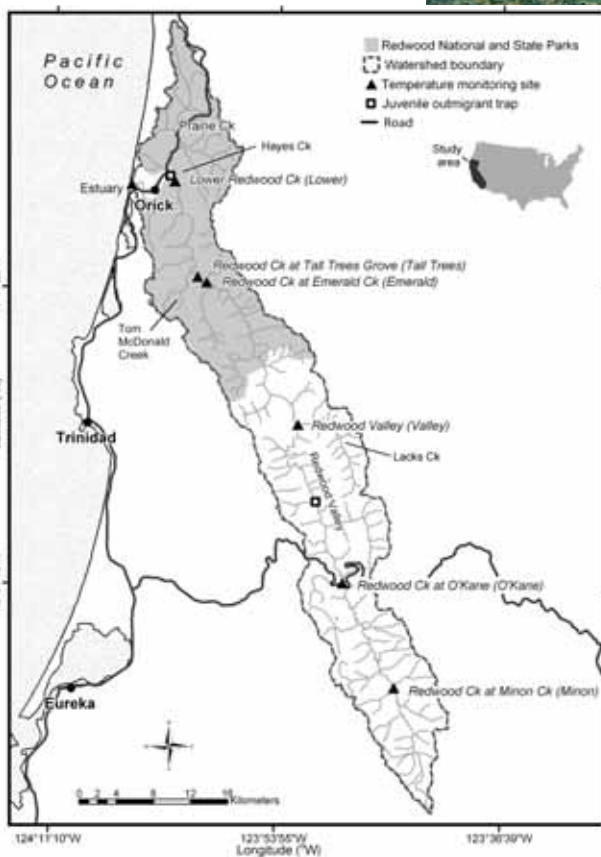
Management implications of the study are as follows:

- Although much upslope road-restoration work has been accomplished in the Redwood Creek basin, current riparian conditions along much of the creek are still degraded and do not provide adequate shading (and thus cooler temperatures) for the stream.
- The absence of large riparian conifers reduces the availability of inchannel wood to scour pools and provide cover and channel complexity, possibly also contributing to the limited upstream distribution of coho salmon.

- Besides efforts to control erosion in this watershed, active riparian restoration may be needed to restore the cool thermal regime along warm stretches of Redwood Creek.



The hot reach of Redwood Creek, looking downstream. Few trees shade the river in this area. As the creek flows to the ocean (in the background), it becomes cooler. Photograph from the Redwood National Park collection.



Redwood Creek watershed in northern California.

The full reference for the recent paper is:

Madej, M.A., Currens, C., Ozaki, V., Yee, J., and Anderson, D.G., 2006, Assessing possible thermal rearing restrictions for juvenile coho salmon (*Oncorhynchus kisutch*) through thermal infrared imaging and in-stream monitoring, Redwood Creek, California: Canadian Journal of Fisheries and Aquatic Sciences, v. 63, p. 1384-1396 [URL [http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2\\_abst\\_e?cjfas\\_f06-043\\_63\\_ns\\_nf\\_cjfas6-06](http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_abst_e?cjfas_f06-043_63_ns_nf_cjfas6-06)].

## Outreach

# Coastal and Marine Exhibits Are Wet and Wild at USGS Open House in Menlo Park, California

By Helen Gibbons

Coastal and marine exhibitors made a splash—many splashes, in fact—at the U.S. Geological Survey (USGS)'s 8th triennial Open House in Menlo Park, Calif., June 2-4, 2006. During the 3-day event, an estimated 10,000 people visited the USGS campus, where they could choose

from more than 130 displays and hands-on activities.

A large tent pitched over a parking lot was an excellent venue for some water-based exhibits. **Carissa Carter** set up a flume to show how water flowing over a sand bed forms ripples and cross-beds.

**Kurt Rosenberger** installed a current meter in a tank to demonstrate real-time measurements of current velocities and to explain how such measurements enabled scientists to detect turbidity flows tumbling down Monterey Submarine Canyon.

(Wet and Wild continued on page 8)

## Outreach, continued

(Wet and Wild continued from page 7)



**Homa Lee** discusses landslide-induced tsunamis as a young visitor prepares to trigger a miniature tsunami.

**Homa Lee** told visitors how undersea landslides trigger damaging tsunamis and invited them to simulate a landslide-induced tsunami by sliding a brick into a tub of water.

The tsunami simulation won the dubious distinction of being the wettest exhibit, as kids placed plastic models of buildings on a surface about half an inch above the water (the “coast”), then washed the buildings away with a “tsunami” produced by sliding a brick into the tub. Inevitably, some water splashed out of the tank, perilously close to unwary visitors, but as far as is known, the only one who got wet without intending to was Western Coastal and Marine Geology Team chief scientist and noted good sport **Sam Johnson**.

