Wood Island Harbor and the Pool at Biddeford Federal Navigation Maintenance Project

Biddeford, Maine

Eelgrass Damage Assessment and Mitigation Plan (DAMP)

US ARMY CORPS
OF ENGINEERS
New England District

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1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New England District (NAE) is proposing maintenance dredging to remove shoals in both the 10-foot Wood Island Harbor Federal Navigation Channel and the 6-foot basin in Biddeford Pool (Figure 1). The City of Biddeford has requested maintenance for this project. Areas of the channel have shoaled in to depths as shallow as 6.3 feet MLLW in the channel and 0.6 feet MLLW in the basin. This is the result of natural shoaling over time. The shoals are hindering navigational access and compromising vessel safety. The proposed work involves dredging approximately 45,000 cubic yards (cy) of sand and silty material from an area of roughly 8.4 acres (3.3 acres within the pool and 5.1 acres within the channel) within Wood Island Harbor channel and the anchorage area of Biddeford Pool. Material to be dredged is primarily sand, except for approximately 6,000 cy of silty material located in the southern corner of the basin. Dredging is expected to take 3 to 4 months in the fall and winter months (November 1 to March 31) in the year that funding becomes available.

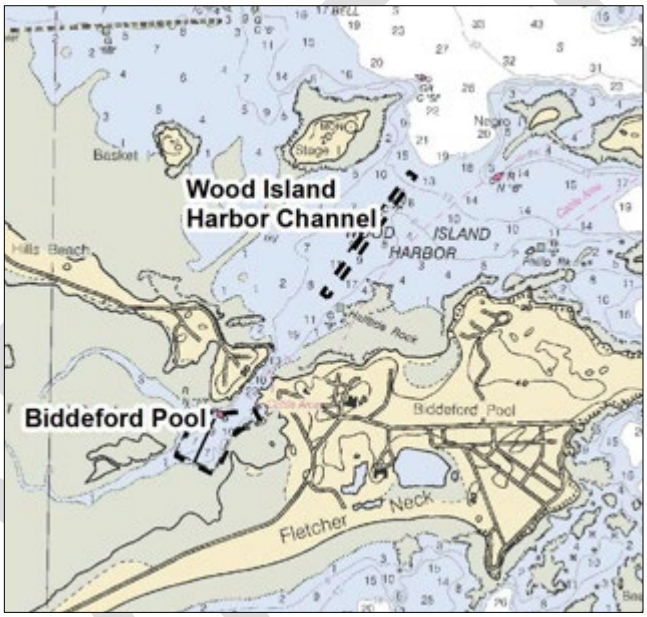

FIGURE 1

1.1 Project History

Original authorization for navigation improvements to Biddeford Pool occurred under the Rivers and Harbor Act of 1950. Construction of improvements occurred in 1956 and consisted of:

1. Dredging a 10.2 acre, 6-foot Mean Low Water anchorage located approximately 800 feet inside the entrance to Biddeford Pool.
2. Dredging an adjoining 2-acre mooring basin at wharfs on the South side of the gut.
3. Constructing of an array of three rubble mound icebreakers southeast of the anchorage to protect mooring basin.

Maintenance dredging of Biddeford Pool was completed in January-May 1989. Approximately 38,000 cy of material were removed and placed at the Saco Bay Disposal Site (USACE, 1990).

The Chief of Engineers under Continuing Authority of Section 107 of the River and Harbor Act of 1960 authorized the 100-foot wide channel by 4,200 feet long through Wood Island Harbor to Biddeford Pool at a depth of ten (10) feet MLW (plus one foot overdepth) on 18 October 1990. Construction of this improvement project occurred in October and November of 1992. Approximately 17,000 cy of material was placed on an inter-island sand bar located between Stage and Basket Islands (USACE, 1990). The 4.6-acre channel area dredged in 1990 is 2,000-feet long by 100-feet wide, and is the current Federal channel boundary (Figure 2).

