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Project Summary

Distribution of Submerged Vascular Plants, Chesapeake Bay, Maryland

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This research was initiated with the overall objectives of determining past and current (1978) distribution of submerged aquatic vegetation (SAV) in Chesapeake Bay, Maryland, and to formulate recommendations for future surveys with regard to frequency and methodology.

Current distribution of SAV was determined through interpretation of 1:24,000 scale black-and-white photographs taken from a seaplane during the growing season. Distribution of SAV was mapped on 1:24,000 U.S. Geological Survey (U.S.G.S.) topographic map mylars. A total of 77 maps were produced. A photo-copy of each map is included in the final report. The minimum mappable bed size was approximately 0.25 hectares. There were 16 quad sheets with no mappable vegetation present, and 24 sheets that had less than 10 hectares of vegetation. Of the 40 sheets with less than 10 hectares of vegetation, 11 were north of the Chester/Magothy Rivers and 21 were south of the Choptank/Upper Patuxent Rivers to Smith Island on the Eastern Shore. This indicates that the mid-portions of Chesapeake Bay were relatively healthy with regard to distribution of submerged vegetation. This area of the Bay also contained the highest diversity of submerged vegetation.

Diversity declined rapidly from eight to two to three species in the southern portion of the Eastern Shore where *Zannichellia palustris* and *Ruppia maritima* predominated. Only a few small areas of *Zostera marina* were found in the lower Bay, in the South Marsh Island area.

Past distribution of SAV was determined through interpretation of archival photographs of varying scale and type. Distribution from 1952 to 1978 for various dates within that time period was plotted for three areas in the upper Bay. These sites encompassed the Chester River area, the Eastern Bay area, and one site on the western shore included Salt Peter and Seneca Creeks.

The Chester River site yielded the best photography, and the Eastern Bay the worst. Trends in the Chester River area indicate fluctuation in distribution with time. The "bloom" and consequent decline of *Myriophyllum spicatum* over the whole Bay may have accounted for some of this fluctuation. There was a decline in the 1972 data probably as a result of a hurricane during June. The 1978 survey showed an encouraging increase in distribution.

The Eastern Bay area site yielded very little distribution data although a downward trend from 1970 to 1978 is indicated. The Salt Peter/Seneca Creek area site was selected because a thermal power generating station, which began operation in 1962, discharges heated water into Salt Peter Creek. SAV distribution data prior to 1960 and after 1964 indicate a relatively stable situation. However,

during that time, *Myriophyllum* "blooms" occurred and might have masked the absence of more thermally sensitive species. A slight downward trend in distribution may have occurred from 1970 to 1978.

Recommendations for future SAV surveys include larger-scale color photography in areas defined as "critical," to better define species association and a frequency of at least once every three years.

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This Project Summary was developed by 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

Over the last 10 years the Bay-grass population of the Chesapeake has declined dramatically. In an attempt to better understand the trends in distribution and abundance of submerged aquatic vegetation (SAV), aerial photography was used to establish an SAV inventory of the Maryland portion of the Bay. By interpreting these black-and-white photos, investigators hoped to focus on species concentrations and to assess the usefulness of photography for estimating past and future trends.

While SAV beds may seem bothersome to boaters, their importance to the Bay's ecosystem is seemingly limitless. Grasses are a principal source of food for waterfowl and some herbivorous fish species. SAV serves as a habitat for species of copepods and mollusks and as a nursery or shelter area for fish and crabs. Grasses are the primary producers of vegetative biomass: almost all of the above ground crop is contributed to the detrital food chain. SAV has a wave-dampening function as it reduces shoreline erosion and allows sediments to settle. Bay grasses also act as nutrient buffers and seasonally important sources of dissolved oxygen.

For these many reasons this study was conducted to determine past and current distributions of SAV and to formulate recommendations for future surveys.

Procedure/Methodology

During the summer of 1978, aerial photographs were taken of the Bay shoreline where grasses are found. Fourteen percent of the area could not be photographed due to military restrictions but field work was substituted. Field studies were also conducted in other areas to verify photographic information and to identify dominant species.

Information from the photographs was then transferred to 77 U.S. Geological Survey Maps; 17 of the maps covered areas with no mappable vegetation and 24 contained less than 10 hectares of grasses. To determine how distribution and abundance have changed over time, archival photos dating from 1952 to 1978 were analyzed. The Chester River area, the Eastern Bay area, and Salt Peter and Seneca Creeks were chosen to indicate historical trends.

Results

In interpreting the photographic coverage of the Maryland portion of the Bay, scientists determined that the mid-Chesapeake is relatively healthy in both diversity and abundance. Archival photographs indicate that grasses in the Chester River area increased until the 1960s, declined, and increased again until a decline after a hurricane in 1972. There seems to be a trend of increased distribution in 1978.

Archival data for the Eastern Bay were too insignificant to draw any meaningful conclusions. Salt Peter and Seneca Creeks had a greater distribution of SAV than in the early 1970s but there seems to be some stabilization in the 1978 survey.

Recommendations

Broad SAV surveys should be initiated every three years to record and predict trends. Yearly monitoring of regionally representative areas should be more complete, including species composition, percentage cover, and seasonal growth characteristics. Color photography should be used as it enhances species distinctions.

Lab and field studies should continue so that the parameters of Bay-grasses, with respect to light, temperature, and other factors which may threaten SAV populations, can be determined. While aerial reconnaissance maps distribution and diversity, it does not ascertain critical ranges.

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The complete report, entitled "Distribution of Submerged Vascular Plants, Chesapeake Bay, Maryland," (Order No. PB 83-264 226; Cost: $14.50, subject to change) will be available only from:
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