Joint Federal Agency

Submerged Aquatic Vegetation Survey Guidance for the New England Region

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FOREWORD

This guidance is the result of on-going interagency collaboration between the Northeast Region National Oceanic Atmospheric Administration Fisheries Service Habitat Conservation Division, U.S. Environmental Protection Agency Region 1 and the U.S. Army Corps of Engineers New England District (Corps). This document has been developed to assist project proponents, applicants and/or their consultants within the geographic area covered by the Corps when an assessment of submerged aquatic vegetation (SAV) is needed to evaluate proposed waterway development projects or regulated work within navigable waters. This two-tiered approach to SAV survey guidance is intended to match the level of detail and complexity of a survey with the potential adverse effect of the proposed work within coastal waters.

The Tier-1 survey is devised to provide qualitative assessment of SAV resources within the vicinity of a proposed project and is generally applicable to small-scale activities, such as single-family docks and piers, small-scale aquaculture projects, boat moorings and ramps, and small-scale activities associated with transmission cables and pipelines. A Tier-1 survey may be considered a reconnaissance level survey that captures basic information such as presence/ absence, identification of SAV bed spatial distribution, approximation of the total area of the SAV bed, qualitative assessment of SAV density, and maximum and minimum depth distribution.

The Tier-2 survey is intended to be a more quantitative assessment for work with the potential for direct impact to SAV resources and is generally applicable to larger-scale projects, such as dredging, commercial-scale marinas, cable and pipeline installation projects involving trenching and filling, and construction of small-scale ocean energy structures (e.g., tidal or wave energy, wind energy). However, it is important to note that the spatial scale of these latter types of coastal development projects can have potentially larger impacts on SAV and may require more extensive site analysis and evaluation than is presented in this guidance. Coordination with the regulatory and resource agencies is advisable prior to developing a SAV survey plan for larger-scaled projects. Likewise, compensatory mitigation projects involving SAV may require environmental assessments beyond the scope of this guidance.

There are other SAV sampling methodologies available, particularly in geographic areas outside New England. The selection of survey methods may be influenced by underwater visibility, SAV species, the availability of baseline SAV distribution data, and other state or local protocols. Consultation with appropriate state, federal, and university SAV experts is advised for areas outside of New England, for larger-scale projects, or projects involving multiple monitoring efforts such as compensatory mitigation and SAV restoration projects.

INTRODUCTION

The methodology described in this document can help determine SAV presence and species composition, the amount and relative density of SAV bed and habitat in an area, and provide spatially-relevant information about the resource. Spatial information can be used to develop a map of the SAV beds, which will help determine the potential impact of the proposed development as well as consideration of alternative locations and configurations that may avoid or minimize impacts to SAV. Because SAV beds can gradually shift in both location and density over time (from months to years) in an area, survey data that have been collected recently are necessary to evaluate a newly proposed waterway development project. The methods here apply to eelgrass (*Zostera marina*), but many of these techniques could be used for surveying other species of SAV, such as widgeon grass (*Ruppia maritima)* and for a tidal freshwater plant such as wild celery (*Vallisneria americana*).

Ideally, the project proponent should map the extent of the eelgrass bed during the time of peak biomass, which in New England is generally in July. Surveys conducted outside of the growing season, May through September, may be unreliable and should be avoided. If at all possible, the size of the affected area, as well as the heterogeneity and complexity of the habitat, water depths, etc. should be taken into account when designing an SAV sampling plan. Finally, the SAV survey should be performed or directed by someone who can demonstrate familiarity with ecological survey methods, identification of SAV, and SAV ecology.

Tier-1 Survey Methodology:
The intent of the Tier-1 survey is to determine the presence/absence of SAV in the vicinity of the proposed project and, if applicable, delineate the spatial extent of the SAV bed(s). Aerial photography may be available by the state or a university research facility and can be beneficial in providing a historical context on SAV distribution in an area, as well as preliminary information on current distribution. The addendum to this document contains a working list of useful resources and internet links which may assist in this regard. However, a field survey will be necessary to determine site specific SAV presences/absence and distribution. There are three methods that can be used to do this.