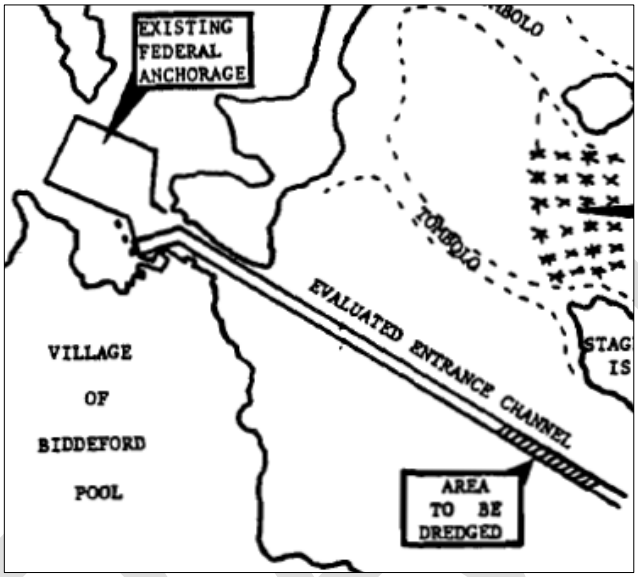

FIGURE 2

1.2 Purpose

The purpose of this document is to (1) document USACE impact estimation calculations; (2) describe existing eelgrass resources in Wood Island Harbor; (3) demonstrate how project planning has avoided and minimized eelgrass impacts for this project; and (4) present an eelgrass damage assessment and mitigation plan for Wood Island Harbor.

2. GENERAL DREDGE IMPACT ESTIMATIONS

For initial general impact estimations, USACE uses a standard 3:1 ratio to estimate the general impact area due to construction of a slope. For example, if the channel is authorized to a 10-foot depth, a 30-foot perimeter extending beyond the channel boundary would be added to the acreage of the channel itself (Figure 3 – not to scale).

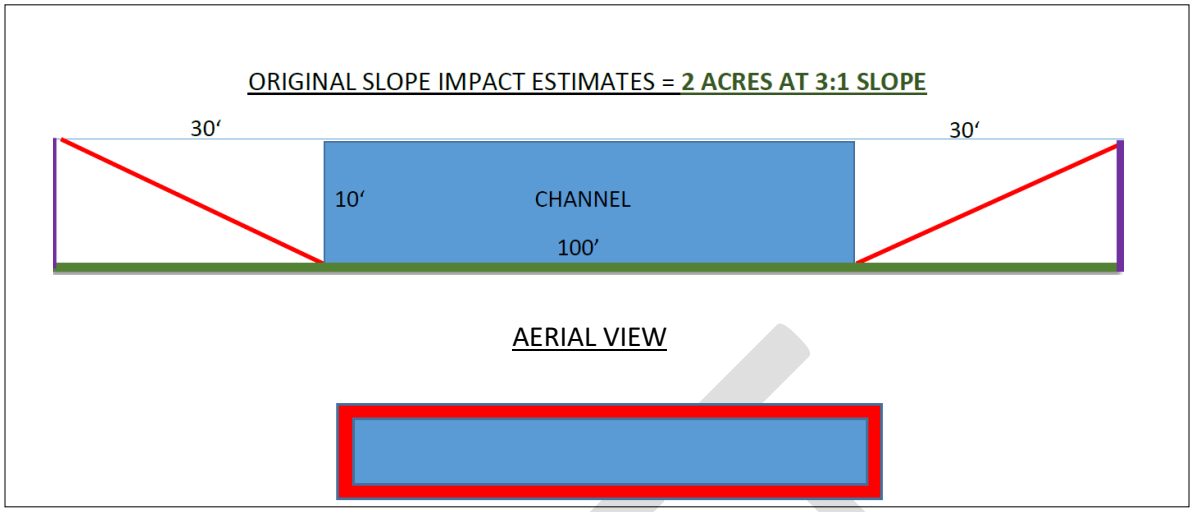

FIGURE 3

In the aerial view, above, blue represents the standard channel acreage and red would be the additional estimated standard 3:1 slope impact acreage.

A box cut is a side slope dredging technique in which shoal material is removed in a trench-like manner along the exterior limits of the dredge area (as opposed to a stepped cut feature which creates a slope which is typically used). The depth and width of the box cut vary to account for material outside of this trenched feature to slough in at the sediment's natural angle of repose (stable slope angle based on sediment characteristics). The more material in the side slope area, the deeper/wider the box cut should be to avoid creating a post-dredge shoal above the target depth.

2.1 Areal and Reduced Impact Estimations

Areal impact estimations due to direct dredging and subsequent channel sloughing incorporate site bathymetry data, the method of dredging along the channel edges (using a standard 3:1 slope or using a box cut), the actual elevations within the dredge footprint of the channel (which varies depending on targeted overdepth) (Figure 4). These calculations are developed by USACE engineers and are presented in the Final EA document.

