

Puget Sound Nearshore Habitat Calculator User Guide

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Version 1.6

February, 2024

Preferred Citation:

Ehinger, S. I., L. Abernathy, M. Bhuthimethee, L. Corum, N. Rudh, D. Price, J. Lim, M. O'Connor, S. Smith, B. Shorin, J. Quan. 2024. Puget Sound Nearshore Habitat Calculator User Guide V1.6. NOAA, editor. Accessed via. <https://www.fisheries.noaa.gov/west-coast/habitat-conservation/puget-sound-nearshore-habitat-conservation-calculator>

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Abbreviations

DSAYs	Discounted Service Acre Years
DSZ	Deeper Shore Zone
ESA	Endangered Species Act
GIS	Geographic Information System
HAT	Highest Astronomical Tide
HEA	Habitat Equivalency Analysis
LSZ	Lower Shore Zone
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MSDG	Marine Shoreline Design Guidelines
NHVM	Nearshore Habitat Service Values Model
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NRDA	Natural Resource Damage Assessments
OWS	Overwater Structures
PS	Puget Sound
RZ	Riparian Zone
SAV	Submerged Aquatic Vegetation
SSNP	Salish Sea Nearshore Programmatic
USACE	US Army Corps of Engineers
USGS	US Geological Survey
USFWS	US Fish and Wildlife Service
USZ	Upper Shore Zone
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WDOE	Washington State Department of Ecology

Definitions

Action Agency: Federal Agency seeking Endangered Species Act (ESA) section 7 consultation with the National Marine Fisheries Service (NMFS) or US Fish and Wildlife Service (USFWS).

Conservation Credit (credit): A unit of measure (e.g., a functional or areal measure or other suitable metric) representing a gain in ecological functions for Puget Sound Chinook and Hood Canal summer-run chum at a mitigation site. The measure of ecological functions is based on the resources restored, established, enhanced, or preserved. As part of Puget Sound Nearshore consultations, a credit is determined using the Puget Sound Nearshore Habitat Conservation Calculator (Nearshore Calculator) or other Services and Action Agency approved habitat quantification tool.

Conservation Debit (debit): A unit of measure (e.g., a functional or areal measure or other suitable metric) representing the loss in ecological functions at an impacted site. The measure of ecological functions is based on the resources impacted.

Conservation Points: Conservation Points are Discounted Service Acre Years (DSAYs) multiplied by 100. This creates more intuitive outputs for small impacts.

Discounted Service Acre Years (DSAYs): Measure of change in habitat services provided over a specific duration of time to a set of target species within the Habitat Equivalency Analysis (HEA) method.

Entry Block: Installation *ShorelStab* tab only. This block distinguishes between new and replacement entry through a “Yes/No” toggle entry in the.

Entry Block: New The structure entry tabs (*Overwater Structures, BoatR, Jetty*) contain separate entry blocks for repair and replacement, and new structure elements. The Entry Block: New is colored purple.

Entry Block: Removal All structure entry tabs (*Overwater Structures, ShorelStab, BoatR, Jetty*) contain entry blocks for the removal of existing structures and entry of new/replacement structures. Entry blocks for removal are colored green and located at the top of each tab.

Entry Block: Replacement The structure entry tabs (*Overwater Structures, BoatR, Jetty*) contain separate entry blocks for replacement, and new structure elements. The Entry Block: Replacement is colored blue and located at the bottom of each tab.

Force Majeure: Unexpected circumstances including accidents and extreme weather that may damage structures.

Minor Maintenance: Minor servicing of an existing structure that does *not meaningfully prolong the life of the structure*. For minor maintenance, a structure must remain the same size and within its current footprint. Minor Maintenance activities do not have to be entered into the Nearshore Calculator. Further, minor maintenance includes the repair and replacement of previously mitigated elements during the first half of their design life.

Repair: Partial replacement, reconstruction, or rehabilitation of a structure that meaningfully extends the life of that structure.

Replacements: Reconstruction of an identical or highly similar structure in the same location as the structure being replaced.