Additional coastal and marine exhibits in and near the tent included:

- A lidar (light detection and ranging) display in which **Diane Minasian** used a high-precision laser instrument to scan visitors, then showed them the results on a computer screen: thousands of dots defining the shapes of the visitors, props set up within the booth, and even trees and bushes in the scanner’s line of “sight” beyond the tent’s open door.
- A sea-otter display organized by **Alisha Kage** that included pelts of sea otters and other marine mammals (to let visitors feel why the otter’s fur was particularly prized), a microscope activity showing how

tooth layers are used like tree rings to determine a sea otter’s age, samples of what sea otters eat, and plastic casts of marine-mammal skulls.

- A display on the 2004 Indian Ocean tsunami by **Guy Gelfenbaum**, who showed a detailed computer model of tsunami inundation and sediment transport, as well as photographs of tsunami damage in Sumatra (see URL <http://walrus.wr.usgs.gov/tsunami/sumatra05/>). **Guy** explained how he and other scientists measured the 2004 tsunami’s effects and are studying sand deposits to help develop an understanding of past tsunamis in Sumatra and other regions.
- Tsunami animations by **Eric Geist**, who let visitors pick a historical tsunami and observe its propagation through the ocean. He also showed how tsunamis might affect U.S. coasts if triggered by earthquakes off the Pacific Northwest or in the Caribbean region.
- A live bald eagle, named **Sequoia**, in a display about ongoing impacts of DDT contamination in the southern California marine environment, hosted by **Greg Baker** and **Milena Viljoen** of the National Oceanic and Atmospheric Administration (NOAA). For the first time in more than 50 years, bald eagles have suc-



Young preschoolers view a stuffed sea otter with exhibitor **Alisha Kage**. One girl asked how the animal had died (from disease) and concluded that she would become a sea-otter doctor when she grew up.

cessfully hatched eggs in the Channel Islands. A live Webcam (URL [http://chil.vcoe.org/eagle\\_cam.htm](http://chil.vcoe.org/eagle_cam.htm)) gave visitors a view of one of the chicks and occasional glimpses of a parent bringing it food. Visitors were captivated by the majestic look of **Sequoia**, who lives at the San Francisco Zoo (a damaged tail prevents her from living in the wild) and frequently appears at public events. Accompanying her at the Open House were **Kathy Hobson**, coordinator of the zoo’s Avian Conservation Center, and zoo volunteers **Linda Mickey** and **John Flynn**.

- A representative of NOAA’s National Weather Service, **Shawn Weagle**, who showed visitors how to make a “tornado in a bottle,” explained how the National Weather Service gathers and analyzes weather data, and answered numerous questions about forecasting and other topics.
- A “Rock Give-Away” headed by **Terry Bruns**, who offered visitors samples of basalt dredged from the Juan de Fuca Ridge at a water depth of 2,000 m (6,500 ft), plus handouts explaining the rocks’ origin and warnings about their glassy edges.
- A display of “Topo Salad Trays” organized by **Laura Torresan**. These ever-popular clear plastic trays have a contour line drawn on each tray and are stacked together to reveal a three-dimensional view of a landform—in this case Angel Island (in San Francisco Bay) and Monterey Canyon.

More coastal and marine geology exhibits could be viewed in Building 1: **Clint Steele**, **Carolyn Degnan**, **Alex Ma**, and a host of volunteers helped visitors “Dress Like a Marine Geologist” in life vests, hard hats, and other gear, after which they were videotaped and superimposed on a seagoing scene (see URL <http://walrus.wr.usgs.gov/infobank/programs/html/openhouse/2006.html>). **Carol Reiss** invited visitors to cross a gangplank into a life-size model of a shipboard lab, where

(Wet and Wild continued on page 9)



**Outreach, continued**

*(Wet and Wild continued from page 8)*



**Guy Gelfenbaum** discusses the 2004 Indian Ocean tsunami with an Open House visitor.



**Mike and Laura Torresan** show visitors how to make three-dimensional models out of clear plastic trays ("Topo Salad Trays").

they saw a sidescan-sonar "fish" used to image the sea floor, views of data collected by the instrument, and other examples of equipment and data typical of marine-research cruises. **Pete Dartnell** let visitors take virtual flights over the sea floor in coastal areas where the team has collected detailed bathymetric data (for example, off San Diego; see URL <http://walrus.wr.usgs.gov/pacmaps/sd-index.html>). A group organized by **Florence Wong** provided a wealth of information about



