

Fieldwork

California Sea Otters: Population Recovery Continues at Slower Rate

By **Tim Tinker, Brian Hatfield, and Gloria Maender**

The southern sea otter of California, a threatened population on the Endangered Species list, continues to recover, but its rate of recovery appears to have slowed.

U.S. Geological Survey (USGS) scientists say that the latest 3-year average—the average of the totals from the spring counts of 2006, 2007, and 2008 (2,826 sea otters)—is 0.3 percent higher than last year’s 3-year average, representing a slower rate of increase than they have seen in recent years. Scientists use 3-year running averages of spring-census totals to assess population trends because these averages are more reliable than individual year totals.

For southern sea otters to be considered for delisting, the 3-year running averages would have to exceed 3,090 for 3 continuous years, according to the U.S. Fish and Wildlife Service’s Southern Sea Otter Recovery Plan. Differences in weather conditions, otter distribution, and other factors contribute to the year-to-year variance in survey numbers.

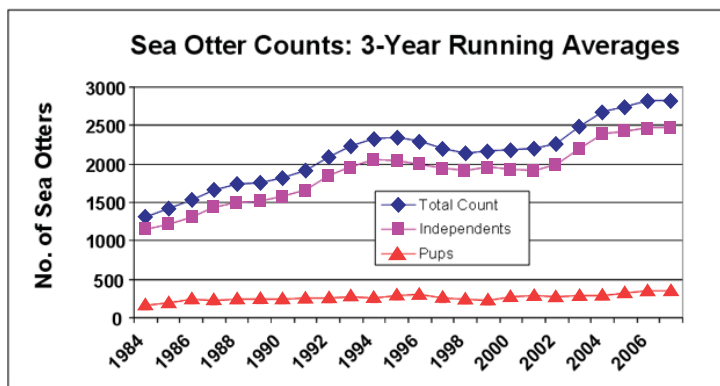
During the 2008 census, observers counted 2,760 California sea otters, 8.8 percent fewer than the 2007 spring census of 3,026. “Because of the inherent variability in the surveys, the lower count this spring is not alarming to me. But what does raise an eyebrow is the leveling off of the 3-year average,” said survey organizer **Brian Hatfield**, a USGS biologist in California. “As usual, the next spring sea-otter survey or two will tell us more about the current population trend.”

“The population dynamics are actually quite variable across the range,” said **Tim Tinker**, lead scientist for the USGS sea-otter-research program in California. “Over the past 5 years we have seen relatively high growth rates at the south end

(Sea Otters continued on page 2)



How many sea otters are floating among the bull kelp (*Nereocystis leutkeana*) in this photograph taken through a spotting scope by **Brian Hatfield** during a southern-sea-otter survey? View the answer at URL <http://www.werc.usgs.gov/otters/find-the-otters.htm>.



Number of southern sea otters counted during spring range-wide censuses, plotted as 3-year running averages. For example, values for 2007 are averages of the 2006, 2007, and 2008 counts.

Sound Waves

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Deadline: The deadline for news items and publication lists for the December issue of *Sound Waves* is Tuesday, October 14.

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

Fieldwork, continued

(*Sea Otters continued from page 1*)

of the range, and to a lesser extent at the northern-range periphery, but we have seen very low or negative growth in the central part of the range, where sea-otter densities are highest and where most of the reproduction occurs.”

“This year’s census results highlight the need for continued attention to the recovery of this threatened subspecies, and the importance of targeted research and recovery actions,” added **Tinker**. Ongoing collection and analysis of demographic data by USGS scientists are aimed at understanding the underlying reasons for the sluggish rate of recovery and variable population trends.

Some of the variation in numbers at smaller scales reflects movements of animals between areas, especially males. For example, counts were lower this year in Estero Bay but higher between Pismo Beach and Point Sal. USGS studies of radio-tagged animals have shown that males frequently make long-distance movements between sandy embayments, such as Estero Bay, Pismo Beach, and Monterey Bay. Additionally, the population distribution has expanded farther to the north and south and now stretches from the mouth of Tunitas Creek in San Mateo County southward to Coal Oil Point in Santa Barbara County. The rate of expansion at the south end of the range continues to outstrip the northward range expansion.

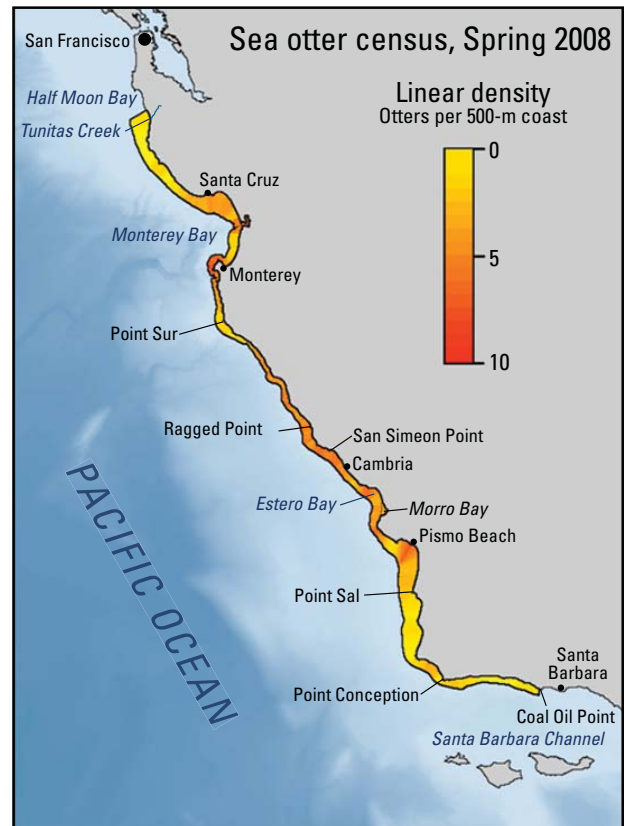
“Range expansion is clearly important for population growth and recovery,” said **Lilian**

Sketch map of California coast, showing spatial variation in population density of sea otters. Local densities were calculated as 3-year average number of sea otters counted at each 500-m interval of coast, smoothed by averaging over 10 km of coastline.

