

Section 4: Water quality in the Maryland Coastal Bays

General Introduction

Increased nutrients to the Coastal Bays lead to degraded water quality and ecosystem health. Increased phytoplankton blooms (measured as water column chlorophyll-*a*) and related swings in dissolved oxygen (DO) are symptoms of ecosystem degradation. Measuring nutrient concentrations in the water column over time allows managers to track changes in nutrient inputs.

As the major source of freshwater to the bays, groundwater is also a dominant source of nutrients. Groundwater flows much slower than surface runoff (several years to decades compared to hours to days); therefore, nutrients entering the bays may be from actions that happened on land many years ago. Hence, improvements to water quality as a result of management actions taken on land may take a minimum of five to ten years.

Data Sets

Routine water quality monitoring includes the National Park Service at Assateague Island National Seashore (ASIS), Maryland Department of Natural Resources (DNR) and the Maryland Coastal Bays Program (MCBP) Volunteer Water Quality Monitoring Program. ASIS measured water quality parameters monthly at 18 stations in the southern Coastal Bays since 1987 (Figure 4.1). DNR measured water quality monthly at 28 sites in the St. Martin River, Isle of Wight Bay, and Newport Bay segments since 1998 and 17 sites in Assawoman Bay, Isle of Wight Bay and Chincoteague Bay since 2001 (Figure 4.1). All stations are tidal, except for five DNR stations, and all are monitored in accordance with EPA approved Quality Assurance Plans and in conjunction with the MCBP Eutrophication Monitoring Plan (Wazniak 1999). MCBP volunteers have collected samples at 25 stations monthly since 1996 (Figure 4.1).

All programs recorded on-site water quality indicator values, such as Secchi depth and salinity, and collected samples to send to laboratories for nutrient and chlorophyll analyses. DNR samples were analyzed by the University of Maryland Center for Environmental Science (UMCES) Chesapeake Biological Laboratory for all nutrient indicators while chlorophyll is analyzed at the Maryland Department of Health and Mental Hygiene (DHMH). ASIS and MCBP samples were analyzed by UMCES Horn Point Laboratory for nutrient and chlorophyll indicators. Quality assurance and quality control measures at these laboratories were virtually identical, allowing for comparability between the different sampling programs. However, no split-sample testing on ASIS and DNR samples was conducted, although the three laboratories have been evaluated as part of the Chesapeake Bay Program quality assurance protocol and not found to differ significantly.

Water Quality Analyses

Status is defined as the measure of current condition (most recent three years) at a station compared to scientifically based thresholds. Current status values were compared to threshold levels determined by the MCBP STAC using non-parametric statistics.

Trend is defined as the measure of how the system has been changing over time, either improving or worsening. Status and trend calculations were based on observed data (i.e., no flow-adjustment was made to the data). For a full description of water quality status and trend analyses, see Ebersole et al. (2002) and Gilbert (1987).

Water Quality Monitoring Objective: To characterize the status and trends in ambient water quality in the Coastal Bays.

Chapter 4.1: Nutrient status and trends in the Maryland Coastal Bays

Chapter 4.2: Algae status and trends in the Maryland Coastal Bays

Chapter 4.3: Dissolved oxygen status and trends in the Maryland Coastal Bays

Chapter 4.4: Development of a Water Quality Index for the Maryland Coastal Bays

Chapter 4.5: Benthic chlorophyll measurements

References

Ebersole, E., M. Lane, M. Olson, E. Perry, and W. Romano. 2002. Assumptions and procedures for calculating water quality status and trends in tidal waters of the Chesapeake Bay and its tributaries: cumulative history. Report prepared for Chesapeake Bay Program, Tidal Monitoring and Analysis Workgroup (http://www.dnr.state.md.us/bay/tribstrat/stat_trend_hist.pdf).

Gilbert, R. O., 1987. Statistical methods for environmental pollution monitoring. Van Nostrand Reinhold, N.Y.

Wazniak, C.E. 1999. Eutrophication monitoring plan. Appendix A of the Maryland Coastal Bays Comprehensive Conservation Management Plan. Maryland Coastal Bays Program, Berlin, MD.

