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Project Summary

Distribution and Abundance of Submerged Aquatic Vegetation in the Lower Chesapeake Bay, Virginia

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Aerial photography and surface information were employed to delineate the distribution and abundance of submerged aquatic vegetation (SAV) in the lower Chesapeake Bay and its tributaries. Aerial photographs were transferred onto 31 topographic quadrangles which represented over 8500 hectares of SAV. All information from this 1978 mapping effort was entered into a computerized data base.

The areas with the greatest concentration of SAV were located at the mouths of the largest tidal rivers and creeks along the Chesapeake Bay shoreline and to the east of Tangier and Great Fox Islands. The oligohaline and freshwater regions were essentially lacking in large areas of SAV.

Analysis of 40 years of SAV historical data revealed reduced coverage and density in the late 1930s, an increase from 1937 to 1953, followed by a large loss between 1971 and 1974. Whatever factor or factors caused the major decline in the 1930s may also explain the decline of the 1970s. The decline continued through 1978, when the lowest levels of SAV in 40 years occurred.

This Project Summary was developed by Linda C. Davidson of EPA's Chesapeake Bay Program, Annapolis, MD, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Submerged aquatic vegetation (SAV) systems serve many functional roles in the Chesapeake Bay ecosystem. Among these are habitat for macroinvertebrates, protection from predators for many species of juvenile fishes and crabs, and food for herbivores which feed off the diverse epiphytic growth on SAV blades. SAV converts an otherwise bare sand or mud bottom into a complicated vegetated community that not only supports a varied animal population but also serves as a very efficient "nutrient pump" moving nutrients from the sediment to the water column and vice versa. Also, these grass-beds help reduce shoreline erosion by absorbing wave energy due to the binding of the sediment by the roots and leaves of the plants.

Chesapeake Bay supports extensive shoal areas that are heavily vegetated with SAV. Historically, emphasis was placed on these areas because of their importance as food for waterfowl. However, with the recent decline of SAV in the 1970s, other important roles of these areas have become apparent. Because these areas are important to the well-being of the Bay, they must be properly managed, recognizing the importance of the SAV resource, its location, its abundance, and the dynamics of the SAV systems. The objective

of this study was to define the current distribution of SAV in the lower Chesapeake Bay and to focus on any trends related to the dynamics of the system that might exist in the historical records.

Procedure/Methodology

Aerial photography and field investigations were employed to delineate the distribution and abundance of submerged aquatic vegetation (SAV) in the lower Chesapeake Bay. Aerial photographs were transferred onto topographic quadrangles (1:24,000). Individual SAV beds were measured and computed with an electronic planimeter and stored in a computer data base. Four density categories were applied to each bed: less than 10 percent cover, 10 to 40 percent cover, 40 to 70 percent cover, and 70 to 100 percent cover. Field investigations were done at numerous sites for species composition, percent cover, and bottom sediment types

Results/Conclusions

Thirty-one mylar USGS topographic quadrangles were produced showing significant areas of SAV. Twenty-seven of these quadrangles were of mesohaline and polyhaline areas dominated by a species mixture of *Zostera marina* and *Ruppia maritima*, the remaining four depicted significant areas in oligohaline and freshwater regions of the Potomac, Chickahominy, and James Rivers.

The oligohaline and freshwater regions were essentially lacking in large areas of SAV. Field investigations revealed mostly small areas of SAV usually adjacent to tidal marshes. The mesohaline and polyhaline regions of the largest rivers and creeks along the Chesapeake Bay shoreline contained the greatest concentrations of SAV. The most significant areas were: along the western shore of the Bay between Back River and the York River, around the shoreline of Mobjack Bay; throughout the shoal areas east of Tangier and Great Fox Islands; and behind large protective sand bars located along the Bay's eastern shoreline near Hungar's Creek and Cherrystone Creek.

The distribution of SAV species in tidal waters was classified into three associations based on their co-occurrence: (1) *Zostera marina* (eelgrass) and *Ruppia maritima* (widgeongrass) dominating mesohaline and polyhaline waters; (2) *Potamogeton* spp (pondweeds) and *Zannichellia palustris* (pondweeds) dominating oligohaline waters; and (3) the freshwater species *Ceratophyllum demersum* (coontail). Species diversity increased in an upstream direction

Analysis of 40 years of historical SAV data for six selected areas revealed changes in grass-bed coverage. All six sites, Munfort Island and Jenkins Neck in the York, the East River in Mobjack Bay, Parrott Island in the Rappahannock River, Fleets Bay, and Vancluse Shores at the mouth of Hungar's Creek showed reduced coverage and density in the late 1930s, an increase from 1937 to 1953, and then the largest loss between 1971 and 1974. Decreases in SAV continued through 1978 when the distribution and abundance was the smallest observed over the last 40 years

Recommendations

Submerged aquatic vegetation communities are dynamic systems that change in abundance annually and seasonally. At present, these systems are in a reduced state of abundance.

Aerial photography should be taken under the constraints of tidal height, sun angle, wind conditions, etc.; at altitudes of 3740 meters which allows direct comparison to the standard topographic quadrangle (1:24,000); and during the early summer to record maximum standing crop of the vegetation. In addition, because the oligohaline and freshwater regions have been shown to have scattered small beds of SAV that are not evident from the aerial photographs, it is recommended that further field studies be done in these areas to provide an understanding of the distribution, abundance, and resource value of the vegetation.

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***William A. Cook** was the EPA Project Officer (for information, see below).*
The complete report, entitled "Distribution and Abundance of Submerged Aquatic Vegetation in the Lower Chesapeake Bay, Virginia," (Order No. PB 80-140 726; Cost: $18.00, subject to change) will be available only from:
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