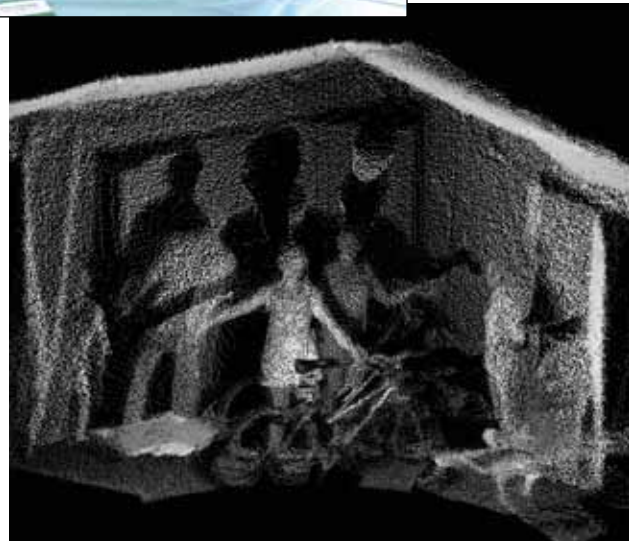
Two of the Open House's most popular exhibits came together when bald eagle **Sequoia** and San Francisco Zoo volunteers **Linda Mickey** (left) and **John Flynn** visited the set of "Dress Like a Marine Geologist." (**Sequoia** was not interested in wearing a life vest or hard hat....)



These boys are eager to see themselves in a lidar scan taken by **Diane Minasian** (operating computer) with the assistance of **Brad Carkin** (behind boy in blue shirt).

Lidar scan of Open House visitors, with bicycle.

the floor of San Francisco Bay, showing visitors exciting new views of the sea floor inside and outside the Golden Gate, explaining how the bay floor has been changed by human activities (see URL <http://pubs.usgs.gov/circ/2004/c1259/>), and discussing ongoing work to restore tidal wetlands around the bay (see URL <http://www.southbayrestoration.org/>). **Ray Sliter** and **Holly Ryan** took visitors on a guided tour of the San Andreas fault, showing them the fault's trace in topographic data viewed from above the land and in seismic-reflection data viewed from beneath the sea floor. **David Finlayson**



invited visitors to view "Puget Sound in 3D" and explained how lidar technology has recently allowed mappers to "see" the

*(Wet and Wild continued on page 10)*

## Outreach, continued

(Wet and Wild continued from page 9)

ground beneath the Pacific Northwest's dense vegetation, revealing such details as grooves, or striations, that show which direction glaciers moved as they flowed over the land.

Across campus in Building 15, **Bob Rosenbauer**, **Fran Hostettler**, and others guided visitors through "Adventures in Geochemistry," inviting them to smell samples of oil from different sources and explaining how the chemistry of an oil sample not only gives it a distinctive smell but also serves as a "fingerprint" that can be used to determine its source—whether it came from a tanker spill or from a natural seep, for example.

Building 15 also contained numerous displays about the water, sediment, and

life of San Francisco Bay. **Mary McGann** asked visitors to guess how many invasive foraminifers (one-celled animals) live in a square foot of San Francisco Bay mud (about a million), and let them look at the tiny invaders (*Trochammina hadai*) through a microscope. **Jan Thompson** and colleagues invited visitors to view and touch some "Critters from the Bay." An exhibit by **Jim Kuwabara**, **Brent Topping**, and **Cyndi Azevedo** had visitors use a conductivity meter to determine the salinity of unlabeled water samples (the saltier the water, the higher its conductivity) then match the samples to descriptions on a poster. An exhibit headed by **Tara Schraga** introduced visitors to phytoplankton, microscopic algae that constitute

the largest part of the biomass in San Francisco Bay.

Just outside Building 15, **Byron Richards**, **Francis Parchaso**, and **Scott Co-nard** set up an exhibit on "Research Vessels on San Francisco Bay," which noted the 80th birthday of the *Polaris*, a 96-ft boat used for USGS research on San Francisco Bay, and displayed the *Frontier*, a 25-ft Boston whaler used in water too shallow for the *Polaris*, plus instruments and gear used by the scientists. Next to the *Frontier*, exhibitors led by **Cindy Brown** showed visitors how active clams are by offering food to two species in "clam farms" (like ant farms but with sediment and water). The clams cooperated nicely, with *Macoma balthica* (estuarine clams from south San Francisco Bay) extending their siphons up into the water and *Corbicula fluminea* (freshwater clams from the Sacramento River) coming up to the sediment surface for food and then burying themselves when it got too warm. **Cindy's** crew also invited visitors to stick their hands into tubs of San Francisco Bay floor sediment to feel how grain sizes change with distance from the mouth of the Sacramento River.

Open House contributions by the Western Coastal and Marine Geology team were not only scientific but also logistical and musical: Before the event, electronics technicians **Larry Kooker** and **Mike Boyle** ran electrical outlets to displays in the Volcanoes, Coasts, and Oceans tent. **Sue Hunt** set up paired recycle bins and trash bins all over campus and monitored them throughout the event with the help of **Catherine Cesnik**, a Department of the Interior employee. On the first day of Open House, Friday, June 2, **Quenton Smith-Costello** and friends kicked off the opening ceremony with an inspiring performance of the national anthem. On all three days, current and former team members **Florence Wong**, **Stephanie Ross**, **Helen Gibbons**, **Gretchen Luepke** (retired), **Alan Cooper** (retired), and **Guy Cochran** performed with the old-time-music group Duckweed (see URL <http://openhouse.wr.usgs.gov/entertainment.html>).