For the Wood Island Harbor channel, the areal extent of dredging (and therefore impacts) was reduced by eliminating overdepth-only areas within the channel (i.e., areas that are currently at depths of -10+ feet MLLW but shallower than -11 feet MLLW). This measure will reduce impacts to eelgrass from 3.65 acres to 2.92 acres (Table 1). In addition, impacts to the extent of eelgrass being dredged will be reduced by utilizing the box cut method, instead of the standard slope cut method. This will reduce direct eelgrass impacts in the channel slopes from 0.55 acres to 0.23 acres (Table 1). This value does not take channel sloughing into account and USACE will be performing post construction monitoring to ensure there's no additional impacts due to sloughing. As a result of utilizing these two methods, USACE reduced direct eelgrass impacts from 4.20 acres to 3.15 acres, resulting in a 1.05 acre avoidance.

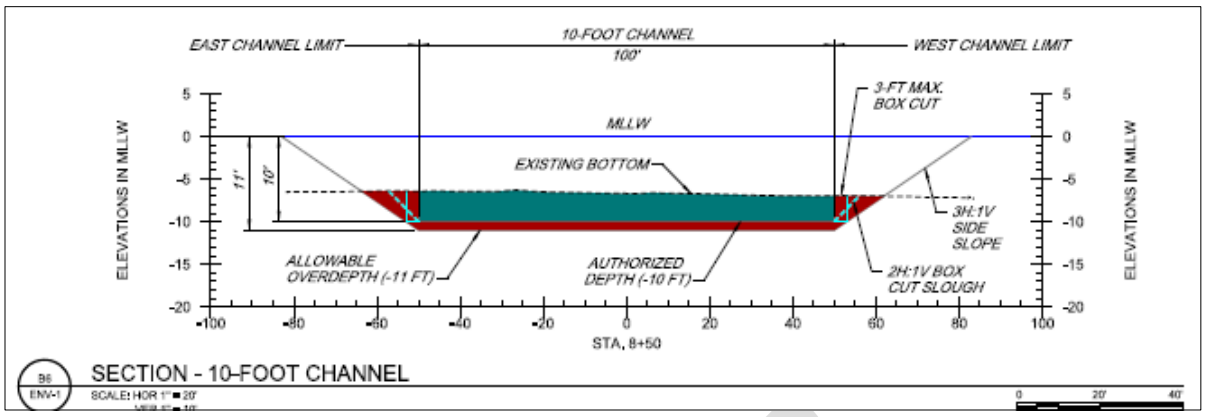

FIGURE 4

Table 1. Impact Estimations

Side Slope Estimations	Area (ac)
Area of side slope impact from standard slope cut method	0.55
- Area of side slope impact from box cut method	0.23
Difference	**0.32**

Overdepth Calculations	Area (ac)
Total area of shoaling in channel authorized for dredging (above -11 MLLW)	3.65
- Area of shoaling in channel without overdepth (above -10 MLLW)	2.92
Difference	**0.73**

Thus, the calculated total direct impact area to eelgrass within the Wood Island Federal navigation project (FNP) is 3.15 acres (137,213 sq feet).

2.2 Estimate of Average Annual Habitat Loss

The documented presence of eelgrass in the channel following the last dredging in 1992 and the fact that eelgrass grows in the channel and its vicinity at depths greater than -10 ft MLLW indicates that the project impacts to eelgrass will be temporary. Over time eelgrass will recolonize the dredged channel. We considered this fact in determining the appropriate amount of compensatory mitigation.

We estimated the average annual loss of habitat value using concepts from the U.S. Fish and Wildlife Service Habitat Evaluation Procedures (HEP) procedures for estimating Average Annual Habitat Units (AAHUs) (USFWS 1980). For this analysis, we've assumed the quality of existing and replacement habitat is equal to 1.0, so that a measure of habitat quality (habitat units (HU) are a measure of area and quality with 1.0 HU equal to one acre of optimum habitat) is not necessary. This is a reasonable assumption because the project will replicate conditions that followed the previous dredging and the habitat condition should, therefore, recover to a similar condition over time following the upcoming dredging event. We used a period of evaluation of 28 years, the duration between the present time and

