Habitat Hotline Atlantic

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Atlantic States Prepare Conservation Plans for Submerged Aquatic Vegetation

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Introduction

Submerged aquatic vegetation (SAV), such as eelgrass and turtle grass (Figure 1), is defined as "rooted, vascular, flowering plants (angiosperms) that, except for some flowering structures, live and grow below the water surface. [1]" SAV beds are considered to be some of the most productive ecosystems in the world. Seagrasses perform a number of ecological functions, including chemical cycling, shoreline stabilization, and modification of the water column and sediments. In addition, seagrasses have been extensively documented in scientific literature as providing critical habitat to many finfish species. The majority of all commercially and recreationally important fish and shellfish species utilize this habitat type during some stage of their life cycle. The fish species managed by the Atlantic States Marine Fisheries Commission (ASMFC) depend on SAV beds for shelter, nursery grounds, and nutrition.

Recognizing the important role that SAV plays in the critical life history of ASMFC managed species, the ASMFC adopted a policy in 1997 to protect SAV habitat. As part of this policy, the ASMFC developed technical guidelines and standards to objectively determine fishing gear impacts to SAV, which are outlined in the report "Evaluating Fishing Gear Impacts to Submerged Aquatic Vegetation and Determining Mitigation Strategies."

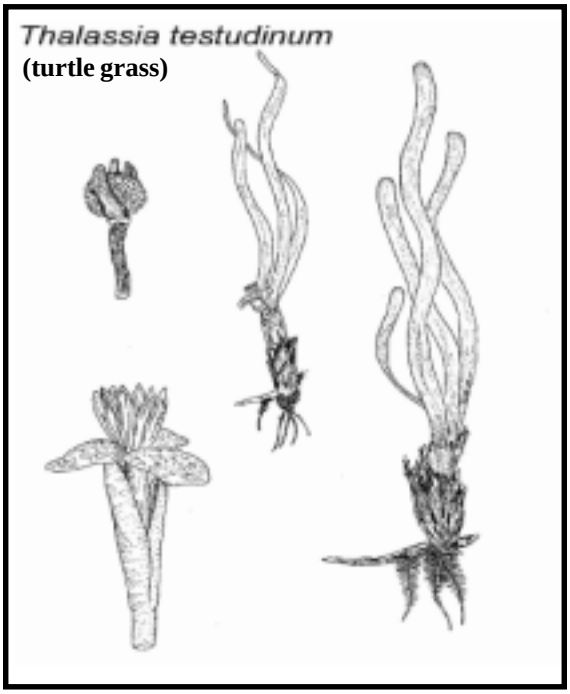

Figure 1. Drawing of turtle grass. Courtesy of the Florida Fish and Wildlife Conservation

In their next step to advance SAV protection and enhancement along the Atlantic coast, several states have voluntarily submitted SAV Conservation Plans, identifying the status of SAV beds, as well as focusing on gear interactions and impacts on seagrasses within their states. Each Plan consists of five main components including public education, identification of SAV areas, identification of gear within the state which interacts with SAV, the actions taken to ameliorate the impacts of gear on identified SAV areas, and recommendations for the ASMFC. For each component (except the final one), the states identify what they are

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presently doing in that category and their plans for improvement over the next three years. In developing its own state-specific plans, each state can tailor its plan to address the SAV species, gear types, different habitat jurisdictions, and past activities of that state.

To date, the ASMFC has received eight plans from Florida, Georgia, Maryland, New Jersey, New York, North Carolina, Rhode Island, and South Carolina. Many of the remaining states are conducting ongoing research on SAV mapping and gear impacts on SAV. This article will summarize the contents of the eight SAV Conservation Plans.