Carswell of the U.S. Fish and Wildlife Service (USFWS), “and it can also give us insight into how sea otters benefit from or are harmed by environmental factors that differ from those at the center of the range. Comparative studies between these areas can yield information on the dynamics that are affecting population growth and point to needed management actions.”

The spring 2008 California sea-otter survey was conducted May 2-24 over about 375 miles of California coast. The census results provide counts used to evaluate trends and are not absolute population estimates. The census is a cooperative effort by the USGS, the California Department of Fish and Game’s Marine Wildlife Veterinary Care and Research Center, the Monterey Bay Aquarium, and many experienced and dedicated volunteers. The information gathered from spring surveys is used by Federal and State wildlife agencies in making decisions about the management of this small sea mammal.

(*Sea Otters continued on page 3*)



Fieldwork, continued

(Sea Otters continued from page 2)

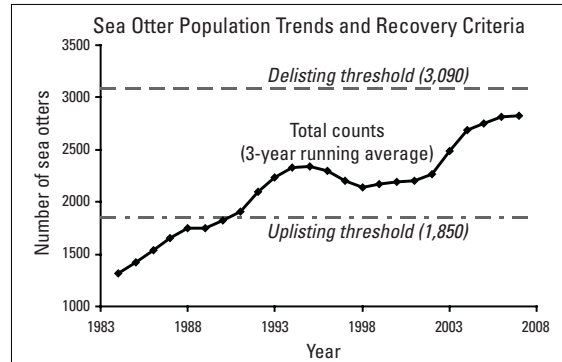
For additional graphics and more detailed information about the 2008 sea-otter survey, visit URL <http://www.werc.usgs.gov/otters/ca-surveyspr2008.htm>. For general information about USGS sea-otter studies and links to online resources, including video footage of southern sea otters, visit URL <http://www.werc.usgs.gov/otters/>.

In recognition of Sea Otter Awareness Week (September 21-27; see URL <http://www.defenders.org/seaotter/awareness/>), a series of podcast interviews with **Tim Tinker** will be posted at the USGS Core-Cast Web site (URL <http://www.usgs.gov/corecast/>) beginning September 22, 2008,

and **Tinker** will give a public lecture on sea otters at the Monterey Bay Aquarium Research Institute in Moss Landing, Cali-

fornia, at 7 p.m. on Wednesday, September 24. (See “Sea Otters Take Center Stage in September,” this issue.)

Population trends and recovery criteria for the southern sea otter in California—a threatened population on the Endangered Species list. For southern sea otters to be considered for delisting, the 3-year running averages would have to exceed 3,090 for 3 consecutive years.



Scientists Map Unexplored Arctic Sea Floor

By Jessica Robertson, Debbie Hutchinson, and Jonathan Childs

Scientists from the U.S. Geological Survey (USGS) and Natural Resources Canada (NRC) are mapping the sea floor in the Arctic Ocean, one of the least explored ocean regions. This research will shed light on the Arctic’s geologic history and help define the limits of the U.S. and Canadian extended continental shelf—the part of the continental shelf beyond 200 nautical miles, where coastal nations have certain sovereign rights over natural resources on and beneath the seabed.

Two cruises underway in August and September are using the U.S. Coast Guard Cutter *Healy*, a polar icebreaker with state-of-the-art research capabilities, to explore continental shelf areas and deep ocean basins in the Arctic Ocean. During the first cruise, August 14 to September 5, scientists on *Healy* employed a sophisticated echosounder to measure sea-floor depths (bathymetry) in an Arctic area known as the Chukchi Cap. During the second cruise, September 6 to October 1, *Healy* will be joined by the Canadian Coast Guard Ship *Louis S. St-Laurent* (*Louis*). *Healy* will collect more bathymetric data, while *Louis* collects seismic-reflection data to map the geology of the subseabed. The ships will take turns leading and breaking ice to maximize the quality of the data each collects.



U.S. Coast Guard Cutter Healy. To view regular updates from Healy during its September cruise in the Arctic Ocean, visit URL <http://www.usgs.gov/journals/arctic/>.

“September’s two-ship experiment will allow both the U.S. and Canada to collect and share complementary data in areas where data acquisition is costly, logistically difficult, and sometimes dangerous,” said USGS scientist and project leader **Debbie Hutchinson**, who has been aboard *Louis* since it left port in late August.

“Both countries benefit through sharing of resources and data, as well as increasing the likelihood of success by using two icebreakers in these remote areas of the Arctic Ocean.”

“*Healy* uses a multibeam bathymetry system to map the sea floor,” said USGS

(Arctic Sea Floor continued on page 4)

Fieldwork, continued

(Arctic Sea Floor continued from page 3)

scientist **Jonathan Childs**, chief scientist on *Healy* during the September cruise.

“Unlike conventional echosounders, which measure the water depth of a point directly beneath the ship, the multibeam system collects a ‘swath’ of depth information about 3 km wide along the ship’s path. When the swaths are merged, they create a three-dimensional view—much like an aerial photograph—of the sea floor.” Although its extensive continental shelves make the Arctic Ocean one of the shallowest ocean regions, with an average depth of approximately 1,200 m (4,000 ft), the water depths in the central Arctic Ocean are almost 4,000 m (more than 13,000 ft).

Data collected aboard *Louis* by scientists with the Geological Survey of Canada, a part of NRC, will be the first modern seismic-reflection data collected in the Beaufort Sea at these latitudes (76° to more than 80° N., depending on ice conditions).

Scientific staff on *Healy* will include not only USGS geologists and geophysicists but also ice researchers measuring and analyzing sea-ice conditions, biologists studying Arctic phytoplankton, and marine-mammal observers monitoring and reporting on the occurrence and behavior of polar bears, seals, walruses, and other Arctic mammals. During the cruise, USGS staff on *Healy* will send updates about their activities and observations—including written descriptions, photographs, audio interviews, and video footage—to the USGS Web site “Arctic Chronicles” at URL <http://www.usgs.gov/journals/arctic/>.

