

Research

Threatened Snowy Plovers Make a Comeback on a Santa Barbara Beach, Thanks to a Public-Friendly, Award-Winning Program

By Gloria Maender

As of December 28, 2003, there were 361 western snowy plovers wintering on the public beach at the University of California, Santa Barbara (UCSB)'s Coal Oil Point Reserve—a record high for the area since a program to protect the birds was begun in 2001. A simple fence separates the snowy plovers from people using the beach for recreation. These small, 6-inch shorebirds, listed as a threatened species in 1993, had seemingly abandoned this site for breeding, but after protection of a 400-yard stretch of sand began in summer 2001, the numbers of breeding snowy plovers increased steadily. Last summer, the site fledged 39 young snowy plovers. The number of snowy plovers wintering at the site has increased as well, more than doubling since the program began.

The success of this combined effort of researchers, managers, and volunteers earned national recognition for three groups for balancing beach recreation and the protection of snowy plovers: the U.S. Geological Survey (USGS), the Santa Barbara Audubon Society, and the University of California Natural Reserve System. The Natural Areas Association (see URL <http://www.naturalarea.org/>) presented the groups with its Resource Stewardship Award on September 26 at the association's annual meeting in Madison, WI. The Resource Stewardship Award recognizes this partnership for demonstrating excellence in the stewardship of natural areas through creative and innovative strategies to resolve issues and advance the preservation of natural resources.

"The research predicted that disturbance rates would drop from their previous high levels, but I had no idea that the plovers would respond as dramatically as they did," said **Kevin Lafferty**, a USGS marine



*Before the fence was installed, western snowy plovers vacated their preferred roosting areas on the beach when disturbed, as on this particularly busy day at the Coal Oil Point Reserve in February 2001. Courtesy of **Cristina Sandoval**, UCSB.*



*Western snowy plover chick. Courtesy of **Morgan Ball**, UCSB.*



*On an inclement day with low visitation, the fence (highlighted by dotted line) guides a visitor and delineates the area set aside for resting shorebirds. Courtesy of **Kendy Radasky**, Santa Barbara Audubon Society.*

ecologist and adjunct professor at UCSB, whose research helped managers plan and evaluate the conservation effort. "This is the first evidence that a reduction in disturbance can lead to the recovery of a formerly abandoned snowy plover breeding site."

On the Pacific Coast, North American snowy plovers, named for their pale plumage, breed from Washington State to Baja California. Although plovers historically bred at Coal Oil Point, the site produced *(Snowy Plovers Make Comeback continued on page 2)*

Sound Waves

Editor

Helen Gibbons
Menlo Park, California
Telephone: (650) 329-5042
E-mail: hgibbons@usgs.gov
Fax: (650) 329-5198

Print Layout Editors

Susan Mayfield, Sara Boore
Menlo Park, California
Telephone: (650) 329-5066
E-mail: smayfiel@usgs.gov; sboore@usgs.gov
Fax: (650) 329-5051

Web Layout Editor

Trent Faust
St. Petersburg, Florida
Telephone: (727) 803-8747 Ext. 3043
E-mail: tfaust@usgs.gov
Fax: (727) 803-2030

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Submission Guidelines

Deadline: The deadline for news items and publication lists for the March issue of *Sound Waves* is Thursday, February 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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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

Research, continued

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no snowy plover chicks from the time it opened to the public in 1970 until the summer of 2001.

In a USGS study, **Lafferty** assessed the rate of different types of human disturbance and found that human use of parts of the beach shared by the plovers interfered with the shorebird's ability to find a predictable place to rest and nest undisturbed. He then determined the smallest part of the beach that could be closed to maximize protection of plovers with minimal inconvenience to beach users. The proposed enclosure would stretch from wet sand to dry areas above the tidal zone but would allow people to walk at the water's edge along the beach. (See article in February 2002 *Sound Waves*.)

The University of California protects 34 natural reserves in California for its research, education, and public-service missions. Coal Oil Point Reserve has a beach area that is popular with students and local residents for its good surfing and unspoiled landscapes. In summer 2001, a single snowy plover chick was seen near a recent dune-restoration project, prompting the UC Coal Oil Point Reserve director, **Cristina Sandoval**, to install a rope fence that denoted the boundaries of the core plover habitat, thereby buffering the chick and its father from disturbance. After the chick fledged, she left the fence in place to reduce disturbance to the 120 plovers that winter at the site. The fence helped people to walk around the plover habitat instead of through it, and disturbance rates plummeted.

Sandoval, who oversees the plover project, implemented a comprehensive Snowy Plover Management Program in 2001 based on the USGS research and the experience of the previous breeding season. The plan included roping off 400 yards of dry sandy beach, closing a trail that directed people through the plover habitat, installing educational and regulatory signs, and beginning an education program led by volunteers.

The plan worked quickly and with unprecedented success. In 2002, 10 plovers chose to breed in the protected area; they made 9 nests with 21 eggs, of which 16 hatched, and 14 chicks fledged. In 2003, these numbers increased to 24 breeders, 24 snowy plover nests, 63 eggs, 45 hatched



The 2003 Natural Areas Association Stewardship Award was given to the pictured team (from left to right): **Kevin Lafferty** (USGS researcher), **Cristina Sandoval** (director of Coal Oil Point Reserve and manager of the Snowy Plover Management program), **Jennifer Stroh** (docent-program coordinator, member of Santa Barbara Audubon Society), and **Kendy Radasky** (docent-program founder, chair of Santa Barbara Audubon Society's Science Committee).

eggs, and 39 fledglings. "We are encouraged by how fast the plovers responded to active management and how the community collaborated with the plan," **Sandoval** said. "I think the secret of this success was the dedication of the various individuals to plover conservation and their openness to go beyond traditional thinking. Partnerships and creative solutions were the key." **Sandoval** presented these findings in September at the 2003 Natural Areas Conference.

A volunteer-docent program designed and founded in 2001 by **Kendy Radasky**, chair of the Santa Barbara Audubon Society's Science Committee, is coordinated by **Jennifer Stroh**, also with the Santa Barbara Audubon Society. The docent program has played a vital role in gaining beachgoers' compliance, providing education, discouraging offleash dog walking, and scaring away crows trying to steal eggs from the nests to eat. On a beach where only a few years ago almost no beachgoers could identify a snowy plover, almost everyone walking the beach can now recognize the shorebird. According to **Stroh**, "The program helped beachgoers understand about snowy plovers and how to share the beach with them. The community is now incredibly supportive, and more than 100 individuals have vol-

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unteered. It's an amazing place to come to the beach and watch plover chicks literally run around your legs. When they have a refuge to retreat to, they no longer see humans as such a threat."

Other shorebirds have benefited from the program, too: researchers counting birds in the snowy plovers' protected area have noted increasing numbers of such shorebirds as sand-erlings, western sandpipers, whimbrels, black-bellied plovers, long-billed curlews, western gulls, and Heermann's gulls.



Sandoval plans to maintain the fence and volunteer program, which is hailed as a model system by the California Coastal Commission and now being emulated at other areas in the State. ❁



Educational signs mark the entrances to the Coal Oil Point Reserve beach. Courtesy of **Kendy Radasky**, Santa Barbara Audubon Society.

Ecological Repercussions of Ditching Wetlands for Mosquito Control in Tampa Bay, Florida, or "Fishes in Ditches"

By **Justin M. Krebs, Adam B. Brame, and Carole C. McIvor**

Fish ecologists at the U.S. Geological Survey (USGS)'s Florida Integrated Science Center for Coastal and Watershed Studies in St. Petersburg, FL, have initiated a 5-year study at selected wetland sites in Tampa Bay, FL, to compare natural-wetland fish habitats with those altered by ditches dug for mosquito control.

Salt-marsh and mangrove wetlands serve as critical habitat for numerous fish species of ecologic and economic importance. Habitat modification through construction of mosquito-control ditches certainly alters the hydrologic and geomorphologic characteristics of these systems. Linear channels or ditches, with their steep, spoil-lined banks, create submerged habitats atypical of natural wetlands and may make parts of the marsh surface inaccessible to fishes.

The few previous studies of fishes in the altered wetlands of Tampa Bay are limited in scope, both spatially and temporally. Studies include assessing the effects of restoring mosquito-ditched wetlands on the fish communities at Feather Sound, Archie Creek, and Double Branch Bay. The Double Branch Bay study examined fishes in a reconnected impoundment but did not include the complex of parallel-grid

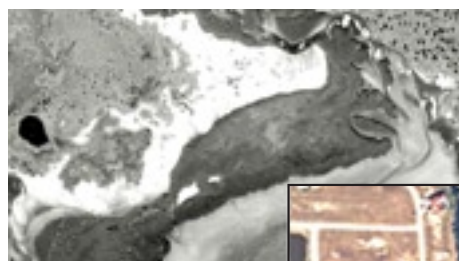
ditches adjacent to the study site. The most comprehensive study was a 2-year effort that examined fish communities in natural wetlands in comparison with those from altered and restored wetlands at several localities within Tampa Bay.