Identification of Submerged Aquatic Vegetation

SAV is found in every coastal state in the United States, except for Georgia and South Carolina where tidal conditions, currents, and water clarity inhibit its growth. The most common species found along the Atlantic are *Zostera marina*, or eelgrass, followed by *Ruppia maritima* (Widgeon grass, Figure 2), and *Halodule wrightii* (Cuban shoalgrass) in North Carolina. In Florida, *Thalassia testudinum* (turtlegrass) and *Syringodium filiforme* (manatee grass) are the dominant species. Other important Atlantic coastal species include, *Vallisnera americana* (water celery), *Potamogeton perfoliatus* (pondweed), *Myriophyllum spicatum* (Eurasian watermilfoil), *Najas quadalupenis* (Bushy pondweed), *Zannichellia palustris* (horned pondweed), and *Potamogeton pectinatus* (Redhead grass). In Florida, several species of Halophila are also common. Several species of macroalgae also perform ecosystem functions similar to SAV, including *Ulva lactuca* (sea lettuce) and muskgrass (Chara sp.).

Figure 2. Drawing of Widgeon grass. Courtesy of the Florida Fish and Wildlife Conservation Commission.

All states that have submitted SAV Plans have conducted SAV mapping at some point employing federal, state, and local partnerships to aid in their mapping projects. Mapping strategies include the use of aerial photography, Geographic Information Systems (GIS), and ground-truthing land surveys. Below is a general description of each state's mapping programs:

Florida works with a variety of agencies to perform aerial surveys every two to five years. Currently, it is developing and testing new techniques to map SAV beds, including satellite and acoustic methods, as well as hyperspectral imaging. Florida has numerous partnerships to complete their mapping. In addition, Florida is working with the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) to develop a standardized benthic mapping classification system, including SAV.

North Carolina does not currently conduct any statewide mapping projects, however, distribution of SAV has been estimated based on a variety of surveys dating from the 1960s through the early 1990s. The current distribution of SAV in coastal North Carolina is believed to be fairly similar to historic distribution, although with less coverage than in the past. Figure 3 shows the estimated distribution of SAV in North Carolina coastal waters.

The State of Maryland, through the Virginia Institute of Marine Sciences, conducts an aerial survey of the entire Chesapeake Bay and coastal bays each year. Maryland also uses a ground-truthing network of volunteers to confirm species identities and densities where possible. The Maryland Department of Natural Resources also occasionally does it's own ground-truthing and aerial surveys. In partnership with EPA's Chesapeake Bay Program, Maryland and Virginia are currently analyzing historic SAV distribution during the 1930's - 1950's to better understand past distribution and more appropriately target areas for restoration.

Although New Jersey currently does not conduct any statewide mapping projects, information on SAV distribution has been collected through a number of different survey mechanisms usually focusing on particular coastal areas, such as Barnegat Bay. Additionally, information has been collected in conjunction with a shellfish inventory. A comprehensive survey of SAV beds was done in 1979 using aerial photography, along with ground-truthing.

New York uses a variety of different mapping techniques. It uses GIS in the Hudson River Estuary, as well as aerial surveys and field measurements in Peconic Bay. New York also has a ground-truthing project planned for the near future. Some of its partners include U.S. Army Corps of Engineers, Peconic Estuary Program, U.S. Fish and Wildlife Service, New York State Department of Environmental Conservation, Cornell University, and the Institute