> Method 1: If the water is clear, it may be possible to delineate the habitat from a boat. The proponent should select a good negative (i.e. low) tide if possible to minimize the depth of water that needs to be worked in/looked through. If the water is clear, it is possible that the deep or offshore edge of the SAV bed may be visible with the naked eye from the boat or with the use of a bathyscope (underwater viewing box). GPS coordinates and water depth can be taken periodically to track the deep edge of the bed. The shallow, or inshore, edge of the bed is usually visible at low tide and a person wading with a handheld GPS unit can quite accurately record the position of this edge.

If the water, even at low tide, does not allow observation of the bottom, then the proponent can proceed in one of two ways.

> Method 2: Using snorkelers/divers, the proponent can have a series of buoys placed at the edge of the bed. Then the applicant or his agent should then maneuver his/her vessel

from buoy to buoy recording GPS coordinates. *One caution*, the scope, or length, of the line on the buoy needs to be minimized to the greatest extent possible. Having a large amount of scope on the line can lead to significant under/overestimate of actual eelgrass extent.

Method 3: If snorkelers/divers cannot be obtained, then the proponent should follow a detailed grid pattern over the project area, using an underwater drop camera. (The camera can be used in conjunction with or instead of a viewing box to determine the bottom type.) GPS coordinates and water depth of each place where SAV is found should be recorded. The grid should extend well beyond just the proposed project area. SAV coverage between points is inferred with this method.

Occasionally, SAV will occur in a thick bed with well defined, distinct edges. When this is the case, mapping the distribution of the habitat is relatively straightforward. However, SAV beds come in many shapes, densities and sizes. Frequently, bare patches of sand will be found within an otherwise continuous bed or the edges will not be sharply defined. Instead, shoot density will gradually decline, but you may continue to find patches of SAV or individual shoots well outside what you could consider the edge of the bed. It is important to record the location and water depth of these patches, as viable SAV habitat may simply be the area shallower/inshore of this point.

Some beds can appear as just a series of small patches. It is not critical to map each individual patch, but to capture a sense of the larger bed. In this case, the deepest and shallowest points of plant growth should be captured and everything in between is considered viable habitat, whether it is presently vegetated or not. One exception to this rule occurs if the bottom substrate is rock, which obviously will not support eelgrass growth.

Using appropriate plotting software and the collected GPS coordinates, the proponent should produce a map of eelgrass distribution and approximate size of the overall bed(s). Relative density of the bed(s) should be estimated [e.g., sparse (1-10% cover), low (11-25%), moderate (26-50%), and high (> 50%)]. Proposed project details should be overlaid on this map. In addition, any other observations that are biological in nature, such as shellfish or algal beds, crabs or lobsters, and fish fauna, should be reported in the SAV survey report submitted to permitting and resource agencies.

The following data should be recorded in the field and included in the survey report:

1. Date and time of day (start and finish)
2. Water depth at substrate for shallowest and deepest edges of bed(s)
3. General sediment type (e.g., silt, mud, sand, shell, etc.)
4. Estimate of the percent cover of SAV within the project vicinity (for each species, if applicable) [e.g., barren, sparse (1-10% cover), low (11-25%), moderate (26-50%), and high (> 50%].
5. Notable biological observations (e.g., shellfish or algal beds, crabs or lobsters, and fish fauna).

Survey Reporting for Tier 1 Survey:
Using the GPS coordinates taken from sampling methods 1, 2 or 3, prepare a map of the project area with the sample date and times, the bathymetry of the site, sediment type(s), SAV species composition, percent SAV coverage, and the location of the SAV bed(s). This information should be projected on the site plan of the proposed project. In addition, calculations of total project acreage, estimated SAV acreage, and total SAV habitat acreage should be provided in the report (the SAV acreage is the total area of all SAV beds and patches where rhizomes overlap or where shoots intermingle on a scale of less than 1 m^2; SAV habitat acreage is all beds, patch beds, and bare interpatch areas). Notable biological observations should be included in the report.

Tier-2 Survey Methodology:
The intent of Tier-2 survey is to expand the scope of the Tier-1 survey to obtain more detailed information about the SAV bed(s). The Tier-2 survey, using quadrat sampling along transect lines and quantitative sampling of shoot length, should be designed to be replicated, because post-construction surveys may be required to determine the extent of potential SAV impact or be used to monitor the success of SAV compensatory mitigation projects. In-water surveys are generally necessary, since quantitative sampling of SAV can only be conducted by close examination of the plants and substrate. In order to provide close examination and inspection of SAV and bottom substrates, in-water surveys are typically conducted by divers using SCUBA or surface-supplied air. As discussed in the Tier-1 survey methodology, aerial photography may be available by the state or a university and can be beneficial in providing a historical context on SAV distribution in an area, as well as preliminary information on current distribution. However, determination of SAV distribution and abundance should be verified with in-water surveys and not on aerial photography alone.