With the advent of insecticides and absence of maintenance, ditches are no longer required to control mosquitoes and could be filled or blocked to restore more natural wetland hydrology. The present condition of wetland ditches var-

ies widely throughout Tampa Bay. Many ditches have become partly to completely filled with anoxic sediment and overgrown by mangroves and Brazilian pepper, a small, nonnative tree; other ditches remain open, with good flow, and structurally resemble natural wetland creeks. Despite their altered condition, ditched wetlands provide habitat for various species of marine, estuarine, and freshwater fish species—thus the problem: which ditches should be restored, and which are still viable habitat?

The 5-year USGS study aims to determine the magnitude of functional equivalency between natural wetland habitats

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Above, a natural-wetland shoreline in northern Tampa Bay in 1952. Right, the same wetland with parallel-grid ditching in 2002.



Research, continued

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and those altered by ditching. Specific questions to be addressed include (1) are there differences between natural and altered wetlands in Tampa Bay that affect habitat functionality for estuarine fish communities? (2) what are the differences in fish-community structure between natural and altered wetlands? and (3) can the relation between habitat characteristics and species composition be used to predict fish-community structure solely on the basis of physicochemical parameters of the wetland habitat?

Sample sites were chosen randomly from accessible areas of several county preserves throughout the Tampa Bay estuary. Sites in creeks and ditches will be isolated with block seines and sampled with a bag seine. Ponds will be sampled with a bag seine, using the State of Florida's Fisheries-Independent Monitoring offshore-seining procedure. Wetland habitat will be characterized by

documenting width, length, and bottom profile of the ditch or creek site. Substrate type and depth, water depth, flow rate, and water quality will also be measured at ditch, creek, and pond sites, as will shoreline and bottom vegetation. Differences in species abundance, composition, and diversity, as well as size structure and overall biomass, will be used to define community structure. Finally, habitat characteristics influencing fish-community structure will be delineated by using multivariate statistics. In addition to enhancing our knowledge of habitat function for fish communities, study results will be applied to guide restoration within county preserves and to assist in construction of a model of ecosystem processes in the estuary. ❁

Natural and ditched wetlands in Tampa Bay: top, a typical wetland creek; bottom, a mosquito-control ditch.



Fieldwork

Geologists and Biologists Endeavor to Understand Seamount Environments Off California

By **Jim Hein**

An interdisciplinary-research cruise conducted by the Monterey Bay Aquarium Research Institute (MBARI) under the direction of MBARI volcanologist **David Clague** recently made several discoveries about Rodriguez Seamount off Point Conception, CA, including new information about how the seamount evolved and what types of organisms it hosts.

The origin and geologic evolution of seamounts off California are poorly understood. In addition, seamounts are among the least understood biological habitats in the ocean basins—more poorly understood even than the abyssal plains, which were recently the subject of study as part of the Census of Marine Life (CoML) program (see URL <http://www.coml.org/coml.htm>).

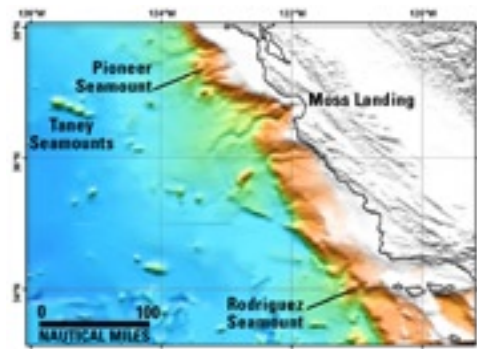
To learn more about the geologic and biologic makeup of seamounts, a week-

long cruise was designed to use the remotely operated vehicle (ROV) *Tiburon* on MBARI's research vessel *Western Flyer* to study seamount environments. Participants included volcanologists **Dave Clague** and **Alicé Davis** of MBARI and **Brian Cousens** of Carleton University, Ottawa, Canada; paleoceanographer and geochemist **Jim Hein** of the U.S. Geological Survey (USGS); biologists **Veronica Franklin** (Monterey Bay Aquarium),

(*Seamount Cruise continued on page 5*)



Control room for the ROV Tiburon aboard MBARI's research vessel Western Flyer.



◀ *Locations of Taney, Pioneer, and Rodriguez Seamounts in the U.S. Exclusive Economic Zone (EEZ).*

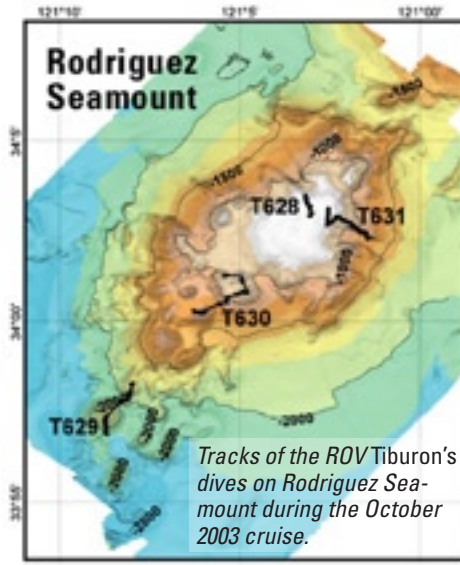
Fieldwork, continued

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Charles Messing (Nova Southeastern University, Florida), and **Lonny Lundsten** (MBARI); geographic-information-system (GIS) experts **Jenny Paduan** and **Nadine Golden** (MBARI); and computer guru **John Graybeal** (MBARI).

The cruise embarked from Moss Landing, CA, on October 11, with the goal of studying the Taney Seamount chain off San Francisco. Plans changed immediately upon departure, however, because the largest low-pressure zone in the North Pacific was parked over the Taney Seamounts, producing gale-force winds and high seas. So, we headed for Pioneer Seamount, at the base of the slope just north of San Francisco; but after the ROV had been on the bottom for 4 hours, the weather caught up with us, with seas approaching 15 ft and projected to be 18 ft, and winds to 30 knots. We had to abandon Pioneer Seamount, and because the forecast predicted worsening conditions for the next several days, we headed south for Rodriguez Seamount, on the lower slope off Point Conception. There we found refuge from the storm and several days of excellent conditions for ROV dives. Seamounts are common in the Exclusive Economic Zone (EEZ, a zone stretching from the shore to 200 nautical miles offshore) off the Western United States, and a wide selection is available for study.

We discovered that Rodriguez Seamount comprises numerous cones composed predominantly of bedded volcanoclastic rocks and fewer cones composed



of basalt flows. One cone that we explored has a volume of 2.6 km³, making it one of the largest known cones on any seamount. The volcanologists were elated to find pristine volcanic glass in collected samples. Analysis of that glass will help determine the environment of seamount formation, such as depth and temperature of eruptions and whether magma was stored for long periods in underground chambers before erupting.

At about 700-m water depth, we discovered ancient beach deposits and associated basalts that had flowed across the ancient shoreline into the sea. These findings indicate that the seamount was an island, subaerially exposed probably some 10 million years ago, which subsided as it approached the subduction zone that was in the region at that time. Jagged piles of lava about 10 m thick may have originated as subaerial aa (lava flows with a rough, rubbly surface) inland from the beach.

Debris chutes and landslide scars characterize the flanks of the seamount. Rocks on the seamount summit and flanks are coated by iron-manganese-oxide crusts that increase in thickness (to as much as 5 cm thick) with increasing water depth. These samples will be

used by **Jim Hein** (USGS) to study the paleoceanography of the California margin and, with accompanying data such as oxygen content of the water column collected by the ROV, to determine mechanisms for the acquisition of metals. This is the first research cruise to allow for the correlation of seawater composition with iron-manganese-oxide crust compositions at precisely known water depths and in well-understood geomorphologic environments.

The flanks of Rodriguez Seamount are generally rugged; however, extensive flat areas covered with crust pavements were mapped by the ROV. The seamount has very little sediment cover, even though primary productivity is high in surface waters. Limestone samples collected on the seamount were once foraminiferal ooze before undergoing diagenesis and cementation, indicating that the seamount's sediment cover may have been greater in the past.