This research program is being conducted in collaboration with the National Oceanographic and Atmospheric Administration (NOAA) and University of New Hampshire’s Joint Hydrographic Center (URL <http://ccom.unh.edu/>), which led the August 14-September 5 cruise. The Arctic research is coordinated by the Extended Continental Shelf Task Force, a government-wide group headed by the U.S. Department of State, whose members include the USGS, NOAA, the Minerals Management Service, the Executive Office of the President, the Joint Chiefs of Staff, the U.S. Navy, the U.S. Coast Guard, the



View from Healy's Webcam (URL <http://mgds.ldeo.columbia.edu/healy/photos/aloftcon/2008/>) on September 8, 2008, at approximately 16:00 GMT (8:00 a.m. Alaska daylight time).

Department of Energy, the National Science Foundation, the Environmental Protection Agency, and the Arctic Research Commission.

Summer 2008 is the fourth summer that the United States has collected data in the Arctic in support of defining the limits of its extended continental shelf, where the United Nations Convention on the Law of the Sea allows coastal nations

to exercise certain sovereign rights. The data, most of which will be released to the public, will also provide greater scientific insight into relatively unexplored regions of the ocean. Learn more about this multiyear effort at URL <http://www.state.gov/g/oes/continentalsshelf/>. Additional information about the September cruise is posted at URL <http://walrus.wr.usgs.gov/news/lawofthesea/>. ❄



Canadian Coast Guard Ship Louis S. St-Laurent. Photograph courtesy of Canadian Coast Guard.

Tribal Canoes Towing Underwater Probes in the Salish Sea Attract Widespread Interest, Gather Valuable Water-Quality Data

By Helen Gibbons

The canoes carried paddlers young and old, novice and expert, members of indigenous peoples living all around the Salish Sea—the inland waters of Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca. Some had enjoyed relatively smooth travel; others had faced strong winds and waves. Some had been on the water as much as 2 weeks before they landed at Cowichan Bay on Vancouver Island, British Columbia, Canada, the destination of this summer’s Tribal Journey—an annual canoe voyage honoring the centuries-old customs of transport, harvest, and trade by the Coast Salish people.

More than 100 canoes took part in the July 2008 voyage, launching from various points around the Salish Sea and beyond. In a first for the Tribal Journey, five of the canoes towed underwater probes that collected scientific data on water quality—part of a collaborative effort with the U.S. Geological Survey (USGS) to better understand how the Salish Sea is responding to pollution, urban growth, and climate change (see article in *Sound Waves*, May 2008, URL <http://soundwaves.usgs.gov/2008/05/>). The probes, towed 1 to 2 ft beneath the water surface, measured such parameters as water temperature, salinity, pH, dissolved oxygen, and turbidity. The data were collected every 10 seconds, transmitted to a data logger onboard the canoe, and tagged with latitude and longitude automatically recorded from a Global Positioning System



(Left to right) **Eric Day**, Swinomish canoe skipper; **Brian Cladoosby**, chairman of the Swinomish Indian Tribal Community; **Bob Doyle**, USGS deputy director; and **Eric Grossman**, USGS scientist, at a July 21, 2008, news conference in the Swinomish Indian Tribal Community’s Administration Building.

(GPS) unit. At the end of each day, the data were downloaded, given preliminary screening for quality control, and published in near-real time on the USGS Web site “A Blending of Science and Tradition” (URL <http://www.usgs.gov/coastsalish/>). Visitors to this site can access the water-quality data by way of a Google map overlain with the tracks of the canoes as they made measurements (go to “Maps—Follow the Journey” and click on “Daily Updates of the Journey”). Clicking on track segments (or on links listed below the master map) leads to more detailed maps that show every point where data were collected by a particular canoe on a particular day; clicking on a data-collection point opens a window listing the time, latitude, and longitude of the measurement and the recorded data.

Collection of water-quality data during the Tribal Journey was supported through

the Swinomish Indian Tribal Community, the Northwest Straits Commission, the USGS, and the Potlatch Fund. The project was coordinated by **Sarah Akin**, a scientist with the Swinomish Indian Tribal Community. USGS scientists **Eric Grossman** and **Paul Schuster** were invited by the Coast Salish to serve as science advisors in planning and conducting the study and analyzing the data. Participants in the collaboration were astounded by the magnitude of

(*Salish Sea continued on page 6*)



USGS scientist **Eric Grossman** demonstrates a water-quality probe during an interview with KOMO-TV (ABC, Seattle) at the Swinomish Tribal Community Center near La Conner, Washington, on July 21, 2008.



Skipper and crew of the Grande Ronde Chinook canoe family prepare to leave from the beach at the Swinomish Tribal Community Center on July 22, 2008.

Fieldwork, continued



Screen shot of Google map (with additional labels in white) showing tracks of canoes (yellow) as they collected water-quality data in the Salish Sea in July 2008 (from URL <http://wa.water.usgs.gov/projects/coastsalish/>). White star, Tribal Journey landing point at Cowichan Bay.

(Salish Sea continued from page 5)

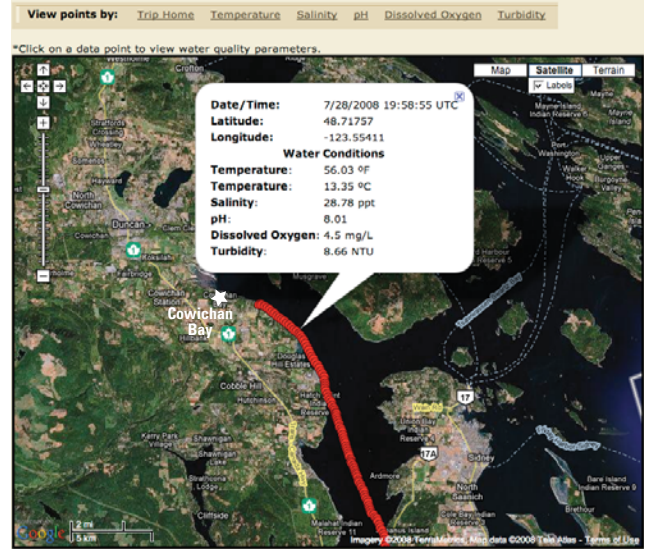
media interest, which resulted in television coverage, radio interviews, and articles in numerous print and online publications in the United States, Canada, and the United Kingdom.