Submerged Aquatic Vegetation (SAV): SAV is a rooted aquatic plant that grows completely under water. These plants occur in both freshwater and saltwater but in estuaries, where fresh and saltwater mix together, they can be an especially important habitat for fish, crabs, and other aquatic organisms. SAV is generally found in the Lower Shore Zone (LSZ) with some plants like non-native eelgrass reaching into the Upper Shore Zone (USZ). Include the landward margin of eelgrass or macroalgae beds on all SAV surveys.

Service Area: The service area is the geographic area in which conservation offsets can be traded to balance the loss of salmonid resource functions.

Standalone Restoration: A standalone restoration project restores or improves habitat functions without introducing new, or temporally extending, adverse effects aside from construction-related effects. Standalone restoration projects include removal of a structure that has adverse effects but does not include any replacement.

Upper Intertidal Vegetation: Upper intertidal vegetation is rooted in the sediment and includes species like *Salicornia depressa*. It is temporarily inundated during high tides. Upper intertidal vegetation is found in the USZ as defined for the Nearshore Calculator.

Introduction to the Nearshore Calculator

What is the Puget Sound Nearshore Calculator?

The National Oceanic and Atmospheric Administration’s (NOAA) National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS), collectively “the Services,” developed the Nearshore Calculator as a user-accessible tool that simplifies the application of the Habitat Equivalency Analysis (HEA) and Nearshore Habitat Service Values Model (NHVM) (Figure 1). The goals of the Nearshore Calculator are to:

- Rapidly quantify the impacts from a proposed action on Puget Sound (PS) Chinook salmon and Hood Canal summer-run chum and their habitats in order to facilitate avoidance, minimization, and, where warranted or appropriate mitigation.
- Consider the duration of proposed actions for the quantification of effects.
- Allow the Services, Action Agencies, and project applicants to simultaneously and consistently apply both HEA and NHVM for proposed actions in the Puget Sound nearshore environment.

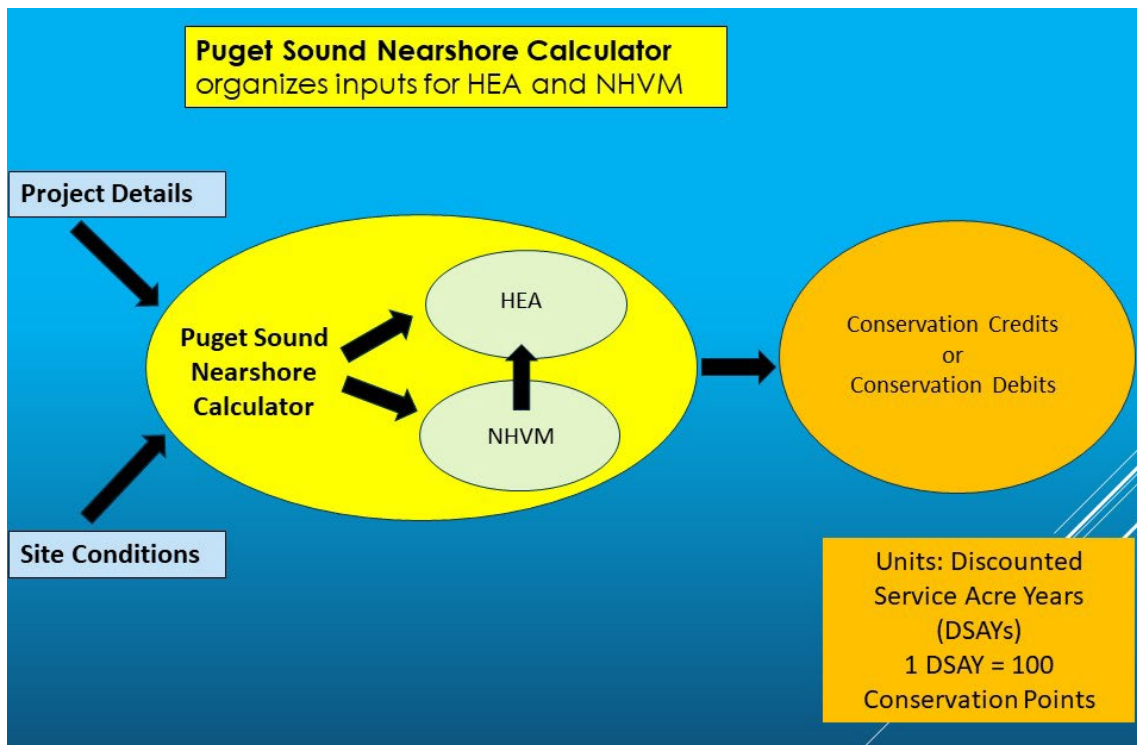


Figure 1: The Nearshore Calculator is an interface for HEA and the NHVM.