the previous dredging in 1992, and estimated the time to full recovery of eelgrass in the channel following dredging at 1 to 8 years based on our experience at other locations in New England. Eelgrass recovered within 1 year at Cuttyhunk, Massachusetts following navigation dredging and within 8 years following restoration project dredging at Ninigret Pond in Charlestown, Rhode Island. We used the conservative end of the estimated recovery period of 8 years and a straight-line relationship to represent the recolonization rate (i.e. 0% cover (0 acres) eelgrass immediately following dredging and 100% cover of eelgrass in the channel at the end of the 8 year recovery period) as shown in Figure 5. Based on that relationship, the area of eelgrass would be 0 acres immediately following dredging and 137,213 sq. ft. (the total area of eelgrass impact) at years 6 through 28. Therefore, the total area of habitat loss on a temporal basis (AAHU) is the difference between the average annual eelgrass area (AAEA) minus the without project area (the present area of eelgrass, which is expected to persist for the 28 year period of evaluation) of eelgrass which is 0.45 acres or 19,600 sq. ft. These results are shown in Table 2.

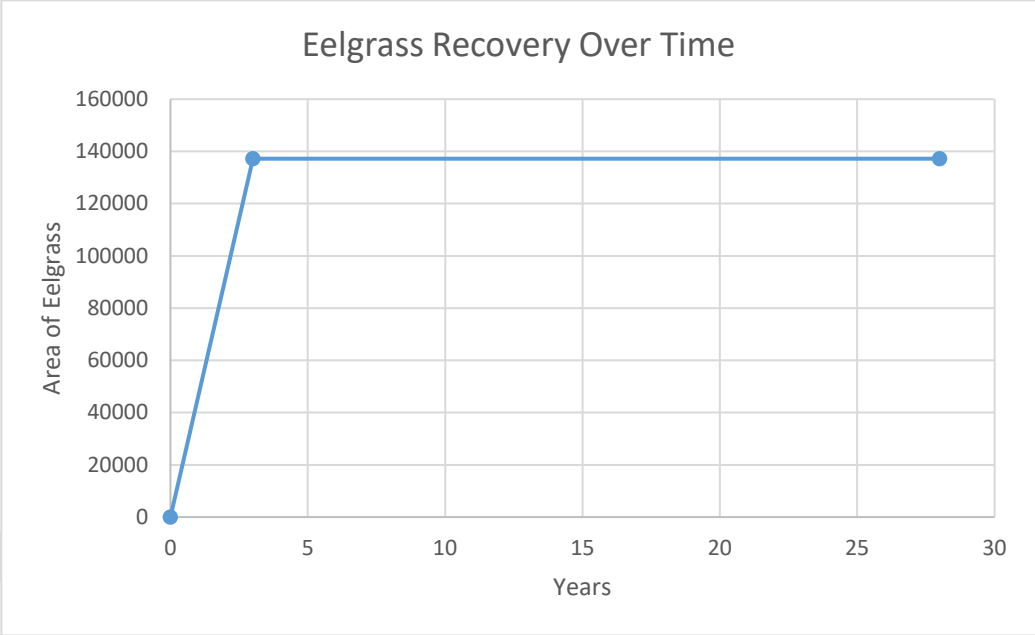

FIGURE 5

Table 2. Average Annual Area of Eelgrass

Year Post Dredging (YPD)	Area of Eelgrass at YPD	Duration of Eelgrass at Area in the Previous Column	Area of Eelgrass at YPD Times No. of Years
1	-	1	-
2	19,602	1	19,602
3	39,204	1	39,204
4	58,806	1	58,806
5	78,408	1	78,408
6	98,009	1	98,009
7	117,611	1	117,611
8	137,213	21	2,881,477
Average Annual Area With Project			117,611
Average Annual Area Without Project			137,213
With Action minus Without Action			19,602

3. EELGRASS ASSESSMENTS

3.1 Methods

Pre and post-construction eelgrass assessments will utilize the same acoustic and video survey methods used during the 2016 and 2019 eelgrass surveys (Appendix C of the EA). The acoustic survey will be performed first to allow for the points for the video ground-truthing to be determined. Positioning for the survey will be achieved using a WAAS enabled Lowrance HDS-10 sonar/chart plotter with external LGC-4000 GPS receiver antenna, and verified with a Trimble GeoXM Differential Global Positioning System (DGPS) with an accuracy of three meters or less.