(Wet and Wild continued on page 11)



**Mary McGann** (right) asks visitors to guess how many foraminifers live in a square foot of San Francisco Bay mud. (The answer is "1 million.")



Visitors play a guessing game to learn what sea otters eat.



Young visitor creates currents while **Andrew Stevens** (background) adjusts a monitor displaying real-time velocity measurements.



**Kurt Rosenberger** (right) talks to visitors about turbidity flows in Monterey Submarine Canyon.

## Outreach, continued

(Wet and Wild continued from page 10)

The weather was sunny and warm throughout the weekend (luckily for those who got soaked by the tsunami simulation!), the mood was festive, and numerous compliments from visitors marked this as another highly successful Open House for the Menlo Park campus. Thanks to all who contributed, not just those named here but also the many other employees and volunteers, including some spouses and children, who prepared the campus, staffed exhibits, and provided invaluable support. (To learn more about the Open House, please visit URL <http://openhouse.wr.usgs.gov/>). ❁

Visitors inspect the cast of a killer-whale skull.



(Right to left) **Terry Bruns** and **Jane Reid** give visitors samples of basalt from the Juan de Fuca Ridge off Oregon and Washington.

**Li Erikson** (right) shows visitors how flowing water produces ripples and cross-beds.



Dancers enjoy music at the Open House. Photograph by **Mike Diggles**.



## Community of Science Experts and Educators Support Local “Watershed Watchers” Program in Florida

By **Ann B. Tihansky**, **Mark Luther** (University of South Florida, College of Marine Science), and **Emily Stehle** (The Pier Aquarium)

In a true community collaborative effort, local scientific experts and educators teamed up to create “Watershed Watchers,” a project for fifth graders run through The Pier Aquarium and housed in Campbell Park Elementary Marine Science Center, an elementary school in St. Petersburg, Fla. The Watershed Watchers will monitor a local stream called Booker Creek (see URL <http://www.pieraquarium.org/about/>

[text.asp?id=about\\_outreach](#)). Organizers hope to develop this effort into a regional Watershed Watchers network. U.S. Geological Survey (USGS) hydrologist **Ann Tihansky** explained: “The USGS wants to help increase community awareness and interest in the coastal and water resources of the region. This partnership is a way to let educators know about many of the USGS coastal and watershed resources.”

USGS hydrologist **Victor Levesque** worked behind the scenes to help University of South Florida researchers select and instrument a site for a stream-gaging station now operating in the creek’s watershed. The watershed drains an area subject to urban, commercial, and industrial land use in southeastern Pinellas County, Fla.,

(Watershed Watchers continued on page 12)

## Outreach, continued

(Watershed Watchers continued from page 11)



**Victor Levesque** (left; USGS) shares his technical expertise with **Cliff Merz** (USF-CMS) at USF's Booker Creek stream-gaging station.

and is within several hundred feet of Campbell Park Elementary Marine Science Center—literally in the school's backyard. The stream-gaging station includes a complete water-quality-monitoring system for gathering such real-time data as water temperature, water level, pH, and dissolved oxygen, as well as a meteorological tower that measures wind-speed, air temperature, humidity, baro-

metric pressure, precipitation, and conductivity. (To see the latest observations, visit URL <http://comps.marine.usf.edu/cpk/>.)

The project resulted from a grant from the Pinellas County Education Foundation and a partnership between the school, The Pier Aquarium, and the University of South Florida's College of Marine Science (USF-CMS). Funds from the Coastal Ocean Monitoring and Prediction System (COMPS) also provided support. Campbell Park is a marine-science magnet school and educationally

focused on increasing understanding of marine science and the coastal zone. Efforts and planning led by **Mark Luther**, associate professor at the USF-CMS Ocean Modeling and Prediction Laboratory (URL <http://ompl.marine.usf.edu/>), and **E. Howard Rutherford**, executive director of The Pier Aquarium (URL <http://www.pieraquarium.org/>), initiated the program with **Jim Steen**, principal of the Campbell Park Elementary Marine Science Center (URL <http://www.campbell-es.pinellas.k12.fl.us/>).



Teachers accompany **Cliff Merz** and **Victor Levesque** as they explain the instrumentation used to provide real-time data at the Booker Creek stream-gaging station.



**Ann Tihansky** (USGS) tells teachers about USGS Web resources at the Watershed Watchers workshop.

“Watershed Watchers” is designed to be “a true learning laboratory” and a way for teachers and students to connect with scientists and their local resources. More than 20 teachers attended an informal workshop at Campbell Park Elementary school to learn more about the site and how to incorporate watershed science and real-time data into their school's curriculum. The Watershed Watchers will share their data and observations with others through the Environmental Distance Learning (EDL) Web site at URL <http://www.edlonline.org/>.

