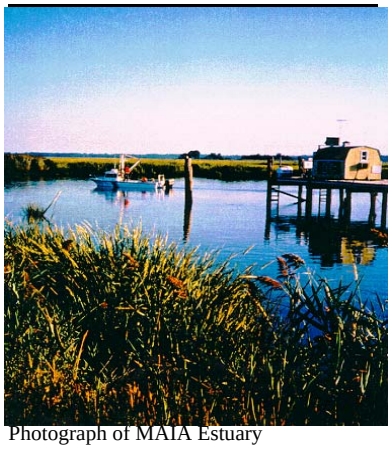
FACT SHEET

State and Federal Partners in Integrated Estuarine Monitoring in the Mid-Atlantic - 1997 & 1998



Photograph of MAIA Estuary

ABSTRACT

Over the next several years, the U.S. Environmental Protection Agency in partnership with other Federal and State programs (see partners on back page) will be conducting research on an integrated monitoring approach for mid-Atlantic estuaries. Estuaries are the aquatic environment where freshwater from rivers and streams meet the saltwater of the ocean. These areas represent a unique and particularly important ecological resource. Estuaries provide habitat for many species of animals and plants. Over 90 percent of commercial marine finfish and shellfish depend on estuaries for some part of their existence. The mid-Atlantic area contains many estuaries, including the Chesapeake Bay -- one of the largest estuaries in the world.

For the purposes of this research, the geographic area covered includes the watersheds of the Delaware Estuary, the Chesapeake Bay, the Delmarva coastal bays, and the Albermarle-Pamlico Sound (see Figure 1).

The objectives of this research program are to: (1) characterize the ecological condition of the mid-Atlantic estuaries using a common set of measurements which will be applied over the entire area, (2) focus research on small estuaries to determine better monitoring approaches for these critical systems, and (3) to demonstrate that effective alliances can be establishment among Federal, State, and County agencies with estuarine responsibilities in the pursuit of scientific data for resource management purposes.

This unique approach to monitoring will permit direct comparisons to be made among and between the many estuaries in the mid-Atlantic area. Comparative risk assessments can lead the way to more informed, scientific strategies for resource preservation and restoration. Additionally, several adjunct research projects being performed simultaneously with monitoring activities will foster better understanding of the ecological processes occurring in the estuaries of this region.

The Mid-Atlantic Integrated Assessment Program

The Mid-Atlantic Integrated Assessment (MAIA) began as a partnership between two EPA organizations (Region 3 and the Office of Research and Development (ORD)) to develop and respond to the best available information on the condition of various ecological resources and to adapt environmental management over time, based on careful monitoring of environmental indicators and related new information. Additional partnerships have been developed with other federal and state environmental organizations.

MAIA has implemented an Assessment Framework which begins by defining realistic environmental goals and related environmental assessment questions. The assessment questions fall into the following broad areas: (1) Is there a problem? (2) Where is the problem located? What is the magnitude, extent, and distribution? (3) What is the cause of the problem? (4) Are things changing? (5) What does it mean to the community ? (6) What can we do about it?

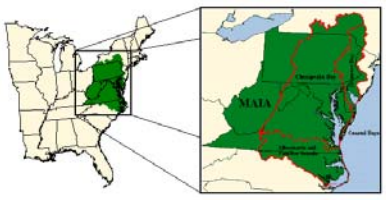


Figure 1. MAIA Study Area

MAIA then strives to answer the assessment questions and to characterize ecological resource condition based upon scientific information gathered by the various monitoring programs. Assessments are produced at four levels: (1) status and trends within single resources (e.g., estuaries); (2) within-resource associations; (3) the associations between resource condition and landscapes; and (4) integrated assessments of multiple resources at various spatial scales.

The MAIA Estuaries Team has been working together to produce the "Condition of the Mid-Atlantic Estuaries Report", which has been reviewed and is in final production.

The data sources underlying this report were the ORD's Environmental Monitoring and Assessment Program (EMAP) and related monitoring efforts (e.g., Regional-EMAP (REMAP) and other special ORD monitoring efforts in the Mid-Atlantic Integrated Assessment (MAIA) geographic area), State programs on the coastal and estuarine resource area, the Chesapeake Bay Program (CBP) and National Estuary Program (NEP) efforts.