Acoustic survey transects will be pre-planned in ESRI ArcGIS 10 and transferred to the Lowrance chart plotter for navigation in the field. Transects will be laid out to provide adequate coverage of the survey area using a spacing of approximately 50 feet in an orientation perpendicular to the Federal channel. Acoustic data will be collected using a Lowrance LSS-1 Structure Scan System with a 200/800 kHz transducer array. Sonar data will be viewed in real time and recorded to a memory card using the Lowrance HDS-10. Waypoints will be created throughout the acoustic survey in real time to be later investigated during the video survey.

Video footage will be collected at stations corresponding to waypoints created during the acoustic survey. Video will be collected using a Sea Viewer Sea-Drop 950 Underwater Video Camera and recorded to a portable DVR system outfitted with an LCD monitor for real time viewing. The camera will be allowed to remain on the bottom for approximately 5 to 10 seconds at each station, observing approximately 5 to 10 linear feet of bottom with typical vessel drift.

The Lowrance .sl2 files containing the acoustic data will be processed using the SAVEWS Jr. (Submersed Aquatic Vegetation [SAV] Early Warning System) software package developed by the U.S. Army Engineer Research and Development Center (ERDC). This software uses an algorithm augmented by user-defined parameters to track the bottom depth and the presence of SAV while providing an estimate of canopy height and vegetation percent coverage. Outputs include an ASCII file with output variables and position referenced data and a graphic consisting of the classified output (bottom depth and canopy top) superimposed on the colorized echogram along with aligned data plots of canopy height and percent coverage for each transect. The SAVEWS Jr. post-processing program FINALIZE will be used to combine transect data files, make depth corrections, and coordinate projection transformations. Tide data for FINALIZE will be obtained from a nearby tide station.

Video files will be reviewed using CyberLink PowerDirector video editing software. Representative screen captures will be created from the footage collected at each video station. In addition, the name of each station, waypoint GPS coordinates, and a brief description of the video content will be recorded in a Microsoft Excel spreadsheet. The screen capture database and library will be presented in the monitoring report.

The ASCII file containing the processed and compiled SAVEWS Jr. output will be imported into ArcGIS as a point shapefile and interpolated to a raster representing the SAV percent cover data along each transect. This data will be compared with the video footage from each station to validate the SAVEWS Jr. output and delineate areas of SAV coverage corresponding to eelgrass beds.

3.2 Pre-Construction Analysis

In 2016 and 2019, USACE personnel completed an eelgrass survey of the Wood Island Harbor channel (USACE 2016; See Appendix C of the Environmental Assessment). Transects were run perpendicular to the Federal channel out to at least 30 meters on either side. Data indicate the presence of eelgrass throughout most of the channel (Figure 5). Survey data confirms that the spatial extent of the existing SAV bed is consistent with historic coverage and that the primary species of SAV growing in the project area is *Zostera marina*. The existing eelgrass bed extends beyond the survey boundary on the western side of the channel and tapers out towards the eastern boundary along the northern half of the channel. The bed terminates abruptly just outside the northern entrance along the southeastern channel boundary. Bottom conditions in these areas consisted of a sand and shell substrate with scattered patches of gravel and small boulders.