The Nearshore Calculator is a user interface for both the NHVM and HEA. The Nearshore Calculator quantifies habitat impacts, resulting from nearshore projects which decrease habitat function (conservation debits), and habitat benefits that increase habitat function (conservation credits).

The Nearshore Calculator allows the Services to assess habitat impacts and benefits in Puget Sound from several actions including:

1. Addition of new, replacement, and the removal of overwater structures including piers, ramps, floats, house-boats, decks, piles, etc.
2. Removal of creosote
3. Addition of new, replacement, and the removal of shoreline armoring
4. Addition of new, replacement, and the removal of boat ramps, jetties, and rubble
5. Addition of new and the removal of riparian plantings
6. Addition of new submerged aquatic vegetation (SAV) plantings (such as eelgrass and kelp)
7. Addition of forage fish spawning supplement/beach nourishment in very limited circumstances (generally not appropriate as mitigation for hard armoring)
8. Maintenance dredging
9. Riparian zone plantings

The Nearshore Calculator is adaptable and allows the Services to make updates as new science or best available information becomes available. It also allows for expanding the types of analysis to account for the different types of nearshore development actions that could occur. (Note: These changes, if necessary, will be scheduled for predictable and regular updates. See below for specifics.)

Habitat Equivalency Analysis (HEA)

The HEA method assesses impacts (net ecological loss) and benefits (net ecological gain) to the habitat. Ecological equivalency provides the basis of HEA as a concept that uses a common medium of exchange called Discounted Service Acre Years, or DSAYs. DSAYs express and assign a value to functional habitat loss and gain over a certain time period. Ecological equivalency is a service-to-service approach where the ecological habitat services relevant for a species or group of species impacted by an activity are fully offset by the services gained from a conservation activity. This is further explained in Ray (2008).

The NOAA Restoration Center developed HEA in cooperation with stakeholders and it has become a common method for Natural Resource Damage Assessments (NRDAs). NOAA's Central and North Puget Sound area offices adapted the HEA method for its Endangered Species Act (ESA) consultations and developed the NHVM and Nearshore Calculator to facilitate the use of the HEA model. Not only has HEA been successfully used in multiple NRDA proceedings, it also addresses temporal impacts of the design life of nearshore structures.

The use of HEA requires several input parameters including the size of an affected area and nearshore habitat service values (Figure 2). Habitat service values characterize the functions and value of a specific habitat for the target species before and after an impact/restoration.