Define the area of SAV within the limits of the proposed activity by surveying a series of transects located between the property line extensions associated with the proposed project site. Generally, surveys should include transect lines running perpendicular to the shoreline. A transect interval of 3 meters is acceptable for most dock and pier projects, but will be dependent on the size of the project area and the heterogeneity of the SAV beds. In the case of fragmented beds, transect lines every 2 meters may be necessary. For areas containing homogeneous SAV beds or for projects involving very large areas, 5-meter interval transects may be appropriate. For projects not adjacent to the shoreline (e.g., aquaculture projects), orientate transects relative to another physical reference, such as a channel boundary or depth gradient. Additional transects beyond the boundaries of the project limits are necessary to determine whether the project is within, or on the edge of, or outside of, SAV habitat.

Quantitative Sampling:
Quantitative sampling of SAV should be limited to areas no deeper than the deepest natural SAV patch found in the vicinity of the project; otherwise, including areas too deep to support SAV in the survey would artificially skew the mean percent cover for the entire site. Along each transect line, a 0.25-m^2 quadrat sampling station should be placed at intervals of 3 meters. Five-meter intervals between quadrats may be appropriate for very homogeneous SAV beds or for larger project sites. The quadrat should be placed on either side of the transect line at each sampling station. This can be done either randomly (e.g., coin toss) or by consistently placing the quadrat on one side or the other for all sampling stations. The datum for the survey data should be mean

low water (MLW). MLW shall be set equal to zero. The following data should be recorded at each sampling station:

1. Date and time of day for each sampling transect
2. Water depth at each sampling station
3. General sediment type (e.g., silt, mud, sand, shell, etc.)
4. Estimate of the percent cover of SAV within each 0.25-m^2 quadrat (for each species) and the mean for the entire site [e.g., barren, sparse (1-10% cover), low (11-25%), moderate (26-50%), and high (> 50%].
5. Mean shoot length of 1-3 randomly chosen SAV blades within each 0.25-m^2 quadrat (for each species) (note: collecting SAV blade samples and measuring them on a boat or on land may be more effective).*
6. Epiphyte coverage (i.e., absent, light, or heavy) for each species.*
7. Notable biological observations (e.g., shellfish or algal beds, crabs or lobsters, and fish fauna).

*applicable only when multi-year or multi-season surveys or pre- and post-construction surveys are required.

Survey Reporting for Tier 2 Surveys:
Using the transect data, prepare a map of the project area showing the location and depth of each sampling station, sample date and times, sediment type, the location of SAV beds, SAV species composition, percent SAV coverage, and the limits of the SAV habitat. This information should be projected on the site plan of the proposed project. In addition, calculations of total project acreage, SAV acreage, and SAV habitat acreage should be provided in the report (the SAV acreage is the total area of all SAV beds and patches where rhizomes overlap or where shoots intermingle on a scale of less than 1 m^2; SAV habitat acreage is all beds, patch beds, and bare interpatch areas). A characterization of the mean shoot length and epiphyte coverage for each species should also be included in the report, when applicable. Because the distribution and density of SAV can demonstrate seasonal and annual variation, it may be necessary to sample a site over multiple growing seasons. This may be particularly important in areas with little or no historic survey data or areas that may be experiencing changing water quality, hydrological or ecological conditions. Attempts should be made to conduct multi-year surveys during the same time of year to avoid seasonal biases in the results. Notable biological observations should be included in the report.

Additional Information:
Please direct questions to Phil Colarusso, EPA at PHONE or colarusso.phil@epa.gov; or Alison Verkade, NMFS, at (978) 281-9266 or alison.verkade@noaa.gov.

Addendum

Connecticut:
http://www.ct.gov/deep/cwp/

Maine:
http://www.maine.gov/megis/catalog/

Massachusetts:
http://maps.massgis.state.ma.us/map_ol/moris.php
http://maps.massgis.state.ma.us/images/dep/eelgrass/eelgrass_map.htm

New Hampshire:
http://www.granit.unh.edu/data/downloadfreedata/category/databycategory.html

Rhode Island:
http://www.rigis.org/data/bio