Organisms were collected from water depths of 700 to 2,100 m. Amazingly, biological communities varied significantly even in similar habitats at similar water depths on different parts of Rodriguez Seamount. The seamount's megafauna consist of a vast array of sponges, including large, brilliant-yellow barrel sponges; many types of coral, including large gorgonians and huge golden coral seafans; abundant brittlestars, crinoids, clams, seastars, polychaete worms, crabs, tunicates, sea urchins, sea cucumbers, octopi, and many more. The giant sponges housed communities of other organisms. New species were found, and some species were rediscovered after not being observed for decades.

The summit of the seamount occurs within the oxygen-minimum zone, where oxygen contents fall as low as 0.2 milliliters per liter, which reduces population size, but biota were still remarkably abundant. Populations were also smaller along debris chutes and in the headwall and debris apron of a landslide. Abundant dead and dying sponges were found in some places.

The little research that has been done on seamounts shows that they provide im-

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Outcrop of volcaniclastic rock that shows crossbedding and other sedimentary structures. The cliff face is home for a multitude of organisms (681-m water depth). Photograph copyright © Monterey Bay Aquarium Research Institute, used with permission.

Fieldwork, continued

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portant hard-rock environments for marine organisms within the U.S. west coast EEZ. They provide important clues to the geologic evolution of the continental margin, and host deposits of paleoceanographic and potential economic interest. Our interdisciplinary effort to understand these important features should provide exciting results. We collected about equal numbers of rocks and organisms, and now the real work begins, as samples are analyzed by a wide variety of techniques.

To learn more about the seamount cruise, read logbook entries accessible from URL <http://www.mbari.org/expeditions/Seamounts/Seamounts.htm>.✿

Large golden coral fan and associated crinoids, brittlestars, and other organisms (1,761-m water depth). Photograph copyright © Monterey Bay Aquarium Research Institute, used with permission.



Investigating Sediment Transport Off South Carolina—Part of the South Carolina Coastal Erosion Study

By John C. Warner, Daniel M. Hanes, and Marinna Martini

Scientists from the U.S. Geological Survey (USGS)'s Coastal and Marine Geology Program in Woods Hole, MA, and Santa Cruz, CA, along with researchers from the University of South Carolina and the Georgia Institute of Technology (Georgia Tech), are conducting an investigation of sediment transport by waves and currents in the coastal waters off South Carolina, in the Myrtle Beach area. This investigation is part of the USGS' South

Carolina Coastal Erosion Study, in which the USGS is collaborating with the National Oceanic and Atmospheric Administration (NOAA)'s Sea Grant Program, the State of South Carolina, and several university partners to examine the causes of severe erosion along the South Carolina coast. (See related article in September 2003 *Sound Waves*.)

Of particular interest in the recent investigation is a large, shore-oblique sand deposit identified during recent geologic-framework mapping. The shoal, a potential source of sand for beach-nourishment projects, is approximately 10 km long by 3 km wide and extends to 11-m water depth. It has a relief of about 2 m above the surrounding sea floor, which consists of a thin veneer of Holocene sediment overlying Cretaceous sedimentary rocks. The sand deposit lies atop an erosional surface cut into the sea floor by landward



Deployment of oceanographic equipment off the research vessel Dan Moore.

migration of the shoreline in response to rising sea level in the past. The sand deposit is considered anomalous because its presence cannot be attributed geologically to a tidal inlet, a typical source of sand for such shoals.

Because the sand deposit is in a region with a limited supply of sand, some of the questions researchers are trying to answer are:

- Where does the sand come from?
- Is the shoal in a steady state, or is it eroding? accumulating?

The shoal is most likely controlled by tidal and wind-driven currents. To study these and other physical processes in the region, the scientists conducting the recent investigation deployed equipment at eight

(*South Carolina Sediment continued on page 7*)

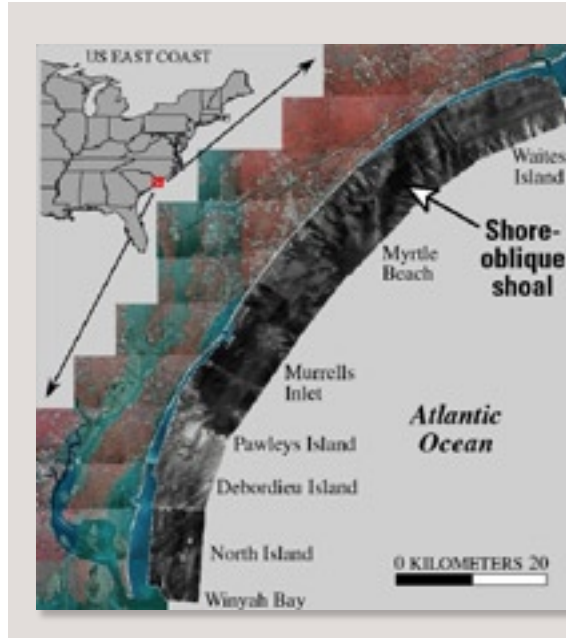


Field-deployment personnel onboard the research vessel Dan Moore, owned and operated by Cape Fear Community College in Wilmington, NC. From left to right: Steve Ruane (USGS), John Warner (USGS), Jonathan Borden (USGS), George Voulgaris (University of South Carolina [USC]), Ben Gutierrez (USC), Duncan Smith (USC), Marinna Martini (USGS), and Stephanie Obley (USC). Not shown are Dan Hanes (USGS), Paul Work (Georgia Tech [GT]), and Kevin Haas (GT).

Fieldwork, continued

(South Carolina Sediment continued from page 6)

sites to measure the vertical structure of currents, salinity, temperature, waves, turbulence intensity, suspended-sediment concentration, and bed forms (sand waves). This field-measurement program will be integrated with a comprehensive numerical-modeling study to predict waves, currents, and sediment transport in the region. The research will identify the oceanographic processes responsible for maintaining the large shore-oblique shoal and will explore possible sediment pathways connecting the shoal to the beach. ❁



Map of the inner continental shelf of Long Bay, South Carolina. Land is in color, the sea floor is in gray tones produced from sidescan-sonar data—a measure of sound energy reflected, or backscattered, from the sea floor. Ground-truth data, such as sediment samples and video footage, indicate that the dark (low backscatter) areas are generally smooth or rippled surfaces composed of mostly fine and medium sand and mud. Light (high backscatter) areas represent more rugged surfaces, consisting of larger scale bedforms or hardgrounds composed of coarse sand, shell hash, gravel, and exposed rock. The arrow points to the shore-oblique sand shoal (elongate black area) being studied in the recent investigation. The sidescan-sonar data were collected between October 1999 and May 2002 and will be published in a USGS Open-File Report by **Wayne Baldwin** and others. Land images were provided by the South Carolina Department of Natural Resources.

High-Resolution Geologic Mapping of the Shallow Sea Floor off Massachusetts

By **Brian Andrews**

The U.S. Geological Survey (USGS)'s Woods Hole Science Center, in cooperation with the Massachusetts Office of Coastal Zone Management (CZM) and the National Oceanic and Atmospheric Administration (NOAA), is conducting geophysical surveys to characterize the bottom morphology, surficial-sediment distribution, and subsurface geology in the shallow coastal waters off Massachusetts. The long-term goal of this mapping effort is to produce high-resolution geologic maps that will be used in aggregate-resource and benthic-habitat studies by State and other Federal agencies. USGS scientists **Brad Butman** and **Ilya Buynevich** are the principal investigators for this cooperative project.

Three nearshore survey areas between Boston and the Massachusetts-New Hampshire State line were initially identified by CZM for study. These survey areas, which are inshore of the Stellwagen Bank multibeam-echosounder survey conducted previously by the USGS, include Boston Harbor and approaches, the South Essex Ocean Sanctuary, and the Southern Merrimack Embayment.

Over the past several years, NOAA's National Ocean Service (NOS) has col-

lected hydrographic sonar data (bathymetry and sidescan-sonar data) in the first survey area, Boston Harbor and approaches, as updates to nautical charts. These data will be reprocessed by USGS and CZM scientists for geologic interpretation. **Seth Ackerman** and **Brad Butman** are leading the data-processing and interpretive efforts for Boston Harbor.