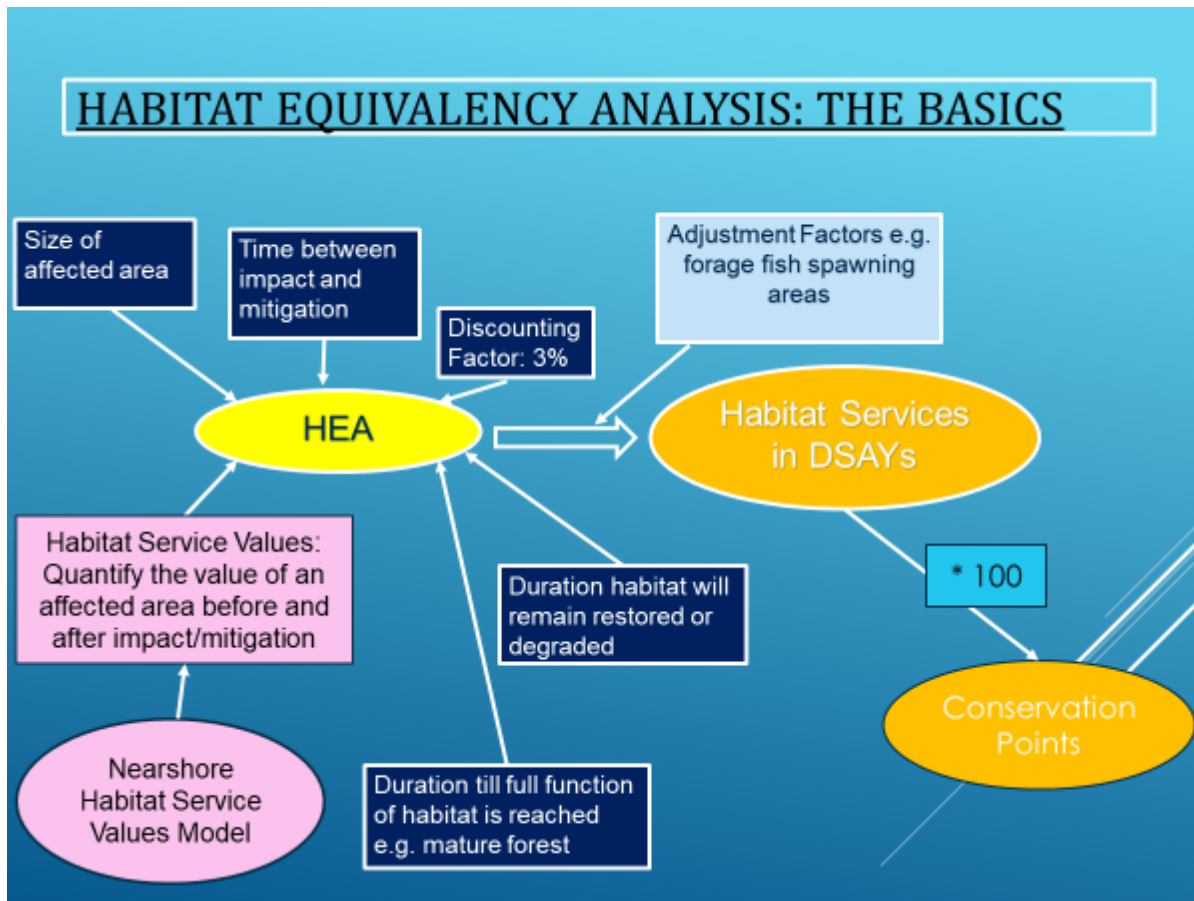


Figure 2: Components of HEA. Inputs include nearshore habitat service values (pink) and additional parameters (navy). Outputs (orange) include DSAYs – conservation credits or debits – and Conservation Points. Conservation points are DSAYs multiplied by 100 which allow the user to work with more intuitive outputs for small impacts.

Nearshore Habitat Service Values Model

A team of NOAA biologists developed a NHVM to aid in consistently determining these habitat service values specific to juvenile PS Chinook salmon and Hood Canal summer-run chum. The NHVM quantifies the conditions of designated critical habitat of listed PS Chinook salmon and Hood Canal summer-run chum by quantifying the existing conditions of its physical and biological features (the unobstructed migratory corridor, cover and primary production, sediment quality and quantity, and water quality) (50 CFR 226.212). The NHVM also consider the effect of habitat conditions on survival, abundance, and productivity of listed salmonids. The NHVM accounts for a range of habitat values (low to high depending on functionality and importance to the species). Quantifications are performed for each of five elevation zones (Figure 3) in the subject habitat.

We split the marine/estuarine nearshore into five elevation zones based on their accessibility and function for the target species. The Riparian Zone (RZ) extends 130 feet landward from the Highest Astronomical Tide (HAT). This is the area we found most relevant for supporting water

quality and food provisioning for salmonids (see *RZ Tab*) for more information). The Upper Shore Zone (USZ) extends between the Highest Astronomical Tide (HAT) and plus five Mean Lower Low Water (MLLW). Upper intertidal vegetation is only contained in the USZ. The USZ is further split into USZ 1 and USZ 2 with the USZ 1 extending from HAT to Mean Higher High Water (MHHW). The duration and extent of tidal inundation in USZ 1 is very limited and thus salmonid access, as well as sand lance and surf smelt spawning, is generally limited to USZ 2. Based on the reduced extent, frequency, and duration of aquatic access for those species, we assigned USZ 1 a lower maximum habitat value than USZ 2 (Figure 4). The Lower Shore Zone (LSZ) extends from plus five MLLW to the deepest extent of SAV. SAV is contained in the LSZ. The Deeper Shore Zone (DSZ) begins at minus 10 feet MLLW or the lowest limit of SAV growth. There is no defined limit end to the DSZ.