The workshop included an overview of methods used to measure streamflow, a basic discussion on water quality, a description of USGS World Wide Web resources, both educational and scientific, and an introduction to several real-time data networks, such as the USGS' National Water Information System (NWIS) at URL <http://waterdata.usgs.gov/nwis/>, USF's Physical Oceanographic Real-Time System (PORTS) at URL <http://ompl.marine.usf.edu/PORTS/>, and COMPS at URL <http://comps.marine.usf.edu/>.

The group of scientists, educators, and school administrators who planned the workshop consisted of **Mark Luther** and **Cliff Merz**, USF; **Karen Henschen**, Pier Aquarium; **Pauline Luther**, EDL; principal **Jim Steen**, Campbell Park Elementary Marine Science Center; and hydrologists **Victor Levesque** and **Ann Tihansky**, USGS. More training sessions will be offered and informational materials provided to teachers in the fall. ☼

## George Cretekos' 30-Year Career Celebrated at USGS Center in Florida

By Ann B. Tihansky

**George Cretekos**, longtime Assistant District Administrator for U.S. Congressman **Bill Young** (R-Florida), was honored by the St. Petersburg Downtown Partnership in a gathering at the U.S. Geological Survey (USGS)'s Normile Conference Room on the evening of May 31, 2006. The gathering was a celebration of **Cretekos'** retirement after more than 30 years of service. It was 1971 when **Cretekos** joined the staff of **Congressman Young**, who represents the 10th Congressional District of Florida. Now serving his 18th term in the U.S. House of Representatives, **Congressman Young** remarked that after all this time working together, there was no way to re-plate **George Cretekos**.

The St. Petersburg Downtown Partnership group, led by **Don Shea**, hosted the recognition and retirement ceremony and chose to hold the honorary event at the USGS Florida Integrated Science Center office in St. Petersburg, Fla. Many of the attendees had been instrumental in securing the site and the complex of buildings that house the USGS offices, working with the St. Petersburg Downtown Partnership to create a scientific-research center as part of the downtown community. Thus, it was fitting that the USGS office was the site for the ceremony.

The event took place in the Normile Conference Room, with all arrangements



(Left to right) **Jack Kindinger** and **Don Shea** present **George Cretekos** with a plaque on behalf of the USGS.



**Peter Betzer** (right), Dean of the College of Marine Science USF, discusses the past and the future with honoree **George Cretekos**.

handled by the Downtown Partnership. Numerous dignitaries were present to honor **George Cretekos**, including the previous president of the Downtown Partnership, **Marty Normile**, for whom the main USGS conference room is named; Congressman **Bill Young**; St. Petersburg



**Sandy Coffman** helps sign in the more than 100 guests who came to recognize **George Cretekos'** distinguished career.



**Marty Normile** (left) and **Jack Kindinger** enjoy a moment together in the USGS Normile Conference Room.



Closeup of the plaque presented on behalf of the USGS to **George Cretekos** recognizing his longtime support for USGS scientific activities. The plaque was made by **Dave Wegener** of the USGS Florida Integrated Science Center's St. Petersburg office.

Mayor **Rick Baker**; former St. Petersburg Mayor **Dave Fischer**; Pinellas County Commissioner **Calvin Harris**; several members of the St. Petersburg City Council; the Dean of the University of South Florida's College of Marine Science, **Peter Betzer**; and the chairman, chief executive officer, and editor of the St. Petersburg *Times*, **Paul Tash**.

During the ceremony, **Cretekos** was recognized by Pinellas County Commissioner **Calvin Harris**, USF Dean **Peter Betzer**, Congressman **Bill Young**, and USGS Associate Center Director **Jack Kindinger**. **Bill Young** presented **Cretekos** with an American flag that was certified to have flown over the Nation's Capitol. On behalf of the USGS, **Kindinger** recognized **Cretekos'** many contributions to the St. Petersburg USGS center by presenting him with a plaque featuring a piece of fossiliferous limestone carved into the shape of the State of Florida. After the formal ceremony, the crowd of more than 100 people enjoyed each other's company, sharing stories and conversation. ❁

## Geography Students Speak Out at Science Symposium in Florida

By Ellen Raabe

Geography students at Stewart Middle Magnet School presented a science symposium at the Museum of Science and Industry (MOSI) on April 19, 2006, in Tampa, Fla. Guided by career mentors, including U.S. Geological Survey (USGS) representative **Ellen Raabe**, sixth graders gave presentations on the application of remotely sensed data to scientific research. The program, "Unlocking Earth's Secrets from Space," was initiated by teachers **Lynn McDaniel**, **Vivian Smithwick**, and **Shoshanna Milberg**. The program was part of a DOE Gifted Challenge Grant, combining geography, science, and career mentoring for gifted students.