The second survey area includes parts of the South Essex Ocean Sanctuary between Nahant and Cape Ann. Approximately 75 percent of this area was surveyed with interferometric sonar, seismic-reflection profiling, and sidescan sonar during a 3-week survey conducted last fall by USGS personnel **Barry Irwin**, **Chuck Worley**, **Ilya Buynevich**, **Brian Andrews**, **Bill Danforth**, **Dave Foster**, **Dave Nichols**, **Tom O'Brien**, and **Jane Denny** on the USGS research vessel *Rafael*. The rest of the area will be surveyed in spring 2004, after which detailed ground-truth data, including grab samples, video footage, and still photographs, will be collected. Last fall's South Essex Sanctuary Survey was designed to acquire 100-percent coverage of the sea floor with interferometric sonar, a swath-bathymetry system. Line spacing

ranged from 100 to 150 m within 10- to 40-m water depths, with the closer line spacing in the shallower water. All survey systems—sidescan sonar, seismic-reflection profiler, and interferometric sonar—were run concurrently. **Brian Andrews**, a recently hired contractor for the USGS' Woods Hole Science Center, and **Ilya Buynevich** are leading the data-processing and interpretive efforts for this area.

The third survey area, the Southern Merrimack Embayment, is an inner-shelf region dominated by drumlins and riverine deposits. Multibeam-echosounder data will be collected from this area by a commercial hydrographic-survey company and analyzed by USGS staff.

Data from these three survey areas will eventually be combined with USGS databases from Stellwagen Bank National Marine Sanctuary, providing continuous high-resolution sea-floor coverage for most of Massachusetts Bay. For more information on these projects and other sea-floor-mapping activities in Massachusetts, please visit URL http://woodshole.er.usgs.gov/project-pages/coastal_mass/index.htm. ❁

USGS Celebrates Earth Science Week with an Open House in St. Petersburg, FL

By Jennifer Rosser

The U.S. Geological Survey (USGS)'s Center for Coastal and Watershed Studies in St. Petersburg, FL, held its fifth annual Open House on October 23 and 24, in a delayed celebration of this year's Earth Science Week (Oct. 12-18; see URL <http://www.earthsciweek.org>). The 2-day event was a successful educational experience for the entire community of Tampa Bay, FL. The 2003 Earth Science Week theme, selected by the American Geological Institute (AGI), was "Eyes on Planet Earth: Monitoring Our Changing World." Hoping for cooler-than-usual weather, tradition was broken to schedule the St. Petersburg Open House for the week after AGI's Earth Science Week.

USGS scientists from Tampa, St. Petersburg, Gainesville, and Miami prepared 39 exciting hands-on exhibits showcasing aspects of their research. Presentations included explanations, demonstrations, and opportunities for questions. Approximately 900 excited Pinellas County 4th-graders, teachers, and chaperones visited the USGS facility from 8:30 a.m. to 12:30 p.m. on October 23. From 3 to 6 p.m. on October 24, USGS scientists and staff met with the general public, including high-school, home-schooled, and college students. Assisting in Open House activities were 75 National Honor Society students from three local high schools. Everyone was thrilled to have the support of these National Honor Society volunteers.

The USGS Open House in St. Petersburg has become increasingly interesting each year because of its successful integration of the four scientific disciplines of the USGS: biology, geology, geography, and hydrology. Interactive displays included an erupting volcano, a model of ground-water movement, a custom-made high-volume dust sampler, water-quality-sampling equipment, and a demonstration of how waves move sand. Visitors were able to pet a 3-year-old salt-water crocodile and reach into a touch tank full of horseshoe crabs, large conchs, and squishy sea squirts. A tank of exotic Asian green mussels and a match-the-manatee-tails game helped keep the kids interested. Students were shown how computers are used



USGS Open House participants pose beneath the USGS blimp, designed for sampling airborne dust from Africa. The tethered blimp helped attract attention to the Open House.



Chris Reich (right) and Don Hickey explain the importance of coral reefs.

in science. Topics included how fractal geometry occurs in nature; what an aerial view of coral reefs looks like, using airborne lidar; and how river and stream flows are monitored.

Students eagerly examined sediment samples from around the world under microscopes and matched samples from the United States with the State where the sample was obtained. Kids and adults feverishly dug through sediment from fresh cores collected at various sites in Florida. "The comparison I like to help the public make is, when we open a sediment core, it's like opening the Earth's history book," said exhibitor **Jim Flocks**. The kids took home a piece of this history in an official USGS sediment-sample bag.



The volcano named Mount Baker erupts as students and Dennis Krohn look on in amazement.

All the exhibits were geared toward helping visitors understand how science is involved in everything. "It's important for the USGS to open its doors to

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Outreach, continued

(St. Petersburg Open House continued from page 8)

the community,” said exhibitor **Rich Young**. “It’s an incredible experience to be able to reach kids at an early age and show them how science surrounds them daily. The Open House helps give kids a much greater appreciation for the world they live in.”

The Open House was so informative that both adults and children left wishing they were scientists!✿



A student from Church of the Cross Lutheran School wears tools frequently used in geology. (Photograph used with school's permission.)



Maggie Irizarry demonstrates a working ground-water model to show how surface pollutants penetrate ground water and contaminate the Biscayne Aquifer.

Pink Sunsets in Florida Caused by African Dust

By Jennifer Rosser

Gene Shinn from the U.S. Geological Survey (USGS)’s Center for Coastal and Watershed Studies in St. Petersburg, FL, presented a lecture entitled “Our Pink Sunsets Are Caused by African Dust: Are the Microbes It Delivers Affecting Your Health?” to the Academy of Senior Professionals at Eckerd College (ASPEC) in St. Petersburg. ASPEC had asked **Gene** to participate in its Public Forum Series on November 5. The lecture allowed **Gene** to combine his two areas of expertise: coral reefs and African dust. Approximately 100 ASPEC members, Eckerd College students, and members of the general public attended the forum to learn about the global effects of African dust.

Influxes of airborne African dust periodically affect the Caribbean and Eastern United States. The audience was fasci-

nated to learn that researchers believe bacteria and other microbes can endure the 5- to 7-day journey from Africa in a dust cloud and that as much as 30 percent of the microbes identified in dust samples are opportunistic pathogens. Several audience members recalled professors having taught that radiation would kill everything found in dust clouds. On the plus side, the dust provides essential nutrients to the upper canopy of the Amazon rain forest and contributes to the formation of red soils, known as pineapple loam, used for agriculture in the Bahamas.

The audience was stunned by how unaware they were of the importance of African dust. Many people were interested in possible connections between African dust and other well-known events, such



as the foot-and-mouth-disease outbreak in England, diseases killing coral reefs, and increasing occurrences of asthma. **Gene** hopes someday to track African dust clouds in an airplane. The presentation ended with a round of applause, intriguing questions, and a picture of a beautiful pink sunset with palm fronds blowing in the breeze.✿

USGS Scientists from St. Petersburg, FL, Participate in GIS (Geographic Information System) Day

By Jennifer Rosser

The U.S. Geological Survey (USGS)’s Center for Coastal and Watershed Studies in St. Petersburg, FL, participated in a Geographic Information System (GIS) Day held November 19 at the University of South Florida. GIS Day is a grassroots event that allows GIS users and vendors an opportunity to interact with the general

public and demonstrate practical applications of GIS technology (see URL <http://www.gisday.com/> for more information).

A GIS is a system of computer software, hardware, and data that allows a user to manipulate, analyze, and present information that is tied to a spatial location. GIS technology is used in scientific investiga-

tions, resource management, development planning, and many other applications that require analysis of spatial data.

The USGS had several exhibits at the GIS Day event. **Russ Peterson** explained how GIS technology is used to map windspeed, storm-tracking information,

(St. Petersburg GIS Day continued on page 10)

(St. Petersburg GIS Day continued from page 9)

and bathymetric data in areas hit by hurricanes. He showed data sets used to determine shoreline changes and other impacts of Hurricane Isabel, which came ashore at Cape Hatteras, NC. **Kathryn Smith** and **Ravic Nijbroek** demonstrated the Tampa Bay Estuary Interactive Mapping System (IMS), a Web-based GIS that requires no

software other than an Internet browser and Internet access. Simulations, maps, and databases are accessible to the public through the Tampa Bay IMS, whose central storage area is in Louisiana (see URL <http://gulfsci.usgs.gov/ims/index.html>).