This summer's Tribal Journey—and the concurrent collection of Salish Sea water-quality data—ended on Landing Day, July 28, at Cowichan Bay, where the assembled groups celebrated their gather-



Landing Day (July 28) at Cowichan Bay. Arriving canoe families maneuver their vessels into a tight array of canoes facing the shore, while supporters welcome them with drumming, chanting, and cheers. View a short video clip at URL <http://soundwaves.usgs.gov/2008/09/fieldwork3.html>. Longer videos—with narration, interviews, and music—are posted at URL <http://www.usgs.gov/coastsalish/>.

Squaxin Island Trip - Day 9



Detailed map of Saanich Inlet, showing points where water-quality data were collected on July 28, 2008. Clicking on a point opens a window displaying time, latitude, and longitude of the measurement and the recorded data. Time of data collection reported in Universal Time Coordinated (UTC), 7 hours later than Pacific daylight time.

ing and went on to hold the North American Indigenous Games (August 3-10; URL <http://www.cowichan2008.com/>). The GPS units and water-quality sensors have been retrieved and returned to the offices that maintain them. In the coming months, the participating scientists will examine the water-quality data more thoroughly to produce maps, geographic-information-system (GIS) data layers, and a report on the results. These products, in turn,

will be used to identify important water-quality issues and design future studies in the Salish Sea.

For more information about the 2008 Tribal Journey, visit URL <http://www.tribaljournies2008.com/>. For more information about the USGS/Tribal Journey collaboration—including links to the water-quality data, maps, audio and video podcasts, photographs, and background articles—visit the USGS Web site “A Blending of Science and Tradition” at URL <http://www.usgs.gov/coastsalish/>.



Reaching Teachers: A Critical Link in Raising Awareness of Water-Resource Issues

By Matt Cimitile

Since 2005, the U.S. Geological Survey (USGS) and the American Ground Water Trust (AGWT) have partnered to advance public understanding of water-resource issues through a nationwide “Ground Water Institute for Teachers” program. The program’s objective is to educate teachers on the environmental and economic importance of ground water so that they can feel more comfortable teaching ground-water issues to their classes. The AGWT began this program in 2000, introducing ground-water concepts, current research techniques, and resource-management issues to hundreds of teachers at institutes nationwide. Even before the formal partnership with the USGS, AGWT executive director **Andrew Stone** enlisted USGS experts to participate in many of the institutes. This year, the Southwest Florida Water Management District (SWFWMD) sponsored four workshops throughout west-central Florida. USGS scientists **Dale Griffin** and **Ann Tihansky** shared their expertise on karst hydrology and threats to water quality in karst regions. Representatives from the Florida Geological Survey, **Tom Scott**, **Harley Means**, **Tom Greenhalgh**, and **Clint Kromhout**, each attended an institute and shared their expert knowledge of Florida’s geologic origins, as well as providing educational resources specific to Florida geology (for more information, see URL <http://www.dep.state.fl.us/geology/>).

The four institute workshops held this year focused on freshwater-resource is-



Ann Tihansky (USGS) introduces **Thomas Scott**, Florida Assistant State Geologist, before he gives a quick overview of the geologic exposures that teachers will see on their canoe trip along the Peace River.

A sunny morning greets the flotilla of teachers as they begin their canoe trip, keeping their eyes out for interesting geology, wildlife, and fossils.



sues critical to the west-central Florida area. In Crystal River, the program focused on karst hydrology and aquifer vulnerability. In Sarasota, the major topics were urban runoff and understanding of ground-water basics. In Arcadia, the teachers canoed a stretch of the Peace River, hunted for fossils, and gained a wider perspective on the geologic history of the river’s water-

*USGS hydrologist and science communicator **Ann Tihansky** shows eager science teachers how to identify fossils and bits of phosphate that make up a substantial portion of the gravel deposits along the Peace River in Florida. Phosphate mining is an important economic industry throughout the watershed.*



shed and the larger role the watershed plays as a water-supply source, not just to humans but also to the entire ecosystem downstream. Both the Tampa and Arcadia workshops focused on watershed management for sustainable water supplies. Both programs looked at how water-resource managers balance ground- and surface-water supplies with urbanization and land-use changes. “The quality instruction provided through lectures enhanced hands-on activities and sparked many ideas for interdisciplinary lessons,” said **Shelly Archambault**, science teacher at Winter Haven High School. Language arts and science teacher **Angela Hemstreet** of Genesis Christian School added: “The pure education and awareness that were given increased my personal interest in water resources. It was a spark.”

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Outreach, continued

(Ground Water Institute continued from page 7)

At the Peace River workshop in Arcadia, **Stone** spoke to a roomful of elementary-, middle-, and high-school science teachers and emphasized the importance of hands-on education for young minds. “You as experts can understand the kind of implications there are in taking students out of the classroom and having them participate in stimulating activities related to water resources and land use,” said **Stone**. Combining science with creativity, teachers explored the surrounding area outside the classroom and traced the journey of a raindrop from the clouds to the land and back to the air as it traveled through soil, storm drains, aquifers, and the digestive tracts of animals and people in a journey of condensation, precipitation, and evaporation. Such activities raise awareness about the manmade obstacles between rainfall and the aquifer recharge of natural systems and highlight issues related to water-resource management.

