

VIMS Researchers See the Bay in a Grain of Sand

Like canaries in a coal mine, the creatures that dwell in and along the floor of Chesapeake Bay can provide scientists with a good sense of environmental stress.

Using a test known as the Benthic Index of Biotic Integrity, or B-IBI, scientists compare a bottom-dwelling community at a site disturbed by human activities to the type of community expected at a pristine site. Undisturbed sites tend to be highly productive, with high biodiversity and lots of food for predators, such as birds, crabs, and fish. A site dominated by pollution-tolerant species or containing few organisms at all is taken as a sign of human disturbance.

A recent grant from the Department of Defense will allow VIMS scientists Drs. Linda Schaffner and Iris Anderson to couple the B-IBI test with a more detailed look at the types of organisms that make up a benthic community, and how those organisms function together in an integrated ecosystem. Whereas the traditional B-IBI test focuses on relatively large and conspicuous creatures like clams,

snails, and worms, Schaffner and Anderson will extend the test to include animals so tiny they inhabit the spaces between sand grains. This community of Lilliputian creatures is a key component of estuarine food webs, especially

for juvenile fish such as spot and croaker.

The 3-year, \$666,000 grant will allow Schaffner and Anderson, along with a team of graduate students, summer interns, and technicians, to

conduct B-IBI studies at six military bases along the Chesapeake Bay shoreline. These include Langley Air Force Base, NASA's Langley Research Center, and Fort Eustis.

One aim of the team's study is to use the B-IBI approach to investigate how pollution from military installations may be impacting Bay health. Several military bases in Virginia and Maryland have been placed on the National Priorities List of most hazardous sites because of non-point source pollution of adjacent aquatic ecosystems.

A more general goal is to better understand what the B-IBI approach truly says about estuarine ecosystems. "The Chesapeake Bay Program has long used the B-IBI as an index of estuarine health," says Anderson. The approach works because benthic organisms tend to be couch potatoes. Many derive sustenance by consuming the sediments and associated detritus in which they live, ingesting any contaminants that may have settled there. And unlike fish or plankton, most bottom-dwellers are literal stick-in-the-muds



Photo courtesy of M. Hooge, Univ. of Maine

Communities of microscopic organisms like this nematode support the marine food web and may shed light on Bay health.

Continued on page 9

*VIMS Researchers See the Bay
in a Grain of Sand
continued from page 3*

who could not move from an unhealthy neighborhood even if they wanted to.

The B-IBI has proven highly effective for detecting changes in the biodiversity and abundance of benthic communities, but the relation of B-IBI to other potential measures of ecosystem health remains unknown. “The question,” says Anderson, “is what B-IBI really means. One way to judge its meaning is to compare it with other measures of ecosystem function such as nutrient cycling, algal blooms, and the rate of microbial processes.”

“Management of the Bay’s ecosystem will be easier if we are able to show that the B-IBI predicts changes in ecosystem function as well as the health of benthic communities, which are important living resources” say Schaffner.

The pair hopes that extending the B-IBI to include investigations of smaller organisms and measures of physical and biogeochemical processes will help provide a yardstick for measuring more subtle changes in ecosystem health and function.

The B-IBI test has been the backbone of the Chesapeake Bay Benthic Monitoring Program since 1994. The program was set up to help scientists and managers track and meet the Chesapeake Bay Program Benthic Community Restoration Goals. These are part of the larger Chesapeake 2000 Agreement, which calls for reducing nutrient and sediment pollution enough by 2010 to remove the Bay and its tidal rivers from the EPA’s list of “impaired” waters.

For further information about the Chesapeake Bay Benthic Monitoring Program, visit www.baybenthos.versar.com