Six mentors from the community prepared the students with lectures, classroom projects, and field activities. The USGS mentor was **Ellen Raabe** from the USGS Florida Integrated Science Center office in St. Petersburg, Fla. Each of the six students in the USGS group was assigned a scientific role: oceanographer, hydrologist, geologist, plant biologist, wildlife biologist, and cultural geographer. As scientists, they explored and shared information on tides, sediment, habitats, watersheds, estuaries, and the food web. They also learned about the importance of collaboration in science.

The USGS group focused on the link between ground-based surveys and remotely sensed data in coastal areas. In addition to imagery from remote platforms, they



Students from **Vivian Smithwick's** sixth-grade geography class record field observations and GPS readings at Crystal Springs Preserve with help from USGS representative **Laura Gauron**.

explored the 24-satellite global-positioning-system (GPS) constellation for navigation and mapping. Students made field observations and recorded their locations with GPS units. Students, teachers, and mentors discussed the importance of field observations to understanding remotely sensed data. The USGS group had the advantage of additional tutoring from USGS representatives **Kristine Martella**, **Laura Gauron**, and **Jordan Sanford**. Students surveyed features on their school campus and at Crystal Springs Preserve and displayed point, line, and polygon features on aerial photography in a computer-mapping program.

The students performed beautifully in the formal setting of the MOSI conference room, with its liquid-crystal-display (LCD) projector, microphones, lights, and professional introductions. They were well prepared after several meetings with career mentors from the USGS, the University of South Florida, the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and Earth Force. Each mentor worked with a group of 5 to 6 students once a month for a period of 5 months, culminating in the science symposium. ❁

### Meetings

## USGS Hydrologist Shares Insights About Science Communication at the Council of Science Editors Annual Meeting

By Anthony Ridge

"Working toward a sustainable, equitable world" was the theme of the 2006 Annual Meeting for the Council of Science Editors. This conference for science journalists and editors had its Tampa, Fla., debut at the Hyatt Regency Hotel, May 19-23.

Originally scheduled for New Orleans, the 5-day event offered presentations from

"renowned and expert speakers," including local U.S. Geological Survey (USGS) hydrologist, **Ann Tihansky**, who runs science communications at the Florida Integrated Science Center (FISC) office in St. Petersburg, Fla.

**Tihansky**, accompanied by **Ron Winslow**, deputy editor of health and science

for the *Wall Street Journal*, spoke to a room of mainly medical journalists from such publications as *The Lancet*.

The focus of the seminar was "Communicating Science to Nonscientists: How Can Writers and Editors Improve the Public's Access to Scientific Information?"

*(Science Communication continued on page 15)*

## Meetings, continued

(Science Communication continued from page 14)

**Winslow**, who spoke mainly about medical issues, spurred debate within the conference when he pointed out that economics is an integral aspect of medical science, owing to the marketable value of drugs and treatments.

**Tihansky** then gave her insight into the difference between the medical and environmental forums, pointing out that environmental scientists often “do not have the same level of resources that commercial bodies, like pharmaceutical companies, have to take their stories forward.”

“But there is an economic side to environmental management,” said **Tihansky**. This past year provided striking examples of how natural hazards and resource-management decisions have economic implications for investment, insurance, and real-estate values. “Coastal-zone hazards and water quality are two issues that come to mind immediately.”

**Tihansky**, whose work includes producing USGS multimedia for communicating scientific issues to the public, spoke about her current projects and how she uses USGS resources to convey the organization’s research to the community.

**Tihansky** wants to improve scientific literacy within the general public. “As a society, we need the general public to be more educated on scientific issues.” She highlighted this when she asked the audience of scientific journalists, “Who knows the meaning of the word ‘karst’?” Only one person in a room of 25 had heard of the word.

**Tihansky** told them, “It’s the word used to describe a landscape formed when the underlying bedrock [often limestone] dissolves. It’s characterized by springs, sinkholes, and caves, which often create conditions that increase ground-water vulnerability to contamination. This is crucially important to understanding the hydrology in Florida and elsewhere; if you don’t understand karst, you cannot understand many of Florida’s resource issues.”

While addressing the attendees, **Penny Hodgson**, director of communications at Duke Clinical Research Institute and moderator of the presentation, complimented **Tihansky** on her ability to capture the public’s interest with scientific stories. **Hodgson** was referring in particular to a story **Tihansky** told about a dye-tracer test conducted by USGS scientists studying aquifer



USGS hydrologist **Ann Tihansky** spoke at the Council of Scientific Editors 2006 annual meeting in Tampa, Fla., giving an audience of mainly medical journalists insights into conveying scientific issues to the public.

vulnerability in South Florida. The water intake at a local cheese-making factory was apparently receiving ground water that contained significant concentrations of the nontoxic dye. The water turned the cheese pink and caught everyone’s attention.