Only 1 percent of the world’s water is freshwater that is accessible to people and animals. Part of this freshwater comes from surface water that collects in streams, ponds, and rivers; the rest comes from rain and melted snow that seeps through the ground into aquifers. Construction, paving, and many other land-use practices disrupt natural ground-water recharge. Overuse of ground water by a growing population has depleted aquifers to the extent that the natural rate of water recharge from rain and snow has been unable to replace what has been removed. In coastal areas, ground-water withdrawals reduce freshwater flow in aquifers, which can result in saltwater intrusion,



After learning about runoff and retention basins, AGWT executive director **Andrew Stone** (left) and teachers explore a real parking-runoff-retention system and discover firsthand the many pathways a raindrop can travel in one of numerous hands-on activities during the 3-day workshop in Arcadia, Florida.

the process by which saltwater seeps into freshwater aquifers. “If we can provide guidance to teachers about these issues and make them aware, then children can form sustainable lifelong habits when it comes to water resources,” said **Garret Graaskamp** of the AWGT.

With the continuing worldwide population-growth rate of 80 million people per year, an estimated 3.3 billion people could face water scarcity by 2025. That’s more than a third of the human population. The challenge posed by water scarcity is generating new ideas about ways to provide drinking water to human populations. “We must utilize and blend different water sources,” said **Greg Young**, a hydrogeologist with consulting firm MWH Americas, “from fresh ground and surface water to storing excess water when it is seasonally available to producing water with desalination plants.” Greater conservation and stricter water laws will also help reduce

the pressure on water resources. Using low-flow fixtures, taking shorter showers, fixing leaky faucets, and following landscape and sprinkler regulations will reduce waste and overconsumption. In the near future, water prices will likely rise. “The reality is, water is too cheap,” said **Stone**. “The average family spends \$740 a year on soda but only \$474 a year on water and wastewater services.”

By participating in this nationwide program, USGS scientists come into closer contact with communities, educators, and other professionals. Besides threats from urbanization and population growth, Florida communities need to understand additional threats to water supplies posed by changing climate patterns and rising sea level. Teachers play a crucial role in educating the general public. “The understanding and differentiation of ground water and watersheds helped me to better understand it myself,” said **Charlene Vaughn**, life-science teacher at Stambaugh Middle School. “If I don’t really understand it, then how can I possibly explain the concepts to my students?”

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



Adding water drops to sand, clay, and sugar cubes illustrates important differences among porosity, permeability, and soluble and insoluble materials—a water-resource-related lesson that teachers can use with their students.

Sea Otters Take Center Stage in September, Feature in USGS Podcasts and Public Lecture During Sea Otter Awareness Week

By Paul Laustsen

It's not difficult to understand why people fall in love with California sea otters: their playful spirit and graceful aquatic maneuvering attract onlookers in droves. In August, the furry little creatures received a boost from the California State Legislature, which made a unanimous decision to declare the last week of September as Sea Otter Awareness Week throughout California.

To help celebrate the California sea otter and bring more attention to the issues surrounding its ongoing recovery from near extinction, lead sea-otter researcher **Tim Tinker** of the U.S. Geological Survey (USGS) will be interviewed for a series of podcasts to air during Sea Otter Awareness Week (September 21-27). Among the topics of discussion will be the findings of the spring 2008 census of southern sea otters (see "California Sea Otters: Population Recovery Continues at Slower Rate," this issue).

The first of the Sea Otter Awareness Week podcasts will be released September 22 on the USGS CoreCast Web site at URL <http://www.usgs.gov/corecast/>, where you can also find more than 60 other podcasts about USGS science. You can even subscribe to receive e-mails when new CoreCasts are released, or automatically download them using iTunes.



Tim Tinker hauls in a freshly caught sea otter off Cypress Point, south of Monterey Bay on the central California coast, April 3, 2008. The otter was examined, radio-tagged, and released as part of ongoing USGS studies of southern sea otters (see URL <http://www.werc.usgs.gov/otters/>). Listen to USGS CoreCast interviews with **Tim Tinker** at URL <http://www.usgs.gov/corecast/>. Photograph by **Tom Suchanek**, USGS.

In addition to the USGS CoreCasts, **Tinker** will give a lecture on "What We Have Learned from Spying on Sea Otters: How Scientists Use Behavioral Studies to Provide Insights into Population Status, Disease Dynamics, Food-Web Interactions, and Ecosystem Shifts" at the Monterey Bay Aquarium Research Institute in Moss Landing, California, at 7 p.m. on Wednesday, September 24. To learn more about the lecture, visit URL http://www.defenders.org/take_action/upcoming_events/ and scroll down to click on the link "Sea Otter Lecture at Monterey Bay Aquarium Research Institute (CA)." For information about Sea Otter Awareness Week nationwide, visit URL <http://www.defenders.org/seaotter/awareness/>. ☼



Sea otter off Santa Cruz, California, photographed by **Paul Laustsen** on August 21, 2008.

MIT Summer Research Program Students Visit the USGS Woods Hole Science Center

By Claudia Flores

On July 12, 2008, a small group of students from the Massachusetts Institute of Technology (MIT)'s Summer Research Program (MSRP) visited the U.S. Geological Survey (USGS) in Woods Hole, Massachusetts, to get a virtual tour with the GeoWall, a stereo-projection system used to illustrate spatial data sets in 3-D. **Claudia Flores** showed the students photographs and short movies in a brief presentation on research methods used at sea around Puerto Rico by the USGS. She used the GeoWall to help them visualize the research being done in the Caribbean

and how all the research methods work together. The presentation concluded with a projection of the Dead Sea region, demonstrating the GeoWall's versatility for illustrating a wide range of spatial data. The students asked many perceptive questions and seemed eager to learn more.

(MIT continued on page 10)



Students wear 3-D glasses to view a GeoWall projection of the sea floor around Puerto Rico, while **Claudia Flores** explains the tectonics of the Caribbean region. Photograph by **Chris Polloni**.

Outreach, continued

(MIT continued from page 9)

The group that visited the USGS was part of a larger group of MSRP students who came for a 1-day tour of the research institutions in Woods Hole: the Marine Biological Laboratory, the National Oceanic and Atmospheric Administration (NOAA)'s National Marine Fisheries Service, the Sea Education Association, the USGS, the Woods Hole Oceanographic Institution, and the Woods Hole Research Center. The stu-

dents toured the facilities of the institutions and received a presentation at the end of their tour explaining the various research programs available in Woods Hole. The MSRP program provides opportunities to talented undergraduate students from underprivileged backgrounds to do summer research at MIT in either science or engineering.