While the report answers many of the assessment questions, there remain data gaps. These may be because there has not been adequate monitoring in some geographic areas (i.e., additional monitoring is required), or because there are no environmental indicators available to adequately answer the question (i.e., additional research is required).

Development of an Integrated Monitoring Design

In 1997 MAIA began a coordinated monitoring effort of the mid-Atlantic estuaries to respond to the data gaps identified during the development of the "Condition of the Mid-Atlantic Estuaries Report". The joint EPA Team held a series of meetings in Annapolis, MD with representatives of the various federal and state monitoring programs to discuss how to integrate estuarine monitoring efforts.

Generally all estuaries face similar environmental problems. However, the severity of each problem may depend on the type of the estuary. Large estuaries (e.g., the Chesapeake Bay and the Delaware Bay) are generally different from tidal rivers(e.g., Susquehanna, Potomac, James and Delaware Rivers) and small estuaries (e.g., Virginia Coastal Bays, Pocomoke River, and Severn River).

Because of these differences, many environmental problems are manifested differently in each estuarine class, and the best solutions to environmental problems may also differ among estuarine class.

The MAIA Estuaries Team approached integration through the assessment process, not by comparing monitoring designs. Using the draft "Condition of the Mid-Atlantic Estuaries Report" as a starting point, they were able to identify assessment questions which would help to characterize the condition of the estuaries. In addition, they identified questions which could not be answered because indicators had not yet been developed or field verified.

Traditionally, the various monitoring programs have collected different types of information. This presents challenges in tying the data together to produce a regional assessment. A unique aspect of the MAIA Estuarine Monitoring Program is the application of the same measurements throughout the entire mid-Atlantic region. Selected parameters which have been shown to be key indicators of overall environmental quality are measured by the various monitoring programs. These measurements emphasize many elements of the biotic community, both plants and animals, as well as provide important information about the exposure to stresses in the estuarine environment. In general, these measurements include data on the benthic (bottom-dwelling) community structure, water quality, toxic contaminants in bottom sediment, and sediment toxicity. These indicators are quantifiable and clearly related to ecological condition.

The group agreed to develop a set of core existing indicators which would be monitored by all parties. The partners developed a list of core indicators. Each partner initially presented the suite of indicators being used in their monitoring program. Detailed discussions about the choice of indicators and the protocols for collection followed. The result of these discussions was ultimately a detailed list of core indicators for which all partners would monitor. They determined the ideal set of indicators would cover the food chain, water quality, habitat quality, eutrophication, and chemical contamination (Figure 2).

It was agreed that all partners would monitor these core indicators, but could monitor additional indicators as required by their individual program. It was also agreed that when monitoring for these core indicators, all partners would use the same protocols.

Measurement Type	Example
Station Data	Latitude/Longitude Time/Date
Water Quality	Nutrients Dissolved Oxygen
Sediment Quality	Pesticides Toxic contaminants Benthic Organisms Bioassay Tests

Figure 2: Measurements Made at All Sampling Stations in 1997

The EPA's Gulf Ecology Division (GED) took input from the partners and developed a comprehensive integrated monitoring design which met the various goals identified. The final design consists of more than 700 stations throughout the mid-Atlantic estuaries (Figure 3). These include stations selected through both the probability and deterministic approaches.

Delaware Estuary	Delaware River and Bay (Mainstem)
	Salem River*
	Schuykill*
	Cohansey River
Delmarva Coastal Bays:	Sinepuxent Bay (MD)*
	Chincoteague Bay (MD & VA)
	Virginia coastal bays*
Chesapeake Bay:	Chesapeake Bay (Mainstem)
	Susquehanna River
	Severn River*
	South River*
	Patuxent River*
	Potomac River
	York River
	James River
	Bohemia River
	Sassafras River
	Chester River
	Nanticoke River
	Pocomoke River*
	Mobjack Bay*
	Cherrystone Inlet*
	Rappahannock River
	Saint Jerome Creek*
	Wicomico River
	Elizabeth River
Albemarle-Pamlico Sound:	Corrituck Sound
	Albemarle Sound
	Chowan River*
	Pamlico Sound
	Pamlico River
	Neuse River

Asterisk (*) denotes small estuaries selected for intensive sampling

Figure 3. Some of the MAIA Estuaries Selecting for Sampling in 1997

Since one of the objectives of the research program is to investigate small estuaries, more emphasis has been placed on these systems by assigning additional numbers of sampling stations. Also, certain areas were selected because of their interest from resource managers.