The National Geographic Society, the Association of American Geographers, the

University Consortium for Geographic Information Science, the USGS, the Library of Congress, Sun Microsystems, Hewlett-Packard, and the Environmental Systems Research Institute (ESRI) were the principal sponsors of this year's GIS Day. ❁

Woods Hole Geographic Information System (GIS) Users Take GIS Day to a Local School

By Erika Hammar-Klose

On Friday, November 21, the Geographic Information System (GIS) Users of the U.S. Geological Survey (USGS)'s Woods Hole Science Center (WHSC) participated in an outreach program at the Lawrence School in Falmouth, MA. An extension of the multisponsored GIS Day (see related article, this issue, and URL <http://www.gisday.com/>), the outreach involved spending a day at the school, visiting each of teacher **Lynn Parks'** eighth-grade Earth-science classes. Each classroom visit included a PowerPoint presentation

explaining GIS and how the USGS WHSC uses GIS in its research activities, specifically discussing the principle of remote sensing. After the presentation, the students engaged in hands-on activities: they were introduced to sidescan sonar and had the opportunity to compare sediment samples and sonar imagery. A chemistry demonstration showed the students how USGS scientists collect, analyze, and interpret the chemistry of sediment samples and then incorporate them into a GIS. Lastly, the students looked at GIS data for the town of Falmouth and aerial photographs of the

area. It's always a big hit to have the kids find their houses on a photograph!

The following members of the USGS' Coastal and Marine Geology Program participated in the Lawrence School outreach: **Seth Ackerman, Soupy Alexander, Sandy Baldwin, VeeAnn Cross, Erika Hammar-Klose, Emily Himmelstoss, Sarah Kelsey, Tammie Middleton, and Ed Sweeney.** This outreach activity has become a yearly event as part of the USGS WHSC's recognition of GIS Day. Thanks to all who participated! ❁

YES Students Visit USGS Scientists' Offices in Woods Hole, MA

By Erika Hammar-Klose and Ann Swift

On Saturday, November 1, the U.S. Geological Survey (USGS)'s Woods Hole Science Center (WHSC) held an open house for a group of students, ages 14-17, from the Youth Enrichment Services (YES) in Boston. This is the first time in the history of the USGS WHSC that students were brought into staff offices to get a firsthand look at how we spend our days. This outreach event was organized primarily by **Glynn Williams, Erika Hammar-Klose, Chris Polloni, and Ellen Mecray.**

YES was founded in 1968 by **Richard Williams** to offer a program of calm in tumultuous times. Initially, skiing was the avenue to teach kids responsibility and to engender trust. The focus was and is to show how success in one environment can translate into success in other environments. The program has expanded in size and application. Skiing is still the primary activity, but a broader exposure to

different environments and issues has also been incorporated into the program. The visit to the USGS was one of about 10 scheduled for the year, demonstrating various approaches to the respect, study, responsibility, and pleasure associated with the environment and the outdoors. Examples of other YES activities include flights over the kids' communities, a trip to the Boston Harbor Islands, and a bike trip through a habitat-restoration project. (For more information about YES, visit URL <http://www.yeskids.org/>).

We thought long and hard about how to organize this open house, and we were very pleased with the resulting schedule. The group of 12 students and staff, as well as a



Wylie Poag uses a shot from the movie Deep Impact to illustrate the results of a bolide impact.

few USGS personnel, began the day with a name game. Given the festivities of the night before (Halloween), participants gave their names, described their favorite candy, and then told the group what they liked about it. After much laughter and our per-

(YES at Woods Hole continued on page 11)

(YES at Woods Hole continued from page 10)

ceived sugar high, everyone met in our conference room for an overview of the USGS WHSC. First, **Ellen Mecray** talked briefly about the different types of science our center conducts; then **Wylie Poag** spoke in depth about the Chesapeake Bay Bolide (see URL <http://woodshole.er.usgs.gov/epubs/bolide/>). This whiz-bang presentation captured the students' attention and engaged them. We then indulged in some cider and doughnuts!

After our time in the conference room, the students were divided into two groups and began a 10-minute rotation through each of 10 USGS WHSC staff offices. We created a matrix of groups and offices, with groups rotating through the building in counterclockwise order. The matrix was set up so that we could add groups of students, while keeping the total time required for office presentations constant. The students enjoyed the presentations and getting into people's actual offices. The following staff participated:

Seth Ackerman presented a 3D fly-through of sea-floor-habitat-mapping sites in the Gulf of Mexico.

Valerie Paskevich gave a presentation on geographic information systems (GIS) and the USGS' interactive map server (URL <http://coastalmap.marine.usgs.gov/>).

Elizabeth Pendleton showed the students examples of coastal-vulnerability studies in national parks and discussed her intergovernmental research experience (working with the USGS and the National Park Service).

Chris Polloni showed the students how USGS scientists are mapping and visualizing the Puerto Rico Trench.

Jamey Reid gave a presentation on aggregates and GIS mapping.

Jianli Song gave the students a two-dimensional demonstration of fault movement (reverse, shear, and normal).

Ed Sweeney gave the students a side-scan-sonar data-processing demonstration.

Ann and **Sarah Swift** gave the students a seismic-data-processing demonstration.

Bill Waite, **Brandon Dugan**, **Bill Winters**, and **Dave Mason** showed the students the GHASTLI (Gas Hydrate and Sediment Testing Laboratory Instrument) and discussed gas hydrates.

Glynn Williams presented a geographic-map display of Boston, Falmouth, and some of the ski slopes used in the YES winter program.

At the end of the office presentations, we had lunch on the beach in the sunshine. After lunch, **Erika Hammar-Klose** gave a brief talk on the glacial history of the Woods Hole area, culminating in a walk down the bike path to Woods Hole. **Hovey Clifford** of the Woods Hole Oceanographic Institution (WHOI) took us on a tour of WHOI's docks and the research vessel *Oceanus*. Our day both began and ended with a bang!

As we looked back at our outreach day, we came up with several recommendations that we hope will be useful to other USGS offices if they plan open houses of this type:

- Limit the number of office visits to no more than 6; we found that 10 presentations were too many for the students to absorb.
- Start off with an engaging presentation and have those following explain some of the concepts in greater detail.
- Get the students involved in your office presentation; don't just have them look over your shoulder.
- Get the students outside! Before beginning any afternoon programs, give participants some time to relax and roam.
- Pick a common theme, such as the importance of detail, and have each office presentation include this theme.
- Try to have a small scientist-to-student ratio, such as 2 to 3 students in each office at one time.
- Designate a staff person to keep the kids moving, keep time, and be a resource for questions.
- The students will be learning many new words during their visit to the USGS. As USGS personnel plan their office presentations, have them write lists (keep them short!) of terms and definitions. Compile these lists into a glossary for the day.
- Keep the energy level high. You are asking the students to absorb a lot of information. Make sure that your presentation includes time to process and think!

Thanks to everyone who helped out to make this a special day! ❄️

Scientists Interact with Students in Tampa Bay Area Classrooms During the Great American Teach-In

By Jennifer Rosser

Seven scientists and staff from the U.S. Geological Survey (USGS)'s Center for Coastal and Watershed Studies in St. Petersburg, FL, participated in the Great American Teach-In on November 19. Following on the recent success of the USGS' fifth annual Open House in St. Petersburg (see article, this issue), teachers in the Tampa Bay area were eager to have a scientist speak to their students. The Great American Teach-In was a special oppor-

tunity for USGS scientists to visit schools and share their knowledge and experiences with a younger generation.

Dennis Krohn and his wife taught a combined total of seven classes at McMullen Booth Elementary School in Clearwater, where their daughter is a third-grader. At Campbell Elementary School, a marine-science school in St. Petersburg, **Ellen Raabe** taught three excited second-grade classes about the

wetland ecosystem. **Kathryn Smith** was ambitious and visited a marine-science class of high-school juniors and seniors at Admiral Farragut Academy in St. Petersburg. Using a PowerPoint presentation to describe the types of study conducted by the USGS, **Smith** emphasized research in Tampa Bay and goals for the USGS' Tampa Bay study (for more informa-

(Great American Teach-In continued on page 12)

Outreach, continued

(Great American Teach-In continued from page 11)

tion, visit URL <http://gulfsci.usgs.gov/tampabay/>). Additionally, she taught the students about models, and together they built a conceptual model for seagrass communities in Tampa Bay. **Dana Nielsen** explained the Tampa Bay study to seventh- and eighth-grade science students at Meadowlawn Middle School in St. Petersburg, who were particularly impressed when he showed them his diving gear. Kindergarten and first-grade classes at St. Paul's Catholic Church in

St. Petersburg were taught geology by **Jennifer Rosser**. The students enjoyed sharing "science stories" and touching rocks, coral, and a manatee bone. **John Lisle**, a strong supporter of science in the classroom, explained the work he is conducting in Antarctica and had interesting visuals to keep the students in five classes engaged during the presentation. **Gene Shinn** spoke to college students at the University of South Florida about karst hydrology.

Volunteers determined the length of their visit and chose topics that they felt comfortable discussing. A few scientists decided to take their Open-House presentations to the schools for a demonstration. Students were fascinated to hear the scientists' stories and view pictures that document data collection in the field. Thank you to all the USGS scientists who participated in the teach-in, and to all who help with outreach activities throughout the year! ❁

Meetings

UPCOMING!