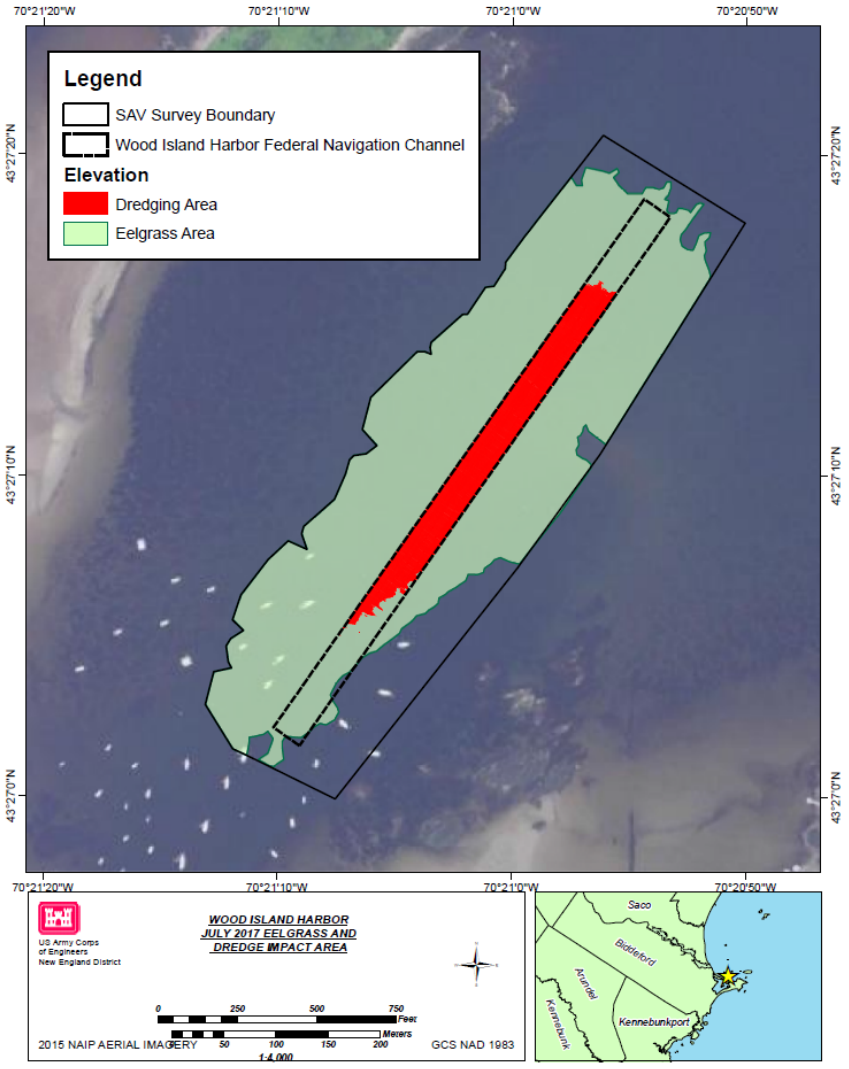

FIGURE 6

A pre-construction eelgrass survey will take place during the growing season (i.e., June-September) prior to project implementation/construction (e.g. 2020). This survey will utilize methods identical to the 2016 and 2019 surveys and data generated will be used to interpret changes in the eelgrass distribution between 2019 and the year of initial construction (e.g. 2020). The pre-construction survey will also provide a more recent set of eelgrass baseline data. As a result of these multiple survey iterations, a margin of error (with confidence intervals) will be calculated to determine what can realistically be differentiated between the two baselines (2019 and pre-construction survey). This margin of error will constitute the sum of all potential mechanical, environmental, and data processing errors and will be applied to the post-construction mitigation assessment survey to evaluate the reproducibility of an areal extent of eelgrass habitat.

The pre-construction eelgrass survey will encompass the Wood Island Harbor channel as well as three reference areas containing eelgrass beds outside of the work zone. The selected reference areas will contain similar habitat as the channel (depth, substrate, water clarify, etc.), but distanced far enough

away from the work zone so that potential impacts to eelgrass from dredging will not be present. The reference areas will serve as an applicable control area and provide baseline data.

3.3 Post-Construction Analysis

Post-construction surveys will follow the same methodology as the pre-construction surveys to document eelgrass impacts. A post-construction acoustic and video survey will be performed in the growing season immediately following completion of all construction activities to assess impacts to eelgrass within the Federal channel and any variation of the reference areas from the prior survey.

This data will be compared in ArcGIS with the pre-construction surveys performed prior to dredging operations. Maps depicting eelgrass percent cover data for the survey area and the video survey stations will be presented in the monitoring report. In addition to the post construction eelgrass survey USACE NAE will perform three (3) additional eelgrass recovery surveys during the summer growing seasons after the completion of the project and generate a report for each comparing the progress of eelgrass recovery.

3.4 Damage Assessment

Impacts to eelgrass beds will be assessed through a statistical comparison of pre and post-construction acoustic surveys of the eelgrass distribution and the visual observations of the ROV data (see Section 2.1). The metric for determining impact will be the analysis of the change in the areal extent between the two surveys less the survey error factor. Video surveys within the survey area will also be conducted to validate the acoustic survey. This statistical comparison and qualitative visual validation observations will provide a final area of impact (in sq ft) as a result of the maintenance dredging project and be used in final mitigation compensation equations described below.

4. MITIGATION APPROACH

The proposed project will temporarily impact approximately 137,214 sq. ft. of eelgrass within the limits of the FNP. According to the mitigation regulation 33 CFR Parts 325 and 332, the project team evaluated several alternative measures for mitigation, based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the project, which are discussed below. The team first attempted to identify a practicable on-site, in-kind mitigation option. None of the alternative mitigation measures were found to be practicable within the Wood Island/Biddeford Pool ecosystem. USACE also reached out to federal and state resource agencies for assistance in developing alternative eelgrass mitigation options, and neither USACE nor other resource agencies were able to identify a practicable in-kind mitigation option within the coastal watershed. No practicable options have been identified besides in-lieu fee.