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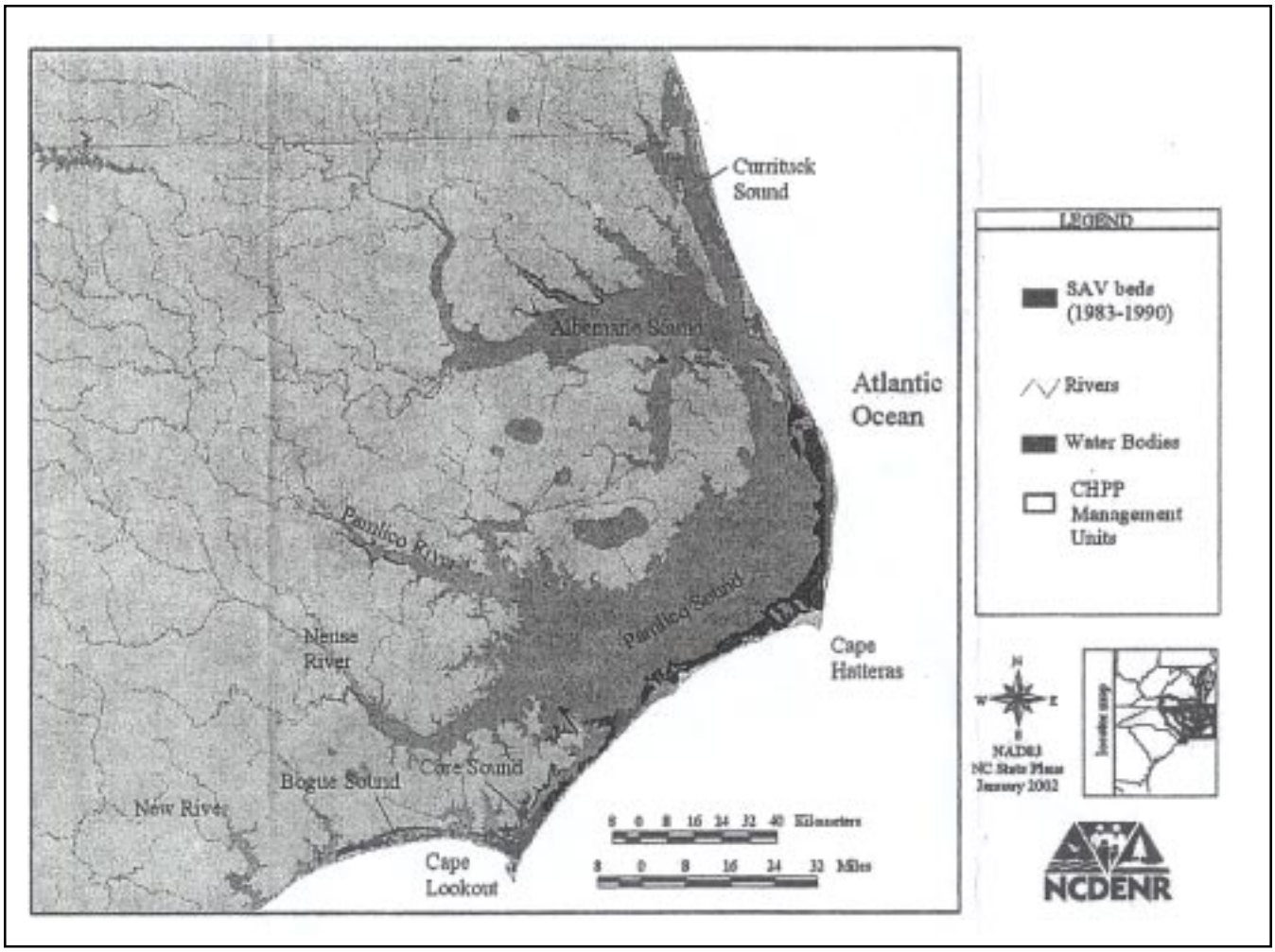

Figure 3. Map showing the distribution of submerged aquatic vegetation in coastal North Carolina.

for Ecosystem Studies.

Rhode Island, through partnership with the Narragansett Bay Estuary Program and Save the Bay Inc., uses true color aerial photographs to map their SAV beds. The Natural Resource Assessment Group at the University of Massachusetts's Department of Plant and Soil Sciences interprets the images. All data are incorporated into the Rhode Island GIS.

Identification of Fishing Gear

In each of the reports, states were asked to identify fishing gear used within state waters that causes impacts of concern to SAV and to specify locations of interactions. Of the various types of gear used in the states, those that harvest shellfish pose the greatest threat to SAV beds. All of the states, with the exception of Florida, listed dredging as one of the gear types that causes serious damage to seagrasses. All of the states rated this type of gear as having a moderate to high level of impact on seagrasses. New Jersey reports that in the past scallop dredging has been a high threat to SAV, but points out that a scallop fishery has not existed in New Jersey for the last three decades.