Nearshore Zones

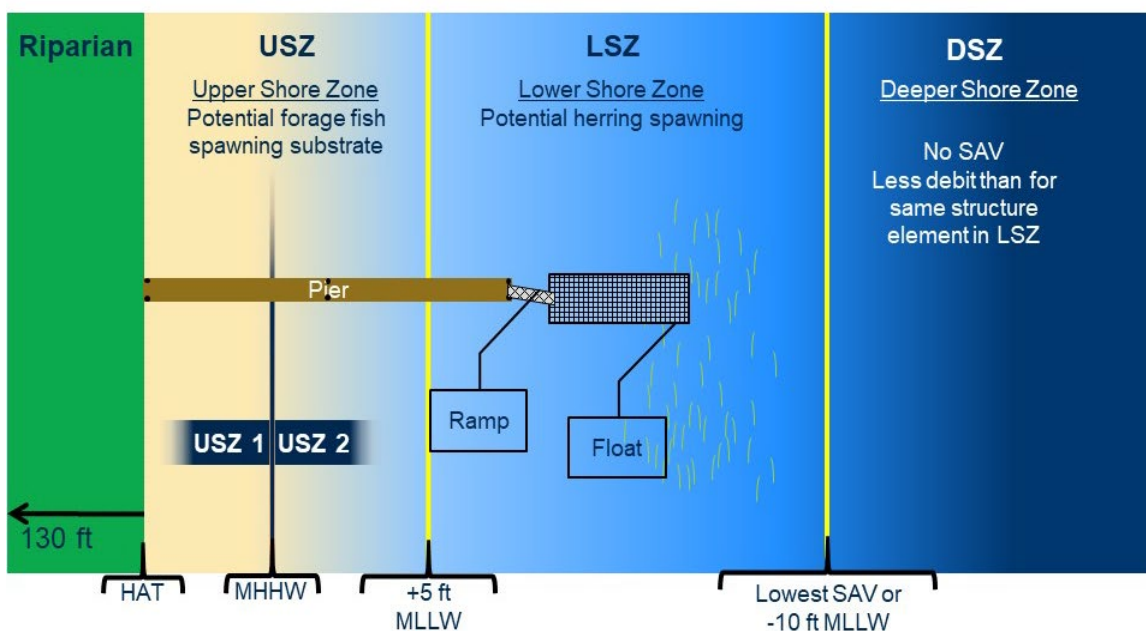


Figure 3: The Five Puget Sound Nearshore Zones. From highest to lowest elevation: RZ, USZ 1, USZ 2, LSZ, and DSZ. Figure by Lee Corum, USFWS.

The five different shore zones provide different maximum habitat service values for juvenile PS Chinook salmon and Hood Canal summer-run chum. Habitat service values range from a minimum of 0 to a maximum of 1. The maximum habitat service values that each zone can provide is based on the maximum possible contribution of habitat functions in that zone (Figure 4). For juvenile salmonids in the marine nearshore – a maximum habitat value of 1 – is an eelgrass meadow or other dense SAV providing food, cover, and an unobstructed migratory corridor. While the DSZ also provides migratory corridor function and forage (via primary production and drift in) for juvenile salmonids, it generally produces less forage than the LSZ as

it does not contain SAV. While the riparian zone is not used directly by salmonids, it provides important functions for juvenile salmonids including provision of food via allochthonous⁴ input including insects. Corresponding maximum habitat service values are shown in Figure 4.