Compensatory Mitigation Alternatives Considered:

4.1 Whole Plant Transplanting

USACE examined whole-plant eelgrass transplanting within the channel and side slopes of the FNP following dredging (using either boat based transplanting or hand transplanting using the TURFS method for anchoring). However, the project team found this to be unfavorable due to the continuing dredge cycle of the project. USACE also looked into other potential areas for eelgrass transplant but found no viable locations.

4.2 Low Impact Moorings

Low impact moorings can reduce eelgrass impacts by reducing the "scar" area produced by traditional moorings. USACE investigated the current conditions in the project area and did not identify any areas where "scars" were evident that would benefit from transitioning from traditional mooring tackle to low-impact moorings.

4.3 Identifying Out-of-kind Mitigation Alternatives

USACE considered out-of-kind mitigation such as land preservation and other ecosystem restoration projects to be used as mitigation. However, we were unable to identify degraded salt marshes or other resources in need of restoration, and no readily available land preservation options were available.

4.4 Maine In Lieu Fee

In absence of other preferable mitigation options as noted above, the USACE has determined that the appropriate, practicable compensatory mitigation for the loss of eelgrass due to dredging is to use the Maine Department of Environmental Protection (MEDEP) In Lieu Fee (ILF) program to compensate for the eelgrass impacted by the proposed maintenance dredging effort. The ILF program allows applicants to pay a fee rather than complete a permittee-responsible on-site or off-site compensation project.

The ILF Program calculates the monetary value of a mitigation fee based on the magnitude of the impact to the resource, a prescribed resource cost, the assessed land valuation, and a resource multiplier using the formula:

Direct Impact/sq. ft. * ((Natural Resource Enhancement & Restoration Cost/sq. ft.) + Avg. Assessed Land Valuation/sq. ft.)) * (Resource Multiplier) = Fee.

Applying the ILF formula to the extent of eelgrass impact anticipated from the maintenance dredging effort (19,602 sq. ft.) equates to the following:

$$(19{,}602 \text{ sq. ft}) * (3.61 + 0.47) * (1.5) = \$119{,}952$$

A resource multiplier of "1" was used in the calculation because the area of impact (Wood Island Channel) has previously been dredged and is considered a regularly disturbed area, not a pristine resource. USACE/US Environmental Protection Agency guidance (33 CFR 325 and 332) recommends a mitigation ratio greater than one-to one to compensate for differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, and if an in-lieu fee program will be used to provide the required compensatory mitigation and the appropriate number and resource type of released credits are not available. In the latter case, sufficient compensation should be provided to account for the risk and uncertainty associated with in-lieu fee projects that have not been implemented before the impacts have occurred. Therefore, an additional 0.5 multiplier was also applied (for a total multiplier of 1.5) because the ILF mitigation will in all likelihood be out of kind.

USACE will provide compensation for eelgrass impacted by the project by cashier's check to the State of Maine ILF program under the requirements provided by MEDEP. Using the current eelgrass

survey (2019) as an initial calculation, USACE anticipates the payment of approximately $119,952 to the ILF Program to mitigate the impacts to eelgrass resources in the project area.

Final calculation of eelgrass impacts and resulting total mitigation compensation fee to the ILF will be determined as outlined in Section 2.4 Damage Assessment. The mitigation compensation fee will be made in one total payment within 90 days of the completion of the approved post-construction eelgrass survey report.

5. MONITORING

USACE will monitor the rate of return of eelgrass to the dredged channel, and the extent of eelgrass in the area surrounding channel at 2, 5, and 8 years post dredging, provided the surrounding area continues to support eelgrass. Full re-colonization will be indicated by a percent cover of eelgrass in the dredged channel similar to the percent cover in the surrounding eelgrass bed. Future eelgrass surveys will not be undertaken if it is determined that eelgrass has fully recovered cover prior to completion of remaining eelgrass surveys listed. For example, if the eelgrass survey 5 years post dredging determines there has been full recovery then a year 8 post dredging survey is unnecessary and will not be undertaken. USACE will prepare monitoring reports summarizing the data collected and the associated analyses and conclusions following each monitoring event and provided to the agencies for review within 120 days of completion of the survey effort

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