Dredging is a bottom disturbing fishing gear and is considered to be a high threat due to the amount of damage that it causes to the plant. This gear type shears the leaf and flower of the SAV, as well as causes root damage and turbidity. It can also completely bury the plant. Many states have restricted dredging in SAV bed areas to minimize the loss of this habitat. Consequently, some states note that in areas with these gear restrictions, dredging is no longer considered a high threat to SAV.

Other gear types of concern include the otter trawl, which was rated as moderate in both Florida and Rhode Island, and hand rakes and tongs (rated high in Rhode Island, moderate to high in New York, and moderate in North Carolina). New Jersey also rates this as a moderate to high threat activity when occurring in SAV beds. However, it states that this type of gear is hard to use in SAV areas due to fouling and operating difficulties, implying that this method is rarely used in SAV beds.

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Other fishing gears of concern include, clam treading (moderate to high) and beam trawling (moderate) in New Jersey. New York also listed churning for soft clams as a high threat to SAV beds, and Rhode Island listed pots and traps as a moderate threat. Florida listed beam trawl with roller frame for bait shrimp and shallow draft boats for recreational divers as high impact activities. In Florida, propellers tear and cut the roots, stems, and leaves of the seagrasses. This is particularly a problem in shallow areas.

State Initiatives to Address Gear Impacts

In order to minimize the impact of fishing gear on seagrass beds, most of the states submitting conservation plans have enacted laws and regulations to ban or limit fishing in areas where the SAV beds exist. Results of these laws have varied among the states. Rhode Island reports that the seasonal and gear restrictions on the bay scallop fishery has dramatically reduced the impact of fishing gear on its seagrass. The effect of the designation of an SAV area in Rhode Island has yet to be determined. On the other hand, Maryland has found that the law it enacted, restricting the use of hydraulic clam dredges in delineated areas, has been difficult to enforce and has not been very effective. As a result—in July 2002, a new law became effective that allows for straighter delineation, making it easier for both watermen and enforcement officers to clearly recognize areas closed to protect SAV beds. New York reports that it does not have enough data to show whether or not its seasonal and gear restrictions are protecting seagrass.

In addition to area closures and gear limits, Florida has designated certain areas as no-motor or no-entry zones to preserve habitat. New Jersey has set standards to protect SAV beds from coastal development.

Public Education

Methods to educate the public about the importance of SAV to many recreational and commercially important species vary greatly among the states. Some states, such as Florida and New York, use educational materials, like pamphlets and brochures, to increase awareness about this habitat type. Maryland uses electronic and print media to educate the public, as well as providing presentations to a wide variety of audiences. North Carolina and New York both utilize a website to educate the public. Florida has a mobile habitat trailer, which travels around to different locations and provides outreach. There is also information on SAV beds in Florida's Boaters and Anglers Guide Series.

Many states also have educational classes and clinics. Florida provides clinics for women and children boaters and anglers, as well as a teaching component on seagrass in a required class for boaters ages 21 years and younger. Save the Bay Inc., in Rhode Island sponsors an educational program with both a field and classroom component. Maryland has a Bay Grasses in Classes Program where seagrasses are grown in the classroom and replanted in the Bay. The classroom component of this program provides students with knowledge on the importance of the SAV habitat type.

New Jersey, North Carolina, and Rhode Island state agencies have no formal educational programs. Other organizations within these states provide some form of education and public outreach.