USGS participants were **Claudia Flores** and **Chris Polloni**. The visit and

tour were organized by **Julia Westwater** of the WHOI Academic Programs Office and **Regina Campbell-Malone**, a WHOI postdoctoral investigator.

Information about the MIT Summer Research Program is posted at URL <http://web.mit.edu/gso/admissions/summer.html>, and information about the Woods Hole Diversity Advisory Committee at URL <http://www.woodsholediversity.org/>. ❁

Meetings

Woods Hole Science Center Hosts Panel Discussion on Diversity in the USGS Workforce

By Ben Gutierrez

A panel discussion addressing the importance of diversity in the U.S. Geological Survey (USGS) workforce was held at the USGS Woods Hole Science Center in Woods Hole, Massachusetts, on June 25, 2008. The event was organized as a part of the annual Woods Hole Diversity Week, which is sponsored by six Woods Hole science institutions: the Woods Hole Oceanographic Institution (WHOI), the Marine Biological Laboratory, the Woods Hole Research Center, the Sea Education Association, the Northeast Fisheries Science Center of the National Oceanic and Atmospheric Administration (NOAA)'s National Marine Fisheries Service, and the USGS Woods Hole Science Center. The four panelists who led the discussion were USGS managers: **Pam Malam**, associate director of the Office of Human Capital; **Suzette Kimball**, associate director of the Geology Discipline; **Rafael (Willie) Rodriguez**, director of the New York Water Science Center; and **Bill Schwab**, chief scientist of the Woods Hole Science Center.

The panel discussion focused on the need to raise awareness regarding attracting women and minorities into the USGS workforce, particularly at managerial levels. **Malam** provided an engaging and eye-opening overview of workforce trends past and present that illustrate the need for diversity in the USGS workforce. **Kimball** discussed some of her personal experiences while pursuing a career in marine geology and geophysics, where women continue to



(Right to left) **Pam Malam**, **Bill Schwab**, **Rafael (Willie) Rodriguez**, and **Suzette Kimball** (on screen) conduct a panel discussion on diversity in the USGS workforce. Photograph by **Chris Polloni**.

be underrepresented. She also emphasized the importance of active participation in recruitment and retention by all USGS employees to ensure the future of the workforce. Finally, **Rodriguez** and **Schwab** discussed efforts to identify and attract talented minority students from the City College of New York for work at the USGS; their program, now in its third year, places nearly a dozen interns annually in USGS offices in the Northeast and other parts of the country. In addition, each of the panelists provided an overview of the challenges and strategies that can be pursued to attract and retain women and minority scientists in the USGS.

This event, organized by **Ben Gutierrez** and **Claudia Flores**, was one of a

series of events for Woods Hole Diversity Week 2008. Events hosted by the other institutions had similar goals in stressing the importance of a diverse community in Woods Hole. The now-annual Woods Hole Diversity Celebrations started in response to the creation of the Woods Hole Diversity Initiative in 2004. This initiative brings together the six Woods Hole science institutions to create "pathways of opportunity" that will attract people from underrepresented groups to the Woods Hole science community and science in general. More information about the Woods Hole Diversity Advisory Committee is posted at URL <http://www.woodsholediversity.org/>. ❁

USGS Emeritus Scientist Keith Kvenvolden Honored at International Conference on Gas Hydrates

U.S. Geological Survey (USGS) Emeritus Scientist **Keith Kvenvolden** received a Lifetime Achievement Award at the 6th International Conference on Gas Hydrates (ICGH) held in Vancouver, British Columbia, Canada, from July 6 to 10, 2008. Also present were numerous scientists from USGS programs in Coastal and Marine Geology, Energy Resources, and Earthquake Hazards who gave presentations at the conference and shared in the celebration of **Kvenvolden's** award.

The citation reads: "The Sixth International Conference on Gas Hydrates 2008 recognizes **Dr. Keith A. Kvenvolden** for his contributions to the study of marine gas hydrates. His work on the organic geochemistry of gas-hydrate systems throughout the world set the foundation for our understanding of the role gas hydrates play in the Earth's natural system."

A second Lifetime Achievement Award was given to **Professor Yuri Makogon** of Texas A&M University for his pioneering work on permafrost-associated gas hydrates.

The ICGH (URL <http://www.icgh.org/>) met for the first time in New York State in 1993 and has since met at various places throughout the world at 3-year intervals. The 6th ICGH was convened in Vancouver, British Columbia, Canada, in 2008. Lifetime Achievement Awards were presented for the first time at this most recent conference. The actual awards are unique in that they are small woodcarvings by a member of the Musqueam Indian Band, one of the groups of indigenous people in British Columbia. The 6th ICGH opened with a ceremony by representatives of the Squamish Nation, another indigenous group, in which a "Talking Stick" (a long—approx 4 ft—woodcarving of various animals signifying human attributes) was presented to the conference cochairmen. The Lifetime Achievement Awards presented at the conference are small versions of the Talking Stick, depicting a raven, the spirit symbol of knowledge and intelligence.



