Miselis Chosen as Foster Scholar

VIMS graduate student Jennifer Miselis has been awarded a prestigious Dr. Nancy Foster Scholarship from the National Oceanic and Atmospheric Administration (NOAA) for her work to better understand the interaction between coastal geology and beach erosion.

Miselis is pursuing a Ph.D. degree at VIMS under the guidance of faculty advisor Dr. Jesse McNinch. Their field studies of the barrier islands of Virginia and North Carolina are helping to explain how the depth, extent, and configuration of near-shore sand bars affect beach erosion and build-up, particularly during and after major storms.

Miselis's most recent findings, soon to appear in the *Journal of Geophysical Research*, indicate that the volume of sediment in the surf zone is a better predictor of long-term shoreline changes than conventional parameters such as shoreface slope or grain size.

"A volume metric that accounts for both seafloor geology and morphology better represents the geologic character of the shoreface and may help to improve existing predictive models of shoreline change," says Miselis.

"That's a very important finding," says McNinch. "Particularly in light of continued coastal development along the nation's vulnerable barrier-island shorelines."

Miselis is one of only five graduate students from the around the nation chosen for the 2005-2006 Foster award. The other four recipients hail from the University of California San Diego, the University of Rhode Island, Oregon State University, and the University of Georgia.

Jen Miselis

Miselis's receipt of the Foster Scholarship is particularly impressive, says McNinch, as it follows closely on the heels of another prestigious award—the National Defense Science and Engineering Graduate Fellowship—which supported the first three years of Miselis's research.

The Dr. Nancy Foster Scholarship recognizes the career contributions of its namesake, who served as NOAA's Assistant Administrator for Oceanic Services and Coastal Zone Management, and Director of the National Ocean Service. Foster's early understanding of marine ecosystems and their conservation, and the need to consider the interdependent roles of organisms in marine ecosystems, set her apart as a pioneer and visionary.

The Foster Scholarship Program provides support for outstanding scholarship and encourages independent graduate-level research in oceanography, marine biology, or maritime archaeology, particularly by women and members of minority groups. The scholarship carries a 12-month stipend for each student of $20,000 and an annual cost-of-education allowance of up to $12,000. Masters students may be supported for up to two years, and doctoral students for up to four years. About four scholarships are awarded each year.

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fisheries. Most of the catch is made by purse seine for the reduction fishery (in which menhaden are "reduced" to fish meal and oil).

Following industry consolidation and closure of most state waters to the reduction fishery in the 1980s and early 1990s, more than half of the total menhaden harvest has shifted to Chesapeake Bay (the remaining harvest, of the closely related Gulf menhaden *Brevoortia patronus*, takes place largely in the Gulf of Mexico).

The concentrated harvest in Chesapeake Bay has raised concern among recreational anglers and conservation groups, who fear that it will disrupt the menhaden's ecological role as a forage fish and filter feeder in Bay waters.

Atlantic menhaden are a favorite food of striped bass, bluefish, sea trout, tunas, sharks, and sea birds. They also consume large quantities of plankton, thus helping to maintain water clarity.

Although the ASMFC's most recent stock assessment indicates that the coast-wide menhaden stock is not over-fished, anecdotal evidence suggests that menhaden abundance in the Bay has declined since the 1980s. A related concern is that low recruitment of juvenile menhaden may decrease the species' ability to serve as a major food source for other fish.

In 2004, the ASMFC's Atlantic Menhaden Technical Committee realized that it could not address these concerns in the absence of reliable data. The Committee thus identified four research goals: to determine menhaden abundance in the Bay; estimate the removal of menhaden by predators; quantify the exchange of menhaden between Bay and coastal systems; and quantify the recruitment of menhaden larvae to the Bay.

Latour, along with colleagues at VIMS, the Maryland Dept. of Natural Resources, the U.S. Fish and Wildlife Service, and NOAA's Environmental Technology Laboratory, are focusing on the first goal, by testing the feasibility of using LIDAR and sonar as fishery-independent tools for assessing the size of the Chesapeake Bay menhaden stock.

LIDAR (for Light Detection and Ranging) and SONAR (for Sound Navigation and Ranging) are technologies that use the strength of reflected pulses of light or sound to distinguish among materials with differing compositions or surface properties, such as water and fish tissue.

Juvenile menhaden. Photo by Chris Crippen.

The goal of Latour's two-year study is to determine whether use of an airplane-mounted LIDAR unit, a boat-mounted sonar unit, or some combination of these two technologies can detect and quantify menhaden schools, thereby providing a rapid, reliable, and relatively inexpensive means for estimating menhaden populations in the Chesapeake.

Traditional fishery surveys (in which scientists tow a net behind a research vessel for a standardized time period along numerous randomly chosen transects) are prohibitively expensive for this purpose, and are also poorly suited for counting menhaden and other fish that travel in discrete schools and instinctively flee oncoming sampling nets.

"Because both LIDAR and sonar techniques can survey a large area quickly, we expect a significant cost savings as compared to a large-scale survey using traditional fishing gear," writes Latour. "Calibration of both techniques during the first year and comparisons between both techniques and the fishery during the second year will facilitate full-scale implementation of future menhaden surveys."

VIMS researcher Dr. Mark Brush is leading a related three-year project that will use a state-of-the-art computer model to quantify the role of menhaden as prey items and filter feeders in the Bay.

Brush's team will couple the bay-wide assessment of the menhaden stock with a laboratory study of menhaden diet and feeding behavior. They will use these results to model the "bioenergetics" of menhaden on both the individual and population level, and then couple the bioenergetics model to two different food-web models both separately and in combination.

"Our modeling will help us predict how different populations of menhaden might affect Bay water quality, and how different nutrient-reduction and fishery-management scenarios might impact the menhaden population and its potential to improve water quality," says Brush. "Our results will thus provide the basis for weighing potential management options."

A third menhaden project at VIMS, led by Dr. Mary Fabrizio, is designed to quantify the recruitment of young menhaden into the adult population. The study builds on the long-term records of VIMS' juvenile seine survey, which has monitored juvenile fish abundance for many species, including Atlantic menhaden and striped bass, since 1980.

The survey shows that the abundance of juvenile Atlantic menhaden has declined since the early years of the survey. An index of abundance value for 2006 was 0.79, compared with the survey's greatest index value, 9.01, which occurred in 1982.

For more details on menhaden research at VIMS, visit www.vims.edu/menhaden