The Atlantic States Marine Fisheries Commission (ASMFC) has written several documents that establish the importance of submerged aquatic vegetation (SAV) to fisheries. Documents published by the ASMFC include: Atlantic Coastal Submerged Aquatic Vegetation: A Review of its Ecological Role, Anthropogenic Impacts, State Regulations, and Value to Atlantic Coastal Fisheries (1997), ASMFC Submerged Aquatic Vegetation Policy (1997), and Evaluating Fishing Gear Impacts to Submerged Aquatic Vegetation and Determining Mitigation Strategies (2000). These reports are available through the ASMFC website at www.asmfc.org/news/htm under Habitat Management Series.

ASMFC Recommendations

States were asked to outline what activities the ASMFC could undertake to assist the states in protecting SAV. Some of the common recommendations to the ASMFC included:

- ▶ Preparation and distribution of educational documents to the public
- ▶ Development of a generic protection and preservation program
- ▶ Influence Congress to obtain funding for continued monitoring programs
- ▶ Funding for educational programs

In response to these recommendations, the ASMFC is releasing a SAV brochure which outlines the importance of SAV as well as information on how boaters and fishermen can protect it. This will be available on the ASMFC website (www.asmfc.org) and distributed to interested states.

[1] ASMFC. 1997. Submerged Aquatic Vegetation Policy. ASMFC Habitat Management Series No. 3. Washington, DC. 9 pp.

Shad and River Herring Habitat Restoration

Habitat restoration is one of many components in the Shad & River Herring Fishery Management Plan (Amendment 1, Objective 4) of the Atlantic States Marine Fisheries Commission (ASMFC). As part of its management program, the ASMFC's Shad & River Herring Management Board requested that states submit a voluntary report summarizing state initiatives to restore shad and river herring habitat in river systems along the Atlantic coast. The Amendment includes several recommendations for improving alosine habitat, such as improving or installing fish passage at dams, removing dams, improving water quality, evaluating fish passage efficiency, and ensuring appropriate river flow allocations and water withdrawls. Reports have been submitted by Maine, Massachusetts, Connecticut, Pennsylvania, Delaware, Maryland, North Carolina, South Carolina, and Georgia.

The following examples of some recent and future efforts to restore alosine habitat are taken from the state reports. As part of the Chesapeake Bay Program within Maryland's Chesapeake Bay watershed, more than 292 miles of streams have been reopened to the passage of anadroumous and semi-anadromous fish since 1983. Also as part of this program, Pennsylvania reported that 250 miles of main stem river spawning habitat for migratory fish in the Susquehanna River Basin have been reopened and an additional 270 miles will be reopened in 2003.

In 2001, several states reported successful efforts. Massachusetts had a very productive year for fishway restoration—restoring and maintaining access to over 1,100 acres of spawning/nursery habitat. Connecticut's water quality improved dramatically in the lower Naugatuck River when the last sewage treatment plant was upgraded and the first adult American shad passed through the fishway at the lowermost dam in about fifty years. Maine required that companies or individuals utilizing Maine's rivers as a source of water for industrial purposes register with Maine's Department of Environmental Protection to ensure that decisions on river flow take into account alosine stocks.

Over the past several years, twelve tributary dams on the Delaware River were removed and an additional 15-20 dams are expected for removal over the next five years. North Carolina reports that a flow agreement is currently in effect for the Roanoke River, prescribing minimum flow releases for the maintenance of spawning flows. In South Carolina, preliminary discussions relative to fish passage, water quality improvements and instream flows are underway as part of upcoming Federal Energy Regulatory Commission relicensing at several dams. Future efforts, expected in 2005, in Georgia include installing vented turbines in the Clarks Hill Dam and a hypolimnetic oxygenation system to increase oxygen levels below the dam by 3-4 parts per million.

In addition to providing information on habitat restoration, states were asked to summarize efforts that address the habitat research recommendations that were specified in Amendment 1 to the Shad and River Herring Fishery Management Plan. For example:

- Identify and quantify potential American shad spawning and nursery habitat not presently utilized, and analyze the cost of recovery within those areas,
- Document the impact of power plants and other water intakes on larval, postlarval, and juvenile mortality in spawning and nursery areas, and calculate the resultant impact to adult population size, and
- Evaluate state water quality standards and criteria to ensure accountability for the special needs of anadromous alosines.