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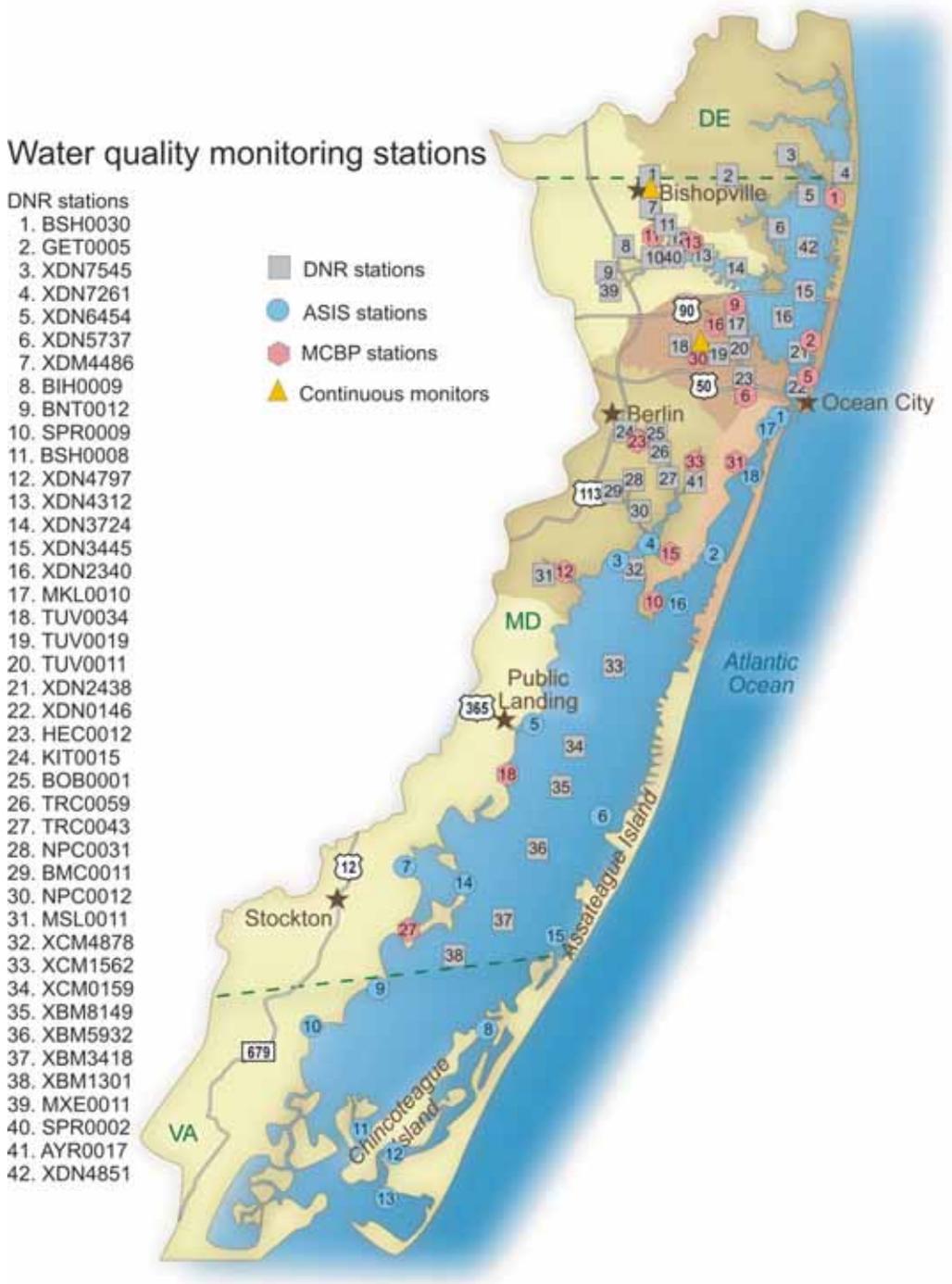


Figure 4.1: Map showing water quality stations in the Maryland Coastal Bays (including the Virginia portion of Chincoteague Bay). DNR station names are listed in the legend. National Park Service, Assateague National Seashore (ASIS) and Maryland Coastal Bays Program Volunteer (MCBP) stations are named by number as on the map.