

# Monitoring the Status and Species Composition of Submerged Aquatic Vegetation Communities in the Patuxent and Bush Rivers, Chesapeake Bay, Maryland

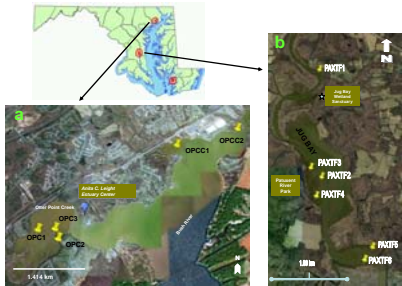
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Submerged aquatic vegetation (SAV) has been monitored since 2007 in an effort to track the status and species composition changes of some of the main SAV beds located within the Jug Bay (Patuxent River) and Otter Point Creek (Bush River) components of the Chesapeake Bay National Estuarine Research Reserve in Maryland. A total of eight species currently occur in each of both components with *Hydrilla verticillata* (Hydrilla – non native) and *Ceratophyllum demersum* (Coontail) as the dominant species. Hydrilla is the most abundant and has the widest distribution within both rivers; its capability to grow well in a wide range of environmental conditions makes it a great competitor. Three-year monitoring observations has shown an overall peak of SAV growth during August with high variability on species spatial and temporal abundance. A trend of decrease biomass of Hydrilla was observed throughout OPC main SAV beds. General water quality observations from both components showed a recurrent peak of salinity at OPC during October (2.15 ppt ± 0.02) and higher pH values during the summer (8.42 ± 0.02) compared with Jug Bay (7.10 ± 0.00). Phosphate concentrations were higher at Jug Bay (0.0213 ± 0.0020 mg l<sup>-1</sup>) than at OPC (0.0040 ± 0.0006 mg l<sup>-1</sup>), while nitrate concentrations were similar in both sites (0.7454 ± 0.0417 mg l<sup>-1</sup> and 0.6034 ± 0.0846 mg l<sup>-1</sup> for Jug Bay and OPC, respectively). Higher phosphate concentrations in Jug Bay may be associated to outflows from nearby wastewater treatment plants.

## Monitoring Sites

Monitoring of SAV has been conducted since 2007 in two of the CBNERR-MD components: Otter Point Creek, Bush River and Jug Bay, Patuxent River. Both components are characterized as tidal freshwater marsh systems.



Location of SAV monitoring transects in a) Otter Point Creek, Bush River and b) Jug Bay, Patuxent River.

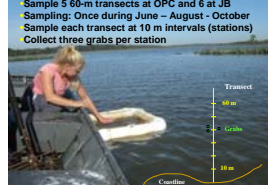
## Long-term SAV Monitoring Objectives

- Determine short and long-term changes in species composition and abundance.
- Study relationships between environmental parameters and SAV population dynamics.
- Monitor potential impacts of climate change (i.e., salinity, temperature) on native and non-native SAV species.
- Monitor non-native SAV species (particularly *Hydrilla verticillata*) and study potential relationships with water quality and other physical-chemical parameters.

## Sampling Technique and Methodology



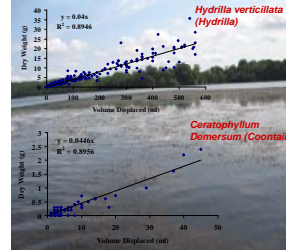
- Sampling using with oyster tongs - approximate area: 0.093m<sup>2</sup>
- Biomass recorded as volume displaced
- Biomass calculated as:  
Total Dry Weight (g) using species linear regressions



Sample 5 60-m transects at OPC and 6 at JB  
Sampling: Once during June – August – October  
Sample each transect at 10 m intervals (stations)  
Collect three grabs per station

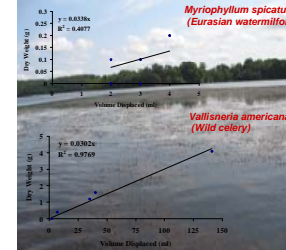
- Information recorded:**
- Species
  - Biomass per species as volume displaced
  - DO
  - Temperature
  - Salinity
  - Total depth
  - Secchi depth
  - Qualitative observation of sediment type