Copies of the state reports are available by contacting the ASMFC. For further information contact Lydia Munger, Fisheries Management Plan Coordinator, ASMFC, 202-289-6400 or lmunger@asmfc.org.

Resources

Policy Proposals and Operational Guidance for Ecosystem-Based Management of Marine Capture Fisheries, a new report published by WWF. The report is designed to "develop the concept of Ecosystem-Based Management (EBM) into a workable approach for implementation in individual fisheries. Implementing EBM in marine capture fisheries requires taking careful account of the condition of ecosystems that may affect fish stocks and their productivity. It also requires taking equally careful account of the ways fishing activities may affect marine ecosystems." The report is available for free online in PDF format at http://archive.panda.org/endangeredseas/pubs.cfm. [Source: MPA News Vol. 4, No. 3 (September 2002)]

Website **www.eyesonthebay.net**. The Maryland Department of Natural Resources launched a comprehensive website that utilizes new monitoring technologies and the Internet to provide a better picture of the health of the Chesapeake and coastal bays and assess progress in meeting Chesapeake 2000 goals. The website provides real-time information on a range of data, including salinity, temperature, levels of dissolved oxygen, pH, water clarity, algal levels and chlorophyll concentrations. The website provides background material and a link to the Virginia Institute of Marine Science's 2001 submerged aquatic vegetation survey for Chesapeake Bay and coastal bays. [Source: MD Dept. of Natural Resources Press Release, September 13, 2002]

Report Describes Status of SAV Restoration and Fish Passage in Chesapeake Bay

The Chesapeake Bay Program is a unique regional cooperative effort by the federal government (the U.S. Environmental Protection Agency), Virginia, Maryland, the District of Columbia, the Chesapeake Bay Commission, and participating citizen advisory groups. Since it began in 1983, the Bay Program's highest priority has been the restoration of the Bay's living resources, including finfish, Bay seagrasses, shellfish and other aquatic life. The first Chesapeake Bay Agreement was signed in 1983 and subsequently, additional agreements were signed in 1987 and 2000. In the agreements, partners committed to reaching specific goals for improving and protecting water quality and living resources in the Chesapeake Bay. The restoration goals focused on nutrient reduction, habitat restoration, sustainable development, toxics management, and federal ecosystem management. For example, in 1987, a goal was set to reduce the nutrients nitrogen and phosphorous entering the Bay by 40% by 2000. In *Chesapeake 2000*, the newest Bay agreement, partners pledged to continue efforts to restore underwater bay grasses (also known as submerged aquatic vegetation or SAV), with a goal of achieving 114,000 acres by 2005 and to open 1,357 miles of streams to migratory fish by 2003.

Information on the status of the Chesapeake Bay and on the progress towards reaching the restoration goals set in the Bay agreements is available in **The State of the Chesapeake Bay**, a regularly produced report since 1985. The most recent report was released in August 2002. According to the report, increases in SAV acreage in the upper and lower portions of the Bay were mostly offset by losses of Bay seagrasses in the middle portion of the Bay—attributed to a large-scale algal bloom that occurred in the spring of 2000. Compared to 1984, Bay seagrasses have increased from 38,000 acres to more than 69,000 acres. The report also tells that shad populations reached their highest levels since the 1980's in part due to recent stocking efforts, a Baywide moratorium on shad fishing and the development of fish passages on the Susquehanna River. In total, 849 miles of streams were opened to fish passage between 1988 and 2001.

The State of the Chesapeake Bay reports and information on the Chesapeake Bay Program and agreements are available at the website www.chesapeakebay.net.

[*Sources:* www.epa.gov/ecoplaces/part1/site2.html, www.chesapeakebay.net/overview.htm, and www.chesapeakebay.net.]

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