First Annual Sustainable Beaches Summit

By Christina Kellogg

The Sustainable Beaches Summit is a groundbreaking effort to bring together a diverse cross section of beach professionals and coastal educators from Federal agencies, State and local governments, nongovernmental organizations, academia, and industry. The summit will convene March 29-31, 2004, at Sandestin Golf and Beach Resort in Walton County, FL.

The first day of the summit will feature several workshops relating to various aspects of beach management. The workshops will allow participants to gain hands-on training in the latest beach-management techniques and will include field trips to the beautiful beaches of Walton County.

The meeting convenes on March 30 with a morning plenary session and will conclude the following day. Technical sessions will focus on five major concurrent tracks relating to beach management: water, sediment, monitoring and mapping, tourism, and education/outreach. In addition to the sessions, major sponsors (listed below) will have booths with beach-related information available in the lobby.

The monitoring and mapping track is being sponsored by the U.S. Geological Survey (USGS)'s Center for Coastal and Watershed Studies in St. Petersburg, FL, one of three locations that compose the USGS' Florida Integrated Science Center (FISC). The monitoring and mapping

track, which targets scientists and public-health officials, will showcase USGS beach research. The dual nature of the track allows for inclusion of microbiological studies being conducted with beach sediment, as well as some of the regional studies of large-scale coastal change being done with a variety of new techniques.

The Center for Sea Change is sponsoring the tourism and policy track, with a focus on the economics and planning of sustainable tourism. This track is expected to appeal to planners, tourism professionals, developers, and policy staff.

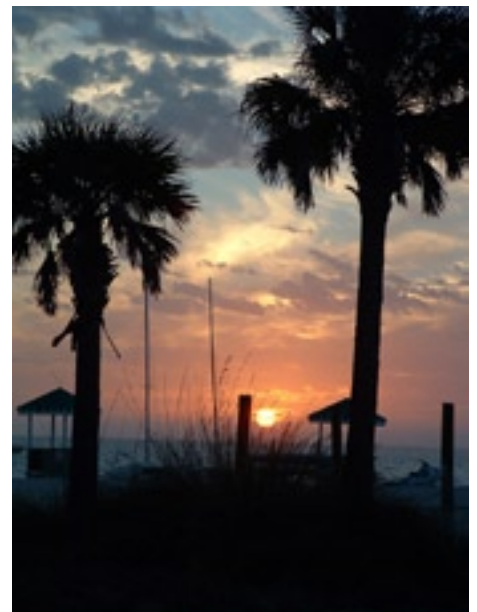
The U.S. Army Corps of Engineers (USACE) is sponsoring the sand and sediment track, geared toward engineers and consultants. This track will include such topics as dredging, maintaining beach fill, and the USACE's new focus on regional sediment management.

The National Oceanic and Atmospheric Administration (NOAA) is sponsoring the education, outreach, and literacy track. The intended audience is educators, scientists, and policy staff. This track will incorporate sessions on K-12 educational programs, aquaria, getting the community involved in programs, and beach protection.

The Clean Beaches Council, with input from the U.S. Environmental Protection Agency (EPA), will sponsor the final track on water, including recreational water qual-

ity, watershed management, and impacts of wastewater on beaches.

Speakers have been chosen for these tracks, and a preliminary agenda is available on the Sustainable Beaches Summit's Web site at URL <http://www.cleanbeaches.org/sustainable/>. Those interested in attending the summit are invited to register on the Web site from now until February 14. The summit will provide an excellent venue for network building and creating synergy among beach professionals of all backgrounds. ❁



Workshop on Offshore Sand Resources in the Mid-Atlantic Region

By S. Jeffress Williams

On October 23, the Minerals Management Service (MMS) sponsored a workshop hosted by the Delaware Geological Survey (DGS) on locating and using offshore sand resources for nourishing eroding beaches on the Atlantic coast.

Coastal erosion, involving land loss, property damage, and sometimes loss of life, is a major issue for developed areas of all 30 U.S. coastal States and territories, as well as for much of the world's low-lying or developed coastal regions. The causes of erosion are complex. Mostly, coastal erosion is caused by natural processes, such as storms and relative sea-level rise; but increasingly, human causes, such as inlet jetties, seawalls, dams, and dredging, are exacerbating coastal erosion by depleting sediment input and blocking sediment transport at the coast. Coastal erosion is likely to increase and have additional impacts on society as sea-level rise accelerates and storminess increases over the 21st

century in response to climate change that is already underway.

One preferred method of mitigating beach erosion, at least temporarily, is beach nourishment. In this method, sand is dredged from offshore, pumped onto the beach, and engineered to build up the beach berm and dunes to enhance storm protection and recreation potential. Although beach nourishment is being increasingly used to mitigate erosion, it is temporary and expensive, and large volumes of high-quality sand are needed over the 50-year life span of most such projects. Because onland sand and gravel resources are limited, marine sand bodies on inner-continental-shelf areas are becoming increasingly attractive sources of sand.

The recent Offshore Sand Workshop was convened so that participants could share information about offshore sand resources in the mid-Atlantic region (Virginia to Maine) and discuss environmental

issues and needs for future studies. Speakers from six States, as well as the MMS and the U.S. Army Corps of Engineers, were on the agenda. **S. Jeffress Williams**, of the U.S. Geological Survey (USGS)'s Woods Hole Science Center, summarized results from the USGS' Marine Aggregate Resources and Processes study in a talk titled "Insights to Seafloor Sedimentary Character, Aggregate Resources, and Processes of U.S. Continental Margins" and presented two posters.

The workshop agenda and copies of the PowerPoint slides from **Jeff's** talk and others are available as pdf (portable document format) files at URL <http://www.udel.edu/dgs/ftp/offshore/> (click on link "workshop_pdf_files").✻

Awards

USGS Scientist Receives Agency's Regional Science Excellence Award

Ecologist **Jim Grace** of the U.S. Geological Survey (USGS)'s National Wetlands Research Center in Lafayette, LA, recently received the Regional



Science Excellence Award in the Biology Discipline in the USGS' Central Region. **Jim** is among the first USGS scientists to receive this new award, which will highlight the USGS' most prominent scientific achievements each year.

Jim's primary scientific responsibility is to conduct research on wetlands conservation and, in particular, restoration and maintenance of native-plant communities in coastal-prairie ecosystems. He has

achieved international renown as a pioneer in the ecology of plant competition and community-analysis methodologies. His use of wetland systems as models to address basic questions in plant-community ecology has produced a fundamental shift in the way ecologists approach studies of species interactions and community dynamics. His multivariate statistical methods have enabled him to develop complex models to create more realistic predictive models of diversity, in line with the National Science Foundation's elevation of "biocomplexity" as an overarching principle and dominant current theme.

Outreach is another responsibility that **Jim** takes very seriously. He is always willing to lend assistance and give advice to more junior researchers. He is active

in training graduate students and teaches occasional special-topic seminars at the University of Louisiana, Lafayette. Lastly, **Jim** is passionately devoted to the promotion of science in his own community, serving on the board of the Lafayette Natural History Museum and Planetarium and playing a major role in the redesign of the museum's exhibit space at its new headquarters, as well as promoting the museum's mission of informing the public about the natural world.

Jim Grace is devoted to his science, to the application of his research in solving problems, to the development of his fellow scientists in their education and careers, and to promoting the understanding of science and natural-resource issues in his community.✻

American Association of Petroleum Geologists Gives USGS Scientist an Award for Presentation Excellence

Bill Winters, an engineer with the U.S. Geological Survey (USGS)'s Woods Hole Science Center, was recently awarded the President's Certificate for Excellence in Presentation (in the poster category) for his presentation entitled "Physical Properties of Sediment Containing Natural and Laboratory-Formed Gas Hydrate." The award was given by the President

of the Energy and Minerals Division of the American Association of Petroleum Geologists. The poster was presented at the association's national meeting, held in Salt Lake City, UT, in May 2003. Congratulations, **Bill!**

Reference: Winters, W.J., Waite, W.F., Mason, D.H., Novosel, I., Boldina, O.M., Dallimore, S.R., Collett, T.S., Lorenson,

T.D., Paull, C.K., Rogers, R.E., Bryant, W.R. and McGee, T.M., 2003, Physical properties of sediment containing natural and laboratory-formed gas hydrate [abs.]: American Association of Petroleum Geologists Annual Meeting, Salt Lake City, UT, May 11-14, 2003, Official Program, v. 12, p. A182. ❁

Staff and Center News

Birthday Surprise for Three USGS Scientists in St. Petersburg, FL

By Jennifer Rosser

U.S. Geological Survey (USGS) scientists **Terry Edgar**, **Gene Shinn**, and **Mario Fernandez** celebrated their 70th birthdays within months of each other. The USGS' Center for Coastal and Watershed Studies in St. Petersburg, FL, held a surprise party for the birthday boys on November 5. The instigator, **Shawn Dadisman**, asked **Jim Flocks**, **Chris Reich**, **Laurinda Frye**, and **Betsy Boynton** for help in creating a memorable event. Just 2 days after preparations began, the planned trap was sprung, complete with a cake that was a creative scientific effort all its own. The cake featured a geologic time scale with

Edgarian, Shinnian, and Fernandezian eras, and an illustration of the evolution from ape to man, culminating in caricatures of the three USGS scientists. The faces of the birthday boys and the specially picked "tools" each carried added the finishing touches to a wonderful and unusually successful surprise! ❁



Birthday honorees (from left to right) **Gene Shinn**, **Terry Edgar**, and **Mario Fernandez**.