**Hodgson** said that the medical community could learn from this method of communicative style, which is common in environmental sciences, because it seems to be more accessible to the layperson than does the highly technical medical style. ❁

## Awards

### USGS Scientists Receive Coral Reef Task Force Award

By **Anthony Ridge**

Two U.S. Geological Survey (USGS) scientists were presented with a U.S. Coral Reef Task Force Award in recognition of their contributions as members of the Atlantic *Acropora* Biological Review Team, which assessed the status of two ecologically important coral species. The award recipients were commended by the U.S. Coral Reef Task Force in Washington, D.C., in May 2006:

“For excellent collaborative research and assessment of the status of Caribbean Acroporids for potential listing under the Endangered Species Act (ESA). This status assessment allowed NOAA [the National Oceanic and Atmospheric Administration] to fulfill its regulatory requirements in a timely fashion, and has proven invaluable in advancing scientific

understanding of and management planning for these key coral species.”

Among the eight Biological Review Team experts were **Bob Halley** of the USGS Florida Integrated Science Center office in St. Petersburg, Fla., and **Caroline Rogers** of the USGS Caribbean Field Station in Virgin Islands National Park on St. John. The Biological Review Team included coral biologists and ecologists, climate specialists, resource managers, and water-quality and coral-disease experts. The team was assembled to review the status of the staghorn coral *Acropora cervicornis* and the elkhorn coral *Acropora palmata*.

In 2003, a petition was received by NOAA’s National Marine Fisheries Service (NMFS) to list the two coral species as either threatened or endangered under

the Endangered Species Act. (The petition also named *Acropora prolifera*, which was then considered a third species but is now considered a hybrid between the other two.) In response, NOAA convened the expert-committee status-review team to evaluate the status of the corals.

The Biological Review Team gathered for meetings over 6 months in Miami and St. Petersburg before they completed their report in spring 2005.

According to **Halley**, the corals are declining because of a combination of natural and anthropogenic stress factors. The Biological Review Team’s report ranks disease as the main stressor, closely followed by temperature. (USGS scientists are currently conducting research on the

(Coral Reef Awards continued on page 16)

(Coral Reef Awards continued from page 15)



Elkhorn coral (*Acropora palmata*) (left) and staghorn coral (*Acropora cervicornis*). Both species have been listed as threatened because their numbers are declining, owing to a combination of natural and anthropogenic stress factors. Photographs by **Caroline Rogers**.

effects of disease on elkhorn corals in the Virgin Islands.) Moderate stressors include sedimentation and the breakage of these branching corals by humans. African dust, sea-level rise, and nutrient stressors were ranked as lower threats to the corals. Not enough information was available for the team to evaluate the threats from contaminants and the loss of genetic diversity.

“Based on the information we compiled, a decision was made to list these corals not as endangered but as threatened, and that decision was announced [in May],” said **Halley**. “To be classified as ‘endangered,’ a species must be in imminent danger of becoming extinct. Threatened species

are not in imminent danger of becoming extinct, but we should watch them closely for the next few years to see whether the populations continue to decline.”

These acroporid corals are the first corals to be listed as threatened under the Endangered Species Act. Sustained observation of the corals by NOAA is now necessary to monitor their future health and abundance. Conservation practices are likely to be implemented shortly—this implementation will involve raising public awareness, adapting conservation policies, and putting them into practice.

The U.S. Coral Reef Task Force, initiated by the Clinton administration in

1998 under Presidential Executive Order 13089, has been continued by the current administration to preserve and protect coral ecosystems. The U.S. Coral Reef Task Force includes 12 Federal agencies, including the Department of the Interior and the USGS.

“...the [task force] decided we did such a good job, that all the members of the review team were given an award,” said **Halley**.

To learn more about the task force and the recent awards, visit URLs <http://www.coralreef.gov/> and <http://www.noaanews.noaa.gov/stories2006/s2625.htm>. For additional information, including a link to the Biological Review Team’s report “Atlantic *Acropora* Status Review,” visit URL <http://sero.nmfs.noaa.gov/pr/protres.htm>. ❁

## National Wetlands Research Center Staff Win Awards for Publications

By **Susan Horton**

Several staff members at the U.S. Geological Survey (USGS) National Wetlands Research Center (NWRC) in Lafayette, La., recently won awards for publications. Research oceanographer **Elijah Ramsey** and USGS contractor and coauthor **Amina Rangoonwala** (remote-sensing specialist) were notified that they were first-prize recipients of the 2006 Leica Geosystems Award for Best Scientific Paper in Remote Sensing. Their paper, “Leaf Optical Property Changes Associated with the Oc-

currence of *Spartina alterniflora* Dieback in Coastal Louisiana Related to Remote Sensing Mapping,” was published in the March 2005 issue of *Photogrammetric Engineering and Remote Sensing* (<http://>

(NWRC Awards continued on page 17)

Coauthors **Elijah Ramsey** (USGS oceanographer) and **Amina Rangoonwala** (IAP World Services contractor) were awarded the 2006 Leica Geosystems Award for Best Scientific Paper in Remote Sensing.





