

# Seamount Census Reveals New and Poorly Known Marine Life

*Editor's Note: The following article is the second in a two-part series designed to highlight the work of VIMS researchers involved in Census of Marine Life projects. The Census of Marine Life is a 10-year international research program to assess and explain the diversity, distribution, and abundance of the world's marine organisms. The information and technologies developed through the Census will be made publicly available to strengthen management of marine ecosystems and improve public understanding of the ocean environment.*

Like anglers everywhere, Dr. Mike Vecchione knows what it feels like to snag a lure and break a line—but on a much grander scale. On a research cruise last year he lost a 60-foot bottom trawl on a seafloor snag a mile down, after only three casts.

Vecchione, a NOAA Fisheries employee, adjunct faculty at VIMS, and world expert in deep-sea squid, describes the loss with surprising equanimity. “One of the risks of deep-sea exploration is losing gear,” says Vecchione. “You just have to be willing to face that hazard.”

Vecchione lost the trawl while studying bottom-dwelling organisms on Bear Seamount, a dormant undersea volcano near Georges Bank. The seamount begins 9,000 ft beneath the waves and rises more than 6,000 ft to its flat top, which still lies more than 3,000 ft below the sea surface. It's at the inshore end of a seamount chain

that runs southeast toward Bermuda, and is distinct in that it rises out of the continental slope.

“Seamounts hold great promise for undiscovered biodiversity,” says Vecchione. “The fauna of such steep, deep bottoms is practically unknown.” One reason is the difficulty of deep-water trawling across a rough volcanic seafloor.

Even more poorly known is the ocean's mid-water fauna, the community of fishes, squid, and other organisms that hover in the water column midway between surface and seafloor.

“Bottom life is generally better known than the stuff up in the water, because it's easier to study an interface and things tend to concentrate there. We've only studied a tiny percentage of the bottom, but it's still taught us a lot more than what we know about what's in this huge volume of water below 1,000 m. That realm makes up more than 90% of the biosphere, but it's the part of the Earth that we know the least about.”

Vecchione's deep- and mid-water investigations are part of MAR-ECO, a Census of Marine Life (CoML) project to explore the poorly known ecosystems of the northern Mid-Atlantic Ridge (MAR). The seamount cruises, which also contribute to another CoML project aimed at the Gulf of Maine, are funded by NOAA's Ocean Exploration Program.

“MAR-ECO wants to compare deep-water communities on the Mid-Atlantic Ridge with similar communities elsewhere,” says Vecchione.



William and Mary graduate students Kathleen Krick, Taylor Heyl, and Jennifer Dreyer hold a chimera fish caught in a mid-water trawl above the Bear Seamount.

“Bear Seamount is associated with the continental slope, but it's depth and steepness resemble that of a ridge environment.”

Vecchione notes that the Census of Marine Life and MAR-ECO were designed to gain a basic understanding of life in the sea. “But there are applied implications to the work as well,” he adds.

“Fishing has been moving progressively into deeper water and fishing on seamounts has become a hot topic. Deep-sea fishery resources are being exploited in such areas elsewhere in the world. It thus makes sense to explore and study deepwater habitats and the distribution and biology of such animals before large-scale exploitation begins in the western North Atlantic.”

A May 2003 cruise was Vecchione's third and most recent trip to Bear Seamount. Previous trips include a 2-week summer cruise in 2002 (when he lost his bottom trawl) and a winter voyage in 2000. The recent spring cruise allowed the expedition's team to further explore how biodiversity on the seamount might change with the seasons.

“Our overall objective is to document the biodiversity of this seamount and how it might differ from the continental slope and from other seamounts,” says Vecchione. “We're also trying to look at seasonal changes in diversity, particularly among pelagic animals.” He plans a fall research cruise within the next few years.

The May cruise gave students in Vecchione's Deep Sea Biology course

at VIMS a unique opportunity to take part in oceanographic research. Student crew members were Joel Hoffman, a Ph.D. student at VIMS, and five masters students from Dr. Cindy van Dover's laboratory at William & Mary.

The group sailed from the National Marine Fisheries Service lab at Woods Hole, MA, on May 12th aboard the 155-foot, 600-ton NOAA ship *Delaware II* for a 19-hour transit to the seamount. They spent the next 10 days working around the seamount before returning to Woods Hole on May 23<sup>rd</sup>.

“It was pretty rough the first two days,” says William & Mary student Taylor Heyl, “but after that it wasn't too bad. The weather didn't cut into our sampling at all. And the food was excellent. That kept morale up.”

While onboard, the scientists kept busy during their 12-hour watches by sorting the trawl catches, recording log entries, and processing salinity, temperature, and depth data from a trawl-mounted CTD.

Heyl notes that the mid-water trawls generally went off without a hitch, but that the bottom trawling was “a little more precarious,” due to occasional snags on seamount crags. “The snags would actually pull the boat backward,” she says. To escape, the ship would have to stop, reverse course for a few hundred meters, then resume its forward motion. Fortunately, this time around the maneuver prevented the loss of any trawl gear.



Dr. Mike Vecchione and other members of the *Delaware II* crew bring in a deep-sea trawl catch.