*The birthday cake was adorned with an illustration of the evolution of man, culminating in caricatures of the three scientists. From left to right: **Terry Edgar** is depicted with a geologic hammer, in recognition of the many years he has dedicated to studying rocks. **Gene Shinn** carries a copy of *Killer Dust*, a murder mystery by former USGS employee **Sarah Andrews** that is based on **Gene's** research on African dust (see articles in March 2002 and April 2003 *Sound Waves*). **Mario Fernandez** carries a magnifying glass, to symbolize his work testing water samples for contaminants in Tampa Bay.*



Remembering Parke Snavelly

Parke D. Snavelly, Jr., Emeritus Geologist and Influential Leader of USGS Marine Studies, Passes Away

By Ray Wells, Parke D. Snavelly III, and Alan Niem

On November 24, U.S. Geological Survey (USGS) emeritus geologist **Parke D. Snavelly, Jr.**, passed away as a result of complications following a stroke. **Parke**, who was 84, had a long and distinguished career with the USGS spanning nearly 60 years.

Parke's geologic mapping of the Cenozoic rocks of the Oregon and Washington Coast Ranges is classic work. Begun in 1946 and continuing through the mid-1990s, it provided the basic geologic and tectonic framework both onshore and offshore. Field studies by **Parke** and his Fuels Branch colleagues established the Centralia-Chehalis coal district as a major energy resource, which now sustains a large generating plant supplying electrical power to the Puget Sound area. **Parke** also popularized his geologic findings in a series of guidebooks outlining the geology of the Oregon coast. Though done largely in support of energy-resource evaluations, his mapping is now being applied to the study of seismic hazards and other problems in the forearc of the Cascadia subduction zone. In this zone, which runs from offshore northern California to offshore British Columbia, the oceanic Juan de Fuca Plate is being subducted beneath the continental North American Plate. **Parke's** efforts to correlate onshore geology with offshore marine data were a life-long research interest, and his numerous onshore-offshore geologic profiles of the Cascadia margin provide unique insight into its evolution.



Parke's broad interests were reflected in his position as a research geologist in both the Branch of Pacific Marine Geology and the Branch of Western Regional Geology. He served as Chief of the Pacific Coast Branch of Regional Geology, where one of his memorable assignments was to have **Tom Dibblee** map the San Andreas Fault south of San Francisco.

Parke was instrumental in establishing a marine program for the USGS as its first Chief of the Office of Marine Geology and Hydrology. He initiated international cooperative research programs with the governments of Canada, Spain, Liberia, Japan, and Taiwan.

Parke also acted as an external advisor to academia, supported student and faculty research, and worked with an array of industry, State, and USGS colleagues to establish the igneous history, stratigraphic framework, and oil-and-gas potential of the Pacific Northwest coast.

Parke's first love was fieldwork, and he was proud to have received the Dibblee Foundation's Dibblee Medal for his significant contributions to geologic mapping. He also was a recipient of the Department of the Interior's Distinguished Service Award, the highest departmental award that can be granted an employee.



Parke in his element—the field—near the beginning and the end of his career. Left, Whale Cove, OR, July 30, 1946. Above, Depoe Bay, OR, 1999.



Parke D. Snavelly, Jr., and his long-time assistants Diane Minasian (on left) and Juanita Mascardo (now Juanita Von Huene) in Parke's office at the Branch of Pacific Marine Geology, then located in Palo Alto, CA. Photograph taken by Florence Wong in April 1989.

Parke was a mentor to many young geologists, who will miss his wise counsel. **Parke** is survived by his wife of 61 years, **Anne**, daughters **Pamela** and **Deborah**, son **Parke III** (a geologist with ExxonMobil), four grandchildren, and one great-granddaughter.

No services are planned. Contributions in **Parke's** name may be sent to the Geological Society of America's "Parke D. Snavelly, Jr., Cascadia Research Award," a newly established endowment fund to provide support for student research, at this address: GSA Foundation, P.O. Box 9140, Boulder, CO 80301-9140.✻

(Remembering Parke Snavelly continued on page 16)



Anne and Parke Snavelly at a celebration of Parke's 50th year with the USGS, held on November 19, 1992.

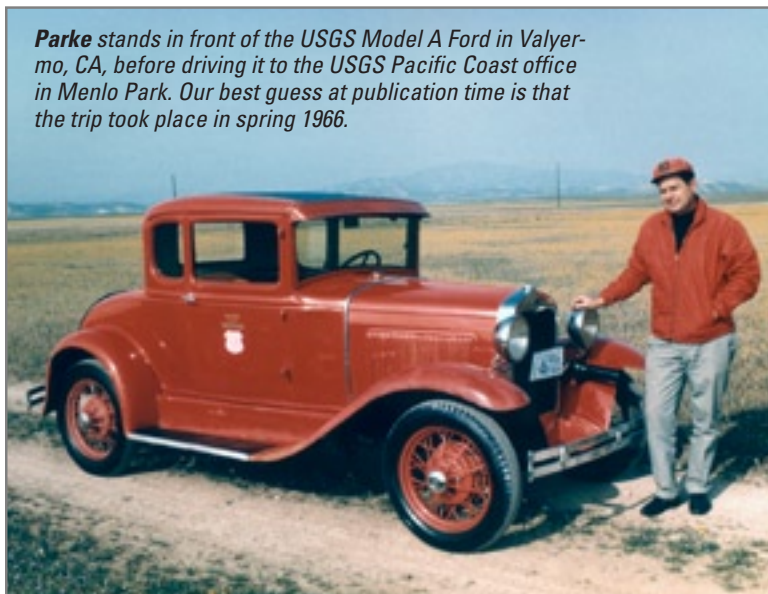
Remembering Parke Snavelly (continued from page 15)

The Saga of the Journey of the Model A from Valyermo to Menlo Park, CA

By Parke D. Snavelly, Jr.

Driving a Government Model A Ford from Valyermo to Menlo Park, CA, was one of **Parke's** favorite services to the U.S. Geological Survey (USGS). Here is some background information about the car (from the USGS' Web site at URL <http://www.usgs.gov/museum/modela.html>): In 1930, the USGS purchased a Model A Ford coupe for \$557. Geologist **Foster Hewett** used it in Death Valley, CA, from 1930 to 1956; then, geologist **Levi Noble** used it for mapping the Mojave Desert from 1956 to 1965. After **Noble's** death, the Model A was stored for a time in Valyermo, CA. **Parke Snavelly**, Chief of the Pacific Coast Branch of Regional Geology, Geologic Division, later drove it from Valyermo to the USGS' Pacific Coast office in Menlo Park, CA. In 1974, the car was shipped to the newly opened USGS headquarters in Reston, VA. Here it was displayed, first in the lobby, then outside on the front portico under a building overhang, where it remains today.

Parke describes the journey below. Our best guess at publication time is that it took place in spring 1966.



Parke stands in front of the USGS Model A Ford in Valyermo, CA, before driving it to the USGS Pacific Coast office in Menlo Park. Our best guess at publication time is that the trip took place in spring 1966.

When **Parke** went to pick up the Model A at **Levi Noble's** Valyermo ranch astride the San Andreas Fault on the south side of the Mojave Desert, he found the car stored in a barn. It was missing its wheels, which were stored in the ranch house for safekeeping. **Mrs. Noble** was reluctant to release the car because she said that Chief Geologist **Bill Bradley** had said that **Levi** could keep the car when he left the USGS. She finally was convinced, after reading a letter from **Bradley**, that the car would end up in a proper setting at the USGS' national headquarters in Reston, VA.