Maximum Habitat Service Values by Elevation

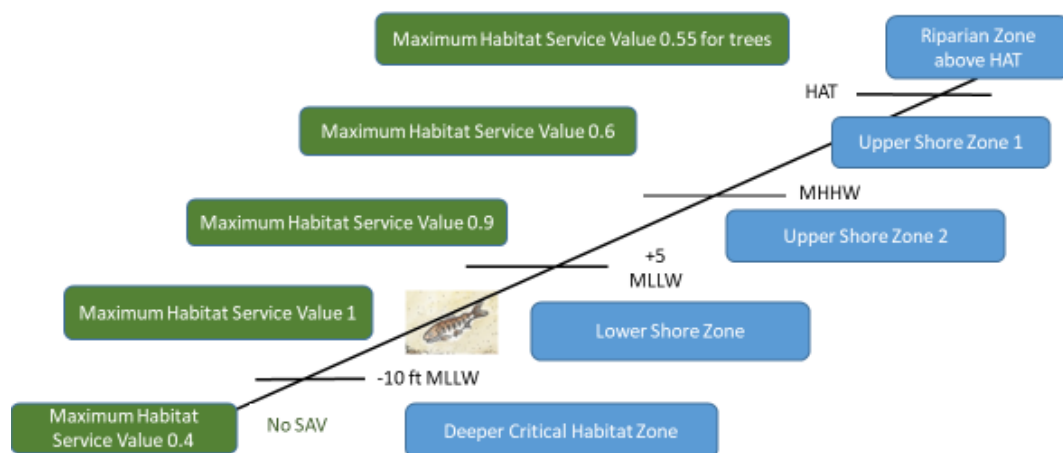


Figure 4: Maximum Habitat service values by Elevation. The corresponding nearshore zones are shown to the right. Values for each zone range from a minimum of 0 to a maximum of 1.

We mention these details to create an understanding about how some of the input requested for the Nearshore Calculator is used. For example, to evaluate the cover and primary production in the LSZ, the NHVM uses presence and quality of SAV. For that evaluation, an assessment of the SAV condition via online resources or field surveys is needed.

The NHVM design and values were derived from scientific literature and best available information, as required by the Endangered Species Act (ESA). The Nearshore Calculator underwent an independent peer review in 2023. The independent peer review found that the Nearshore Calculator and the NHVM are well-founded and analytically sound, and based on best available science. Results of that peer review can be found on NOAA’s webpage titled [“Independent Peer Review of NOAA Fisheries’ Puget Sound Nearshore Calculator”](#).

⁴ Allochthonous: Material that has been imported from outside of the system or considered area.

Application of this Tool

The Nearshore Calculator can be used to quantify habitat impacts for projects within marine and some estuarine environments of Puget Sound including projects within the salt wedge⁵ of riverine systems. The Nearshore Calculator is not currently appropriate for application in some estuarine environments that do not fall within the shoreline descriptions outlined above (Figure 3), such as tidally influenced wetlands with backwater channels. Project elements upstream of documented salt wedges are also not suitable to be evaluated by this Nearshore Calculator.

Nearshore Calculator outputs are based on the evaluation of changes in physical and biological functions and their indicators relevant for PS Chinook salmon and Hood Canal summer-run chum productivity and abundance. The evaluation framework is dependent on the existing HEA model and the NHVM. The evaluation of project related changes is based on best available science, context-specific application of ecological processes, and best professional judgment. As with most other rapid assessment methods (Adamus, P, K. Verble 2020), field verification requires periodic process improvement.

If submitting a Nearshore Calculator with a consultation request, ensure that the most current version of the Nearshore Calculator and User Guide is being utilized. The Nearshore Calculator will be updated in February of every calendar year to incorporate applicable new science, monitoring results, additional modules, or other procedural, design, or usability improvements.

Best Management Practices for Structures

NOAA strongly encourages applicants and consultants to evaluate nearshore projects with the Nearshore Calculator *prior* to engaging in ESA consultation. Consider options for reducing the output before project submission by (1) reducing structure size, (2) incorporating hybrid or soft armoring and/or (3) evaluating possible restoration or structure removal on-site or on adjacent properties. On-site offsets, such as creosote removal, riparian plantings, or structure removal, may not be enough to reduce all debits associated with high impact projects.

To reduce project impacts and a higher output, applicants should strive to minimize habitat impacts associated with their nearshore structures. Minimizing the project footprint to the greatest possible extent and avoiding areas with greater habitat value improves the Nearshore Calculator's output.

Best management practices to minimize impacts include:

1. Minimize the total area of coverage or linear feet of the structure.
2. Reduce shoreline armoring (seawalls, bulkheads, abutments).

⁵ The salt wedge is defined as the area of intrusion of salt water into a tidal estuary in the form of a wedge along the bed of the estuary.