*USGS Emeritus Scientist **Keith Kvenvolden** holds the "Talking Stick" given to him as part of the Lifetime Achievement Award he received at the 6th International Conference on Gas Hydrates (July 2008) for his contributions to the study of marine gas hydrates.*



***Kvenvolden's** award is a small version of Talking Sticks used by West Coast Natives for thousands of years as a symbol of speaking authority and respect for communication during ceremonial gatherings. Talking Sticks are typically about 4 ft long and carved with various animals and mystical family crests signifying human attributes. **Kvenvolden's** award, carved by Musqueam artist **Joe Becker**, depicts a raven, the spirit symbol of knowledge and intelligence.*

Kvenvolden joined the USGS Pacific-Arctic Branch of Marine Geology (now the Western Coastal and Marine Geology Team) in 1975. In 1979, he was designing a program for using organic geochemistry to evaluate the petroleum potential of the outer continental margins of the United States, and he and his collaborators began exploring for methane seeps as a means of identifying possible petroleum occurrences. At the time, **Kvenvolden** was also working with **Mark McMenam**, a graduate student from the University of California, Santa Barbara, on a problem involving geochemical geochronology. **Kvenvolden**

told **McMenamin** that he had seen some literature references to a substance called methane hydrate and asked him to investigate it. **McMenamin** quickly gathered enough information for the two of them to write a report titled "Hydrates of Natural Gas: A Review of Their Geologic Occurrence," which was published as USGS Circular 825 (URL <http://pubs.er.usgs.gov/usgps/cir/cir825>). Their report established the importance of methane hydrate in marine sediment and essentially defined the geochemical program in methane hydrate that has been sustained at the USGS for almost 30 years. ❁

USGS Creates Fleet of Community-Use “Recyclabikes”

By Matthew Cimitile

With no end in sight to rising gasoline prices, employees at the U.S. Geological Survey (USGS) Florida Integrated Science Center office in St. Petersburg, Florida, have established a fleet of bicycles for local use, to help save money and ease parking frustrations. On June 9, USGS employees **Adam Brame**, **Chris Dufore**, and **Jordan Sanford** set out on the inaugural ride of USGS community-use “Recyclabikes” during a trip for lunch in downtown St. Petersburg.

Situated in the heart of downtown St. Petersburg, the USGS science center is surrounded by culturally rich museums, academic institutions, and various restaurants; however, most sites and attractions seem to be just out of walking reach during the lunch hour. With community bicycles available, employees can enjoy the convenience of traveling to their destination in a short time, while avoiding the hassles and expenses of driving and parking.

The idea for USGS community bikes began in Massachusetts. “While visiting the USGS office in Woods Hole, I observed that community bikes were offered to employees to travel locally,” said **Victor Levesque**, a hydrologist with the USGS Tampa and Ft. Myers offices. “So, while walking around the downtown area [St. Petersburg], I thought it would be cool to have a pool of community bikes to help USGS people here get around locally.”



(Left to right) **Ann Tihansky**, student intern (Eckerd College) **Mark Squitieri**, research assistants **Chris Dufore** and **Jordan Sanford**, and fisheries biotechnician **Adam Brame** with two newly designated USGS community-use “Recyclabikes.” Photograph by **Matt Cimitile**.

Shortly thereafter, **Levesque** stumbled upon several unused bikes that were collecting dust in the St. Petersburg center’s stairwell. “Two belonged to **Terry Kelley**, USGS marine operations manager, who donated them for the purpose of providing an alternative mode of transportation,” said **Levesque**. After some critical maintenance, such as the installation of new tires, tubes, and chain grease, the bikes were ready for employees’ general use. “It takes more time to drive somewhere

downtown and find a place to park than it does to just hop on a bike and ride there,” said **Sanford**, a USGS research assistant. **Sanford**, who recently donated his car to charity and depends on his bicycle for transportation, thinks the community-bike idea is fantastic.

Two bicycles adorned with green-and-white USGS stickers are part of the center’s fleet of community-use Recyclabikes. Upgrades and improvements, such as baskets, will provide more convenience as employees use them to go out for lunch, run errands, attend meetings at nearby institutions, or simply explore. Another benefit is healthy exercise! “There are so many great places in the St. Petersburg area, and it’s good to have these community bikes to enjoy the city,” said **Levesque**.

Levesque and **Sanford** hope that more bicycles will become available and generate greater usage. “We already have a pretty good contingent of people cycling to work every day,” said **Sanford**. “It will be great for people to have the option of riding a bike instead of driving their cars, especially for short trips to grab lunch, get to the post office, or attend a lecture at the USF campus next door.”

(Community Bikes continued on page 13)



*USGS Recyclabikes—donated and maintained by employees at no cost to the Government—are an easy way to get from the USGS office to other destinations in downtown St. Petersburg. Here, journalism student **Matt Cimitile**, working for the summer with the USGS, and **Penny Hall**, a scientist with the Florida Fish and Wildlife Research Institute, keep an eye on the bikes while enjoying lunch. Photograph by **Ann Tihansky**.*

(Community Bikes continued from page 12)

With beautiful weather year round, the coast just a short journey away, and an expanding network of public bike lanes, St. Petersburg is a place where bicycling is not only practical but also pleasant. More people are recognizing the advantages of riding a bike as an alternative to driving a car.

“With the growing popularity of bicycles, especially in this community, we are working to organize a ‘Ride to Work Day’ for employees working within the C.W. Bill Young Marine Science Complex

in St. Petersburg,” said **Ann Tihansky**, a USGS hydrologist who works in science communications. “Scientists are aware of many environmental issues associated with urban environments. I think we could use our community bike fleet to raise awareness and get even more people riding.”

In a culturally rich, socially aware city, the USGS hopes to be a community leader in promoting activities that are helpful and healthful for both people and the environment. But don’t forget to Be Safe—wear

your helmet when taking a Recyclabike out for a spin!

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

USGS Woods Hole Science Center Welcomes Cheryl Hapke

By Chris Polloni

The U.S. Geological Survey (USGS)’s Woods Hole Science Center is pleased to welcome USGS scientist **Cheryl J. Hapke**, who has changed her duty station from the University of Rhode Island (URI), Kingston, to Woods Hole, Massachusetts. **Hapke** is attached to the USGS’ Patuxent Wildlife Research Center (PWRC). Before joining PWRC in 2005, **Hapke** was with the USGS Western Coastal and Marine Geology Team in Santa Cruz, California, where her research focused on coastal landslides and other coastal-erosion hazards. **Hapke’s** specialty is coastal geology, and she will continue to work in cooperation with the National Park Service (NPS) on coastal issues. She

is also a partner with the North Atlantic Coast Cooperative Ecosystem Studies Unit (CESU), one of a network of 18 CESUs established to provide research, technical assistance, and education to resource and environmental managers (URL <http://www.cesu.psu.edu/>).