## Awards, continued

(NWRC Awards continued from page 16)

[www.asprs.org/publications/pers/](http://www.asprs.org/publications/pers/)).

**Ramsey** was presented with the award in May at the American Society of Photogrammetry and Remote Sensing 2006 Annual Conference in Reno, Nev.

Another group won a first-place award from the National Association of Government Communicators (NAGC) in the 2005 Blue Pencil and Gold Screen competition. The winning entry in the Shoestring Budget category was a set of two USGS Fact Sheets: "Using Radar to Understand Migratory Birds and Their Habitats: Critical Needs for the Gulf of Mexico" (URL <http://www.nwrc.gov/factshts/2005-3067.pdf>) and "Migratory Bird Pathways and the Gulf of Mexico" (URL <http://>

[www.nwrc.usgs.gov/factshts/2005-3069.pdf](http://www.nwrc.usgs.gov/factshts/2005-3069.pdf)), both by **Gregory J. Smith**, NWRC director; **Wylie Barrow**, USGS wildlife biologist; and **Ann Gaygan**, designer (IAP World Services). In all, the USGS received nine awards in the NAGC competition. (A complete list of winners in the 2005 competition is posted at URL <http://www.nagc.com/awards/>.)✻

**Ann Gaygan** (IAP World Services contractor), a graphic artist at the USGS National Wetlands Research Center, displays the first-place award she received in the Blue Pencil and Gold Screen competition for a pair of USGS Fact Sheets by **Gregory J. Smith** (NWRC director), **Wylie Barrow** (USGS wildlife biologist), and **Gaygan**.



## Staff and Center News

### Visiting Scientist Brings Expertise in Coastal-Evolution Modeling

By Guy Gelfenbaum

**Edwin Elias** has recently joined the U.S. Geological Survey (USGS)'s Coastal and Marine Geology Program (CMGP) as a visiting scientist from Delft Hydraulics in the Netherlands. **Edwin** will carry on the visiting-scientist exchange between Delft Hydraulics and the USGS as part of the cooperative Agreement that brought **Giles Lesser** to work with **Guy Gelfenbaum**, **Chris Sherwood**, and others in CMGP on sediment-transport and morphological modeling (see related article in *Sound Waves*, November 2002, at URL <http://soundwaves.usgs.gov/2002/11/staff.html>).

**Edwin** worked as a researcher and advisor in Delft Hydraulics' Marine and Coastal Infrastructure section. Currently stationed in Menlo Park, Calif., **Edwin** will work with **Guy** and **Andrew Stevens** and **Giles** on modeling sediment transport and morphological change in the Columbia River estuary, to help the States of Washington and Oregon and the U.S. Army Corps of Engineers better understand erosion, transport, and deposition of sediment at this important river mouth. In addition, **Edwin** will work with **Guy** and **Jon Warrick**, **Eric Grossman**, **Jessie Lacy**, and **David Finlayson** to set up



**Edwin Elias** at San Francisco Bay (with the San Mateo-Hayward Bridge in the background).

hydrodynamic and morphological models of Puget Sound and of selected study areas within the sound.

**Edwin** will also be spending time in Santa Cruz, Calif., working with **Dan Hanes**, **Patrick Barnard**, and **Li Erikson** on modeling the San Francisco Bay entrance. A specific aspect of this research concerns the investigation of processes and mechanisms inducing coastal-erosion problems at adjacent Ocean Beach.

**Edwin's** experience at Delft Hydraulics has focused on coastal morphodynamics. Before working at Delft Hydraulics, **Edwin** studied at Hogeschool Zeeland, where

he obtained a Bachelor of Engineering degree in Civil Engineering (Constructions). At the Delft University of Technology, he obtained a Master of Science degree in Civil Engineering (Coastal Engineering). His final thesis covered the validation and calibration of the Delft3D modeling system, using data from an extensive field-measuring campaign (COAST3D) at Egmond aan Zee, the Netherlands.

In October 2006, **Edwin** will defend his Ph.D. thesis, titled "Morphodynamics of Texel Inlet," at Delft University. This thesis deals with the morphodynamic behavior of the largest tidal inlet of the Dutch Wadden Sea under the influence of large-scale human interventions over a wide range of temporal scales. Long-term evolution of the inlet was analyzed by using 400 years of bathymetric observations, and a detailed analysis of governing processes and mechanisms for sediment transport was accomplished by integrating field and model data.

People interested in coastal evolution, morphological modeling, or use of the Delft3D model in their coastal research are kindly invited to contact **Edwin** at [eelias@usgs.gov](mailto:eelias@usgs.gov) or (650) 329-5475.✻

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(Recently Published continued on page 19)

(Recently Published continued from page 18)

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