The partners agreed to provide summary tables of water quality and sediment monitoring, including methods, maps, outlines, measurements, and schedules and to provide recent summary reports of their own monitoring activities.

This information will be compiled by EPA's Atlantic Ecology Division (AED) into a summary overview of the MAIA integrated estuaries monitoring program which will be put on the EMAP homepage. The EMAP homepage will also serve as a MAIA Information Clearinghouse for the 1997 MAIA Estuaries Monitoring data.

The partners collected the field data during the months of July, August, and September of 1997. Data and assessment reports are scheduled to be available in 1998.

Future Activities

The ultimate goal of this cooperative research program is to design an integrated monitoring approach for the mid-Atlantic which will be adopted in some permanent, continuous monitoring effort. Field activities will be continued during the summer of 1998 with additional sampling in areas of particular management or scientific interest. Plans for 1998 activities will be predicted upon the assessment of information collected during the 1997 field season.

For more information contact Pat Gant (410-573-2744), Kevin Summers (904-934-9244), Rick Kutz (410-573-2742), or Brian Melzian (401-782-3188).

EMAP Home Page Address: http//www.epa/gov/emap

Partners in the MAIA Estuarine Monitoring Program

Environmental Monitoring and Assessment Program (EMAP)

EMAP activities in estuaries were initiated in 1990 by the EPA and NOAA. EMAP was designed to assess changes in ecological condition over large biogeographical regions (e.g., the Virginian Province and Carolinian Province in MAIA), and over long periods of time (e.g., decades). A central goal of EMAP was to make representative estimates of status and trends in ecological condition with known confidence. To attain this objective, the EMAP estuaries sampling network used a probability based sampling design.

For more information on EMAP Estuaries, contact: Kevin Summers, 904/934-924

NOAA's National Status and Trends Program - Delaware Bay

Based on previous discussions with the EPA, NOAA added the Delaware River to its NS&T Program in 1997. NOAA will use the triad approach to sediment sampling (chemical analyses, benthic populations, and sediment toxicity tests) at 40 monitoring stations in Delaware Bay for a ten-day period.

For more information on NOAA's NS&T contact: Andrew Robertson, 301/712-3028 ext 162

Delaware River Basin Commission
DELAWARE • NEW JERSEY
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Since 1968, the DRBC has sampled the water column from March through November. Samples are collected near the surface at slack tide at stations located from mid-bay to Trenton (the 127 river-mile mark). The samples are collected two to three times per month and analyzed for conventional parameters, volatile organic compounds, dissolved and total metals, and productivity measurements by the State of Delaware's laboratory.

For more information on the DRBC contact: Ed Santoro, 609/883-9500

National Park Service Maryland Coastal Bays Monitoring

Since 1987, the National Park Service (NPS) conducts monthly monitoring at 18 stations in the Maryland Coastal Bays, 11 of which are in Chincoteague Bay. The monitoring stations were selected deterministically, not randomly. During the past two years, NPS has monitored the stations year round. Water samples are collected and analyzed for water quality parameters only. During the 1994-1995 time period, the Assateague Island monitoring program also collected benthic samples at 45 stations (3X/year).

For more information on NPS activities in Maryland Coastal Bays contact: Carl Zimmerman, 410/641-1443

The Chesapeake Bay Program (a consortium of Federal state and local governments and non-governmental organizations) has been operating since 1983. Both main stem and tributary "Water Quality" stations are monitored 12 to 20 times per year in Maryland and Virginia. Two water column samples are collected at each station: one above the pycnocline, and one below it. In addition, benthic, phytoplankton, and zooplankton samples are collected at a subset of the monitoring stations. A stratified random design is followed for benthic sampling; 25 benthic samples are collected at a subset of the stations each year.

Sediments at most stations are sampled once per year for organics and metals analyses. Additionally, there recently has been ambient toxicity testing at 3 to 4 stations to assess sediment contamination in the Bay. There also is a 4-5 year pilot program to monitor fish communities (e.g., IBI) and tie this information into ambient toxicity programs. Historically there has been no routine analysis for sediment chemistry in the Chesapeake Bay in Virginia.

For more information on the Chesapeake Bay Program contact: Rich Batiuk, 410/267-5731