The collaborative North Atlantic Coast CESU partnership was recognized at the Biennial National Meeting of the CESU Network held June 2008 in Washington, D.C., where the North Atlantic Coast CESU received a distinguished CESU Network National Award for demonstrating collaboration among Federal agencies and academic partners toward the accomplishment of outstanding science, technical assistance, and graduate education to support natural-resource decision making. **Hapke** was identified as one of the team leaders in this effort, and **Bill Schwab** and **Jeff Williams** of the USGS Woods Hole Science Center were included among the supporting scientists. To learn more about the CESU National Awards,



(Left to right) **Hapke’s** graduate students **Meredithe Kratzmann** (in red) and **Erika Lentz**, and research associate **Mike Bradley**, all of the University of Rhode Island, conducting beach and dune surveys at Fire Island National Seashore. Photograph by **Cheryl Hapke**, USGS.



Hapke collecting real-time kinematic (RTK) global-positioning-system (GPS) beach profiles at Fire Island National Seashore as part of a topographic study of the beach and dune. Data have been collected seasonally in late March and late September for the past 3 years; data collection will continue for at least 2 more years. The NPS Northeast Regional Office in Boston is currently funding this research. Photograph by **Mike Bradley**, University of Rhode Island.

which were established in 2003, visit URL http://www.cesu.psu.edu/news/2008_meeting.htm#awards.

Hapke, USGS civil engineer **John Warner**, and **Schwab** are currently developing a collaborative program with the U.S. Army Corps of Engineers and the NPS to create a more quantitative understanding of the processes controlling the coastal-sediment budget along the Fire Island National Seashore on southern Long Island, New York. **Hapke** will also continue to work with USGS scientists **Rob Thieler** and **Emily Himmelstoss** on the National Assessment of Coastal Change Hazards project. ☼

USGS Scientists Contribute to *Coral Reefs of the USA*

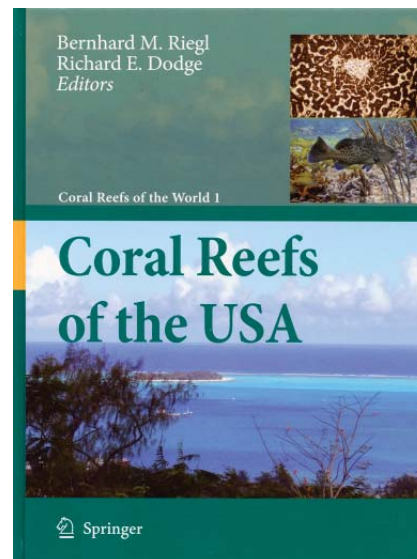
By Barbara Lidz and Caroline Rogers

Coral-reef biologists, ecologists, and geologists from the U.S. Geological Survey (USGS) and numerous other organizations have made significant contributions to a comprehensive new book, *Coral Reefs of the USA*. Edited by **Bernhard M. Riegl** and **Richard E. Dodge** of the National Coral Reef Institute, which operates at the Nova Southeastern University Oceanographic Center in Dania Beach, Florida, the book is the first volume in a series titled *Coral Reefs of the World*. Published in March 2008 by Springer Science+Business Media in Berlin, the book was showcased in July to more than 3,500 registered attendees at the 11th International Coral Reef Symposium held in Fort Lauderdale, Florida. A scholarly overview of what is known about coral reefs in U.S. territorial waters, the book is rich in both color and cultural history, as well as scientific aspects of the various reef types, their geomorphic and oceanographic characteristics, and their inhabitants.

USGS researchers are lead authors on 3 of the 21 chapters: **Charles Birkeland** (Hawai'i Cooperative Fishery Research Unit, University of Hawai'i), **Barbara H. Lidz** (Florida Integrated Science Center, St. Petersburg, Florida), and **Caroline S. Rogers** (Caribbean Field Station, St. John, U.S. Virgin Islands). USGS coauthors are

Eric E. Grossman (Pacific Science Center, Santa Cruz, California), **Ilsa B. Kuffner** (Florida Integrated Science Center, St. Petersburg, Florida), and **William Bane Schill** (National Fish Health Research Laboratory, Kearneysville, West Virginia). Former USGS researchers are also coauthors: **Kate T. Ciembronowicz**, **Robert B. Halley**, **J. Harold Hudson**, **Erinn Muller**, **Daniel M. Robbin**, **Eugene A. Shinn**, and **Anthony Spitzack**. Besides USGS scientists, contributors include researchers from 28 universities, the National Park Service, the National Oceanic and Atmospheric Administration, State entities, and nongovernmental organizations (NGOs).

Organization of chapters is alphabetically by ocean. First are reefs of the Atlantic Ocean (Florida; the U.S. Virgin Islands, Puerto Rico, and Navassa Island in the Caribbean; and the northern Gulf of Mexico), then the Pacific (the main Hawaiian Islands, the northwestern Hawaiian Islands, the Line and Phoenix Islands, Wake and Johnston Atolls, Guam and the Commonwealth of the Northern Mariana Islands, and American Samoa), and finally deep reefs of all oceans. Chapter titles by the lead USGS authors are "Geologic Setting and Ecological Functioning of Coral Reefs in American Samoa" (**Birkeland**), "Controls on Late Quaternary



Coral Reefs of the Florida Keys" (**Lidz**), and "Ecology of Coral Reefs in the US Virgin Islands" (**Rogers**).

The full citation of the book is: Riegl, B.M., and Dodge, R.E., eds., 2008, *Coral reefs of the USA*, v. 1 of *Coral reefs of the world*: Springer Science+Business Media, Berlin, 803 p. (See list of "Recently Published Articles" in *Sound Waves*, August 2008, for individual chapter citations.) Cover photographs from the chapters within provide examples of the rich use of color throughout the book. To learn more about the book or to order a copy (\$169), visit URL <http://www.springer.com/geosciences/book/978-1-4020-6846-1>. ❁

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