- a. Instead of a traditional “hard armoring” bulkheads (concrete, steel, rock), use soft-shore or hybrid armoring whenever possible. The Washington State Department of Fish and Wildlife (WDFW) “[Your Marine Waterfront](#)” guide is a valuable resource for minimizing environmental impact. Soft or hybrid armoring is not entered into the Nearshore Calculator, and therefore does not accrue debits. Replacement of hard armoring with soft or hybrid armoring usually has habitat benefits that can result in conservation credits.
 - b. Relocate shoreline armoring as far landward as possible to reduce impacts to the USZ. Armoring landward of HAT does not incur debits for placement of armoring, but may incur small debits related to impacts to riparian vegetation.
 - c. Slope rock bulkheads landward and incorporate native woody plantings.
 - d. Place vulnerable structures (like homes) as far landward of the shoreline as possible to reduce dependence on shoreline modification.
3. Minimize impacts to SAV.
- a. Delineate SAV for the project area within 25 feet of proposed structures. If SAV is found within that area, then delineate the entire property and choose a location for the structures that demonstrates the greatest avoidance and minimization of vegetation.
 - b. Floating structures should never “ground out” on the substrate, and stoppers/pin piles/feet should hold the structure at least 12 inches above the substrate.
 - c. If SAV is present within 25 feet of the proposed float, the bottom side of the float must be elevated at least 4 feet above the substrate at low tide to reduce prop scour impacts on SAV (Figure 5).

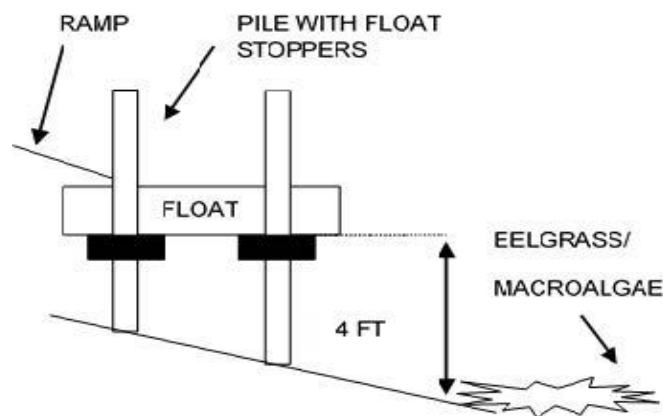


Figure 5: Proposed Float within 25 feet of SAV. Side-view. The bottom side of the float must be elevated at least 4 feet above the substrate at low tide.

4. Minimize impacts to forage fish spawning substrate by avoiding spawning areas, which can be found using WDFW’s [Forage Fish Spawning map](#). If this is not possible, construct

100% grated piers and ramps over spawning habitat and minimize the number of piles in the USZ.

5. Maximize light penetration
 - a. Pier surfaces and ramps should be entirely grated with at least 60% open space.
 - b. Floats should be grated to the maximum extent possible. To qualify as a grated float in the Nearshore Calculator, floats must have 50% effective grating with 60% or more open space (Compliant with WAC 220-660-280).
 - c. Install a mooring buoy in the DSZ rather than a boat lift in the LSZ.
6. Minimize impacts from piers
 - a. Minimize the width of the pier. We recommend a pier width of 4 feet for residential structures, and as narrow as possible for commercial structures (ADA compliance may impact how wide the structure must be).
 - b. Piers should be a straight line rather than finger, “L,” or “T” shaped.
 - c. Do not construct additional structures on piers (i.e., buildings, planter boxes, slides, etc.). Solid structure areas are entered in the Nearshore Calculator as a solid pier, which has more habitat impacts than grated surfaces.
 - d. Stairways should be open-frame construction and not solid structures (i.e., concrete). The width of stairway landings and steps should not exceed 4 feet for single-use and 6 feet for joint-use.

User Requirements

Use of the Nearshore Calculator requires a moderate to substantial knowledge of nearshore ecology and coastal geology, and experience with field data collection methods including determining some tidal elevation. Field data that are necessary for use of the Nearshore Calculator also include SAV surveys and forage fish surveys and appropriate use of a breadth of existing information. Users will need experience with geographic information systems (GIS) or Google Earth, aerial photo interpretation, and/or field evaluation experience, depending on the project type. Users will need to be able to interpret maps related to areas valuable for the target species⁶ In addition, the user must have access to the internet and Microsoft Excel 2007 or later. Moderate Microsoft Excel knowledge allows for further understanding of equations used within the Nearshore Calculator.

