

Tidal Open Waters

Written by Claire - Last Updated Tuesday, 17 June 2008 16:20

This environment comprises all surface waters beyond the shallow waters near the shore. Open waters are found in tidal embayments, river mainstems, and Chesapeake Bay. Over deep areas, the bottom of the open water environment is bound by the pycnocline, a rapid change in the water column's salt gradient that is usually present in estuaries. The ICPRB works closely with Chesapeake Bay Program partners in understand Potomac tidal, or estuarine, environments because of the Potomac River's importance to Chesapeake Bay.



Plankton Communities

Plankton are essential members of the tidal open water food web, and link nutrients with many fish, birds and mammals. The term plankton encompasses all bacteria and all microscopic plants (phytoplankton) and animals (zooplankton) that drift in open water habitats. Plankton in the Potomac estuary have been studied and monitored by several agencies and institutions, most recently by the Chesapeake Bay Program (CBP) and the Gunston Cove Ecosystem Study, in recognition of their important ecosystem roles. Much of the data are downloadable from the [CBP Data Hub](#) . CBP has supported ICPRB involvement in the development of plankton indicators of Chesapeake Bay status and indexes of biotic integrity.

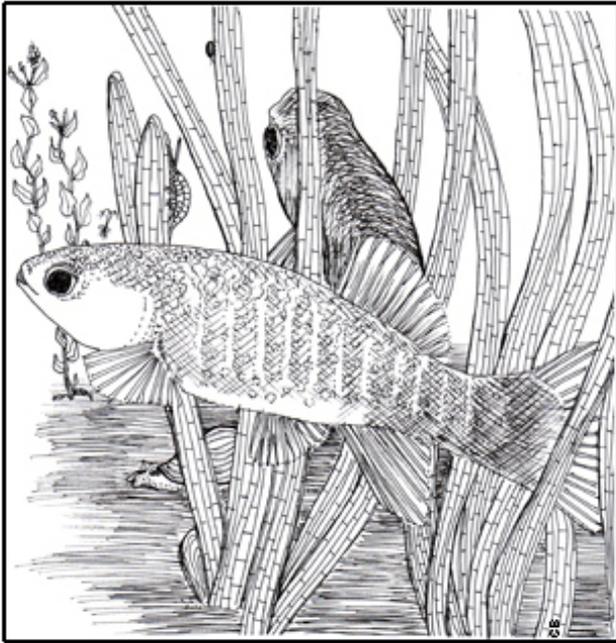
ICPRB recently lead a team of researchers to develop Plankton Restoration Goals to characterize phytoplankton and zooplankton reference communities using indicators and metrics. Using these reference communities, the team developed phytoplankton and

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zooplankton indexes of biotic integrity and proposed criteria for bay-wide restoration goals. Papers and presentations describing this effort are available.

Phytoplankton indicators are currently used to interpret and communicate monitoring results. They are highlighting deteriorating trends in the estuarine food web that are linked to nutrient enrichment and poor water clarity. Phytoplankton indicators are an effective means for justifying nutrient and sediment load reductions and ecosystem-based, multi-species management.



Habitat Suitability

Habitat conditions identified as suitable for a particular group of organisms and supportive of a human [designated use](#) are called reference habitat conditions. They are often sites that are least-impaired by human activities. The biological populations living in these reference habitat conditions are typically the reference communities used to develop indexes of biotic integrity.

Habitat suitability for a particular group of organisms is determined by a combination of environmental variables important to those organisms. Phytoplankton habitat suitability in estuaries can be characterized by the environmental variables that frequently control phytoplankton growth and survival, i.e., dissolved inorganic nitrogen (DIN), ortho-phosphate (PO_4), and water clarity (Secchi depth). Zooplankton habitat suitability in estuaries can be characterized by a mixture of water quality and phytoplankton parameters. Fish habitat suitability relies on many factors, including the environmental preferences of each fish species,

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food availability, and access to structures or areas that provide refuge. ICPRB is attempting to develop indexes of habitat suitability from the criteria used to identify habitat reference conditions.

Index of Ecosystem Integrity for Tidal Waters

The ICPRB is working to integrate the available indexes of habitat suitability and biotic integrity into an overarching index of ecosystem integrity for tidal open waters. Claire Buchanan presented the approach and initial results at the biennial Estuarine Research Federation meetings in October 2005. Available in PDF.