Data and Models Help State Manage Shellfish-growing Waters

By Carl Hershner

Closure of shellfish-growing waters because of elevated bacterial levels is a common, long-standing problem in Virginia. The Commonwealth is now engaged in efforts to improve these conditions by reducing controllable sources of bacteria entering tidal waters. This activity is part of the water-quality management program operated by Virginia's Department of Environmental Quality (DEQ).

Remediation of contaminated water involves development of total maximum daily load models, or TMDLs. These models do just what the name implies— calculate the total maximum daily load of bacteria that can be allowed to enter a water body without violating water-quality standards. Once regulators know these limits, they must figure out where excessive bacterial loads originate.

VIMS currently plays an important role in DEQ's effort to develop TMDLs for condemned shellfish-growing waters. Scientists in the Center for Coastal Resources Management (CCRM) and the Physical Sciences Department are working on projects to create databases and models that will facilitate Virginia's efforts to develop shellfish TMDLs. CCRM scientists have created an extensive database of near-shore shellfish waters using geographic information systems (GIS). The database contains digital maps of the small coastal watersheds that feed each of the 276 condemned shellfish areas in Virginia. The CCRM staff has also converted shoreline surveys into a computer-based system that allows regulators quick access to much of the information necessary to develop a TMDL. These surveys are conducted by the Department of Health's Division of Shellfish Sanitation.

Scientists in VIMS' Physical Sciences department have developed models that link watershed, hydrodynamic, and water-quality parameters to generate TMDLs. These models take information in the computer database and quickly calculate both the required limits on bacterial loads and various ways to achieve those limits. The output is a number of management options that can be considered by DEQ and local residents in efforts to "clean up" affected areas.

Both of these projects are nearing completion. VIMS scientists are now working with DEQ staff to plan for the actual development of TMDLs for all the condemned shellfish-growing waters in the Commonwealth. The Institute will assist DEQ by using its expertise to develop and analyze models for each of the affected shellfish-growing areas. The effort, which will require several years to complete, is an outstanding example of the Institute using its expertise to solve very practical problems for the Commonwealth.