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*Seamount*  
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“Our main goal was to explore the seamount’s biodiversity by collecting fishes and cephalopods in bottom and mid-water trawls,” says Vecchione. The researchers identified, counted, and measured the netted organisms, and sampled tissues for later DNA analysis. They also prepared voucher specimens for museum collections at the Smithsonian, Harvard, and Yale. Their deepest trawl ran to more than 6,000 feet.

In keeping with the Census of Marine Life’s goal to develop and implement new marine-science technologies, the group tested a new computer-based measuring system during the cruise. The system, which uses a magnetized ruler and a digital weight table to automatically record an

organism’s length and weight, “worked extremely well,” says Heyl.

Preliminary identifications indicate that the group collected about 200 species of fishes, more than 40 species of cephalopods, and many other invertebrate species from on or over Bear Seamount during the cruise. A more precise list will be produced once taxonomic experts complete their studies of the animals captured and compare their findings with results from previous cruises. Many of the species are extremely rare in previous collections and some specimens are the largest ever captured for their species. A newly discovered species of mid-water fish is being described from the 2002 cruise.

Both Vecchione and Heyl consider their most exciting find a cephalopod species called the ram’s horn squid. “This is a very unusual kind of deep-

sea cephalopod with an internal coiled shell,” says Vecchione. Just a few inches long, these creatures float and sink through the water column by varying the amount of gas within their shell. Detailed photo-documentation of the live animal and tissue collected for DNA analysis will be useful for figuring out the relationships of this strange little squid.

Vecchione’s team is also intrigued by an unusual biogeographic pattern that has begun to emerge after analysis of taxonomic and range data from the three cruises. “One interesting result from these studies is that a small percentage of the fauna is represented by ‘natural invader’ species,” he says. “Most of these species are more typically found in the eastern Atlantic, and are either rare or previously unknown from the western Atlantic. Their occurrence appears to represent a natural process. We don’t yet know for certain how they arrived at Bear Seamount, but it’s possible that the seamount chain is acting as a series of



This ram’s horn squid was one of the unusual deep-sea organisms collected in mid-water trawls above the Bear Seamount. Its internal coiled shell is partly visible to the right.

‘stepping stones’ across the deep seafloor.”

“Some people seem to think that a taxonomic study like the Census of Marine Life is a cut-and-dried exercise, just arranging organisms in little cubbyholes,” says Vecchione. “But it’s not. It’s the process of understanding relationships. And it’s really important for us to know the relationships among different groups of organisms so that we can understand things like how evolution occurs and how different organisms come to be where they are.”

For more information on MAR-ECO and the Bear Seamount cruises visit [www.mar-eco.no](http://www.mar-eco.no)

## VIMS Helps Local Students Aid Oyster Restoration Effort

Students from local schools are helping to restore Chesapeake Bay’s beleaguered oyster population through a hands-on collaboration with two Gloucester Point agencies.

Researchers with VIMS’ Chesapeake Bay National Estuarine Research Reserve in Virginia (CBNERRVA) and the Oyster Reef Keepers of Virginia (ORKV) helped the students transplant 104,000 one-year-old oysters onto the Felgates Creek Oyster Reef this past spring and summer. Felgates Creek empties into the York River between Yorktown and Williamsburg.

The students, from York, Gloucester, Hampton, Williamsburg, and Newport News, grew and monitored the oysters during the 2002-2003 school year through an ORKV oyster-restoration education program. CBNERRVA ran oyster-transplant

field trips that allowed the students to access the Felgates Creek oyster reef with canoes launched from the Yorktown Naval Weapons Station, by wading to the reef from National Park Service property on the Colonial Parkway, or by boating to the reef from VIMS.

“We had great student interest and involvement during the oyster transplant field trips this past spring and summer,” says CBNERRVA Education Director Bob Carroll, “and we’ll continue the program in 2004.”

ORKV Director Laurie Sorabella says it was “a great partnership” and notes that ORKV is looking for 10 new teachers to participate in the program this coming year. Sorabella is a recent VIMS graduate who started the ORKV program after she completed her master’s thesis under Drs. Mark Luckenbach and Ken Moore.

Early monitoring suggests that the transplanted oysters are surviving and will hopefully increase oyster reproduction on the Felgates Creek reef and surrounding areas.

For more information about how school groups can start growing oysters in this restoration program, contact Laurie Sorabella at 804-721-8806 or email [oysterreefkeeper@yahoo.com](mailto:oysterreefkeeper@yahoo.com)



Students from Gloucester Montessori school help restore oysters to Felgates Creek.



Members of the organizing committee for the 2003 Crustacean Society Annual Meeting gather at VIMS on June 5th. Committee members are (L to R) Dr. Rochelle Seitz, Dr. Jeff Shields, Dr. Martha Nizinski (formerly at VIMS), Senior Research Scientist Karen Hudson, and Dr. Emmett Duffy. The conference, which was held in Williamsburg, attracted 150 scientists from 11 countries and featured symposia on the biology and ecology of the blue crab, exploited shrimp, deep-sea crustaceans and the behavioral ecology of crustaceans. Meeting participants also celebrated the scientific career of Dr. Willard van Engel, VIMS faculty emeritus, who recently received VIMS’ inaugural Lifetime Achievement Award (see story on page 8).