After he retired, **Levi** used the Model A to map on the ranch when he could not get a driver's license to drive on a public road. On several occasions, he asked **Parke** to obtain a USGS license for him—**Parke** had to decline. (As an aside, **Levi's** per-

sonal cars were two Jaguars—one at the ranch and one at the family home in the east.) [For more information about **Levi Noble**, visit URL <http://pubs.usgs.gov/of/2002/ofr-02-422/> and read *Levi Noble: Geologist*, by **Lauren A. Wright** and **Benjie W. Troxel**, U.S. Geological Survey Open-File Report 02-422.]

Holly Wagner had accompanied **Parke** to Valyermo, and after they mounted the tires, put in 5 gallons of gas, and rolled it down an incline to get it started, it ran like a top. The tires looked almost white because of small cactus needles embedded in them. As it turned out, the cactus needles were holding the tires together—one blew up just south of Menlo Park.

The first stop of the trip was at a Shell station in Valyermo for gas and a lube. Never did a car get more TLC than that Model A—including blackening the tires and polishing the body. On the way to Bakersfield, **Holly** followed in the Jeep Wagoneer to make sure that the Model A had no mishaps. En route, several Federal cars came alongside, and, noting the U.S. Government insignia, the drivers said that it was ridiculous to be using a vehicle that old. They were assured that the old Model A was just beginning to earn its keep.

The second stop of the trip was in Bakersfield, where the International Model A Club was having a meeting. The parking lot of the motel where **Parke** and **Holly** spent the night was full of Models A. One of the local judges agreed to rate the USGS vehicle—it rated an 86, on the basis of deductions for parts that were not original. The running board dated the car at late 1930 vintage.

A decision was made to take the back route northward to avoid the main California Highway 99. The car's performance on steep hills was impressive—no downshifting! It perked right along. The trip along the coast range was great fun. However, by the time the Bayshore Highway [U.S. Interstate Highway 101] was reached, it started to rain. The car was equipped with hand-activated windshield wipers—no fun. Near San Jose, with the rain coming down, one tire developed a big balloon and exploded. Fortunately, the spare tire had air, and the Model A arrived in Menlo Park late in the evening intact, just in time to be exhibited with new USGS utility vehicles at a taxpayer "Show and Tell." The Model A was undoubtedly "Best in Class." ❁

(Remembering Parke Snavelly continued on page 17)



Holly Wagner, shown here at a get-together of USGS marine scientists in 2002, helped **Parke** drive the Model A to Menlo Park.

Remembering Parke Snavelly (continued from page 16)

Tribute to Parke by Terry Bruns

Parke Snavelly should hold a special place in the hearts of those in the U.S. Geological Survey (USGS)'s Coastal and Marine Geology Program. In 1963, the USGS tried to establish a Marine Geology program but had little success in finding funding. The marine program did not really begin to exist as a strong scientific arm of the USGS until **Parke** agreed

to be the Chief of the Office of Marine Geology and Hydrology in 1965. **Parke** was the one who got the marine program off the ground and left it happy, healthy, and well funded. We are the inheritors of his wisdom and guidance during the program's early, formative years.

Parke was a giant presence in both regional geology and marine geology

on the West Coast. He was also a true gentleman in every sense of the word. For those of you who did not know him, I can only wish that you had. I will miss him, as will everyone else who knew and interacted with him. **Parke**, wherever you are, may the winds be fair, the waves small, the skies blue, and the rocks always exposed. ❁

Tribute to Parke by David Scholl

The obituary printed here and the tribute by **Terry Bruns** highlight a little-remembered truth about the impact of **Parke Snavelly** in building and nurturing the growth of the scientific and operational arm of the U.S. Geological Survey (USGS) that is now the modern Coastal and Marine Geology Program. **Parke**, a land-oriented geologist, was a programmatic visionary who saw the need for and the importance of a USGS capability to

conduct investigations of the coastal and offshore realms—in the Pacific Ocean, the Atlantic Ocean, the Gulf of Mexico—just anywhere and everywhere of interest to the United States. In the mid-1960s, **Parke** pioneered ways to get the marine program funded, staffed, and instrumented through the Nation's need to locate new sources of heavy metals. "So, why not look offshore?" he argued successfully. We all need mentors and caretakers

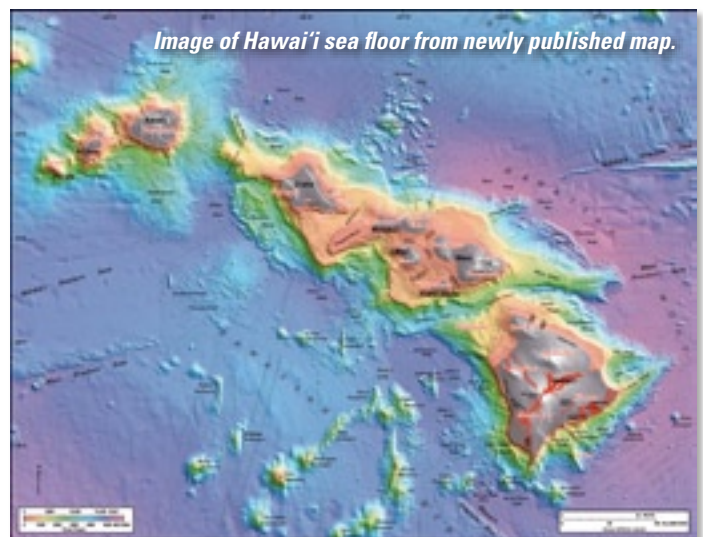
to clear the path of obstacles and find ways to bring our abilities forward. To accomplish this task within the USGS requires scientific inspiration, personal aspiration, and smarts about how our organization works. **Parke D. Snavelly, Jr.**, provided all of this for us at a crucial time and for reasons that were just plain instinctive to him—he could not help himself. **Parke** is the progenitor of our continuing USGS mission. ❁

Publications

Scientists Unveil New Map of Hawai'i Sea Floor

U.S. Geological Survey (USGS) scientists, in cooperation with the Japan Marine Science and Technology Center (JAMSTEC), the University of Hawai'i, and the Monterey Bay Aquarium and Research Institute, have recently published a new colored map showing the topography of the Hawai'i sea floor and chain of islands. Prominent geologic features of the sea floor, including landslides, seamounts, fracture zones, and volcanic fields, are portrayed in vivid color and shown in shaded relief. JAMSTEC led the collaborative survey of the sea floor, which used submersible crafts, rock dredges, and sediment piston cores to sample and observe the sea-floor sites. The map shows

updated information on lava flows (current through summer 2003) and defines submarine rift zones—the sites of past and, most likely, future eruptions. The full reference for the map is Eakins, B.W., Robinson, J.E., Kanamatsu, Toshiya, Naka, Jiro, Smith, J.R., Takahashi, Eiichi, and Clague, D.A., 2003, Hawaii's volcanoes revealed: U.S. Geological Survey Geologic Investigations Series I-2809. An online version of the map is available at



URL <http://geopubs.wr.usgs.gov/i-map/i2809/>. For additional information, please contact **Barry Eakins**, USGS, at 650-329-5237 or beakins@usgs.gov ❁.

USGS Scientist's Coral Photograph Graces the Cover of *GSA Bulletin*, November 2003

By Curt Storlazzi

An underwater photograph taken by U.S. Geological Survey (USGS) scientist **Tom Reiss** graces the cover of the November 2003 issue (v. 115, no. 11) of the *Geological Society of America Bulletin*, more commonly known as the *GSA Bulletin*. Nice job, **Tom!**

Here is the photograph's caption, reprinted from *GSA Bulletin*: This photograph was taken approximately 10 m (33 ft) below the surface off Umipaa, south-central Molokai, Hawaii. This photograph, taken facing north and onshore, shows the bifurcation of one coral "spur" into two coral "spurs" and the intervening sand-filled "groove," more commonly known as spur-and-groove structures. The smaller piece of coral in the center of the photograph demonstrates one mechanism for coral-reef growth—break-

age and seeding. Pieces of corals often break off the reef and fall into the surrounding sea floor, providing hard substrate where the surviving coral or new coral recruits can grow. Continued lateral and vertical growth might cause this piece of coral to merge with the nearby spur in the future, further expanding the spur's size. Also notice the shore-parallel wave-orbital ripples on the sea floor that cross the lower part of the photograph, demonstrating how these shore-normal spur-and-groove structures typically grow out into the dominant wave field. See related article by **Storlazzi et al.** (v. 115, no. 11, p. 1344-1355). Photograph by **Thomas E. Reiss**. ✿



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