## SAV at Otter Point Creek, Bush River

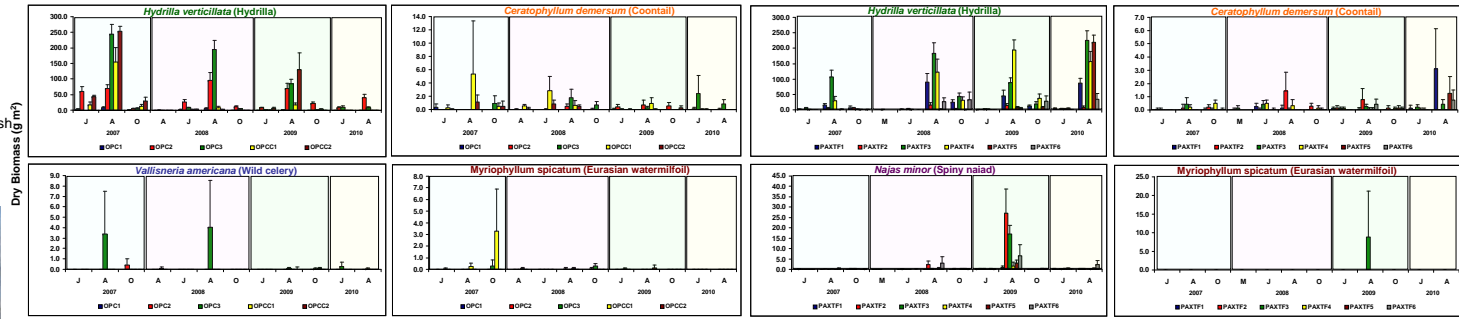


A total of eight species were present at OPC; those highlighted yellow were only found at OPC, not Jug Bay.

## SAV at Jug Bay, Patuxent River



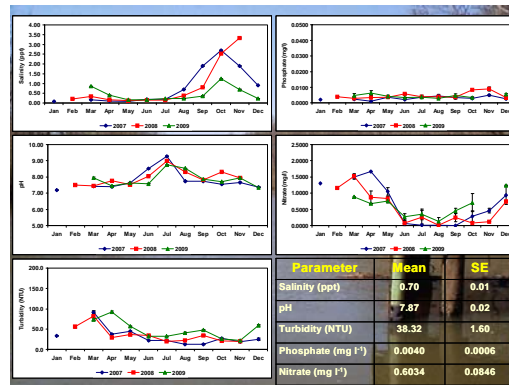
A total of eight species were present at Jug Bay; those highlighted blue were only found at Jug Bay, not OPC.



- Hydrilla is the dominant species, followed by Coontail.
- Overall, Hydrilla shows a decreasing trend of biomass through time and at the different transects.
- The peak of Hydrilla biomass growth is in August; this is similar to most of the other species.

- Hydrilla is the dominant species, followed by Coontail.
- Hydrilla biomass shows high variability through time and among transects.
- The peak of Hydrilla biomass growth is in August; this is similar to the other species.
- Spiny naiad showed high growth in 2009 and that same year some Eurasian watermilfoil was also observed.

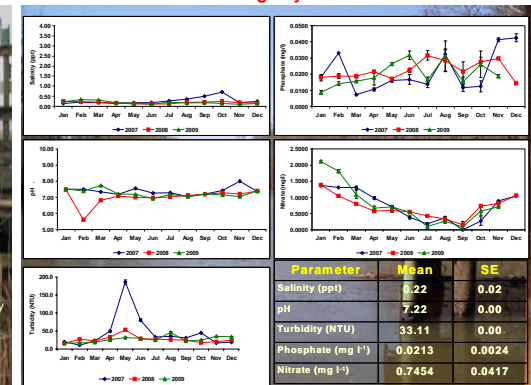
## Otter Point Creek



## Water quality observations at OPC and Jug Bay

- OPC shows a consistent salinity peak during October. In Jug Bay, salinity remained below 0.5 ppt during most of the monitoring time. A significant increase of salinity levels would primarily affect Hydrilla and Slender pondweed, which tolerance level ranges between 0.5-5 ppt.
- Overall, OPC shows slightly higher pH values than Jug Bay, particularly during the summer time.
- Spring runoff seems to be driving high turbidity levels during that season, particularly at OPC.
- Dissolved oxygen concentrations remained above the threshold level of 5mg l<sup>-1</sup> at both OPC and Jug Bay during the 3-yr monitoring period.
- Higher phosphate values at Jug Bay than at OPC may be the result of outflows from nearby wastewater treatment plants.
- Nitrate values show a decrease during the growing season at both OPC and Jug Bay sites.

## Jug Bay



## Acknowledgements:

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