



# Shallow Water Habitats

...key features of Virginia's bays and estuaries

[VIMS](#) > [Home](#) > [Methods](#)

Home

Introduction

Physical Characteristics

Shallow Water Communities

Ecosystem Processes

Human Effects

Methods

References

## Methods - Water Column Characteristics

Basic water quality parameters and depth of the water column should always be monitored to provide a record of environmental conditions at the time of sampling and to provide information used in assessing the condition of benthic assemblages and understanding ecosystem processes. Water quality parameters should be measured at the same time and location as any biological sampling. While episodic data provide a snapshot of environmental conditions at the time of sampling, the spatial and temporal variability common in estuarine ecosystems make it difficult to characterize general habitat conditions with these limited data. To properly characterize many water quality conditions, long-term data sets are generally required.



Water quality characteristics can be measured with a variety of handheld instruments

Monitoring schemes for many water quality characteristics of a habitat involve relatively simple in situ methods. Portable instruments (e.g. [YSI](#) and [Hach - Hydrolab](#)), allow for rapid measurement of parameters such as [temperature](#), [salinity](#), [dissolved oxygen](#), pH, chlorophyll fluorescence, and turbidity. Light attenuation is also measured in the field. In shallow water habitats, where the water column is typically well-mixed, measurements are made at mid-depth, except for light attenuation, which is measured at multiple depths through the water column.

For long-term continuous data collection, YSI Datasondes may be mounted on fixed stations or on vertical profilers, which move up and down through the water column and radio data back to the laboratory. Surface water mapping of water quality parameters can be performed using a DataFlow system mounted on a boat. Water is pumped through a YSI Datasonde as the boat moves at 20 or more knots through the water. Water quality data and GPS locations are collected using an [on-board computer system](#). Three-dimensional water quality data can be collected using an ACROBAT towed undulating vehicle. The ACROBAT flight through the water column is controlled by an on-board computer while sensors mounted on the ACROBAT transmit data along with GPS location back to a [second computer](#).

[Nutrients](#) such as nitrogen and phosphorus, total suspended solids, and chlorophyll a concentrations in the water column are typically measured in the laboratory after collecting water samples at field sites. Water column samples for nutrient analysis may be collected using bottle samplers or pumps.

Analytical methods for determinations of water quality are presented in: Kirk (1994), Parsons et al. (1985), Methods for the Determination of Chemical Substances in Marine and Estuarine Environmental Matrices -2nd Edition. National Exposure Research Laboratory, Office of Research and Development. U.S. EPA, Cincinnati, Ohio 45268, and APHA (1992) These

analyses will help identify eutrophication factors affecting benthic assemblages and ecosystem processes.

It is important to standardize a sampling design in order to ensure the comparability of data throughout a program. It is also important that the methods used to collect data are comparable with methods used to collect any datasets that may be used for comparison. Newer methods, such as observing systems and towed arrays (see description above), are allowing monitoring programs to more detailed temporal and spatial information on water quality.

For additional details on sampling the water column refer to the following:

Gibson , G.R., M. L. Bowman, J. Gerritsen and B. D. Snyder. 2000. Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance. EPA [822-B-00-024](#). U.S. Environmental Protection Agency, Office of Water, Washington, DC. (sections 3.3 and 6.8)

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