Resources on NOAA’s [Puget Sound Nearshore Habitat Conservation Calculator Webpage](#), along with this User Guide, provide information regarding the use of the Nearshore Calculator.

For additional questions and Nearshore Calculator help:

⁶ Map layers are provided on NOAA web page and as hot links in the Nearshore Calculator

- View the [FAQ page](#) on our website
- Recorded training workshops and example calculators with keys are posted on our website. We strongly encourage users to review this training before sending questions about Nearshore Calculator entries or requesting additional training.
- Still have questions? Sign up for a free 20 minute office hour session with a NMFS calculator expert (live video chat or phone call). Sessions are available weekly and anyone can book one through on our [webpage](#). At least one member of the Nearshore Team will attend your meeting.

We will continue to provide training and technical assistance for use of the Nearshore Calculator by adding training materials and updates.

Nearshore Calculator as part of ESA Consultations in Puget Sound

The Nearshore Calculator is a tool that can be used by agency staff, environmental consultants, non-profit and corporate staff, and project proponents. Users can download the Nearshore Calculator and enter project specifications to determine conservation offsets and long-term habitat impacts. Project specific Nearshore Calculators are recommended for most, if not all, Puget Sound nearshore projects. For example, no-net loss is required as part of the proposed action in the Salish Sea Nearshore Programmatic (SSNP) biological opinion. A tool to demonstrate no-net loss is the Nearshore Calculator.

Nearshore Calculator Process Improvements

The Services will apply new science, incorporate monitoring results, and process improvements to the Nearshore Calculator, NHVM, and this User Guide with thorough, regular and predictable updates.

Throughout the year, we encourage users to send improvement suggestions, new and relevant science, and potential bugs to PSNearshoreConservation.WCR@noaa.gov at NOAA and questions specific to USFWS species to (SSNP_WA@fws.gov).

The Services plan to post any updates to the Nearshore Calculator and User Guide, if needed, in February of every year. We document all updates and additions in a separate document, the [Change Log](#), also available on our web page. In the event a more critical update would need to occur sooner, the Service will make every effort to update the website and user forums. Annual updates may include adjustments to site-specific adjustment factors, updates to maps for the site-specific adjustment factors, and changes based on new science, policies, and feedback from applicants. Changes may also include improvements to the layout of the Nearshore Calculator and User Guide.

When a project specific Nearshore Calculator is submitted as part of an ESA consultation initiation package, NMFS requests that applicants and their agent submit the most recent version of the Nearshore Calculator posted on NMFS's web page. Once a project is initiated, or for a

programmatic implementation once NMFS confirms that the project fits the programmatic, the project's Nearshore Calculator version is final and will stay with the project.

After the annual February Nearshore Calculator update has been posted on [PS Nearshore web page](#), applicants whose projects have not been initiated or whose programmatic implementation has not been confirmed by NMFS to fit a programmatic may amend their project file with a new Nearshore Calculator using the updated February version.

Conservation Offsets

Applicant-responsible Credit Generation

Conservation credits to offset impacts can be generated by engaging in standalone restoration actions. Applicant-generated conservation credits can be generated on the same site as a project causing debits or within the same service area. For example, an applicant may remove structures in the nearshore of the same service area of an impacting project to generate conservation credits to offset debits. The removal must be a standalone and separate action and cannot be integral to another project.⁷ Standalone applicant-responsible credit generation include:

- Removal of individual creosote piles, or rubble, not associated with a structure
- Removal of an overwater structure (either containing creosote or not)
- Removal of a portion of a structure⁸
- Removal of shoreline armoring (complete armoring, not a portion)
- Riparian or SAV plantings
- In extremely limited cases beach nourishment (see Beach Nourishment section below)

Habitat Improvements Funded with Restoration Funds

Public funds (such as grants or other programs) that are intended for restoration cannot be used to offset conservation debits. Following NOAA's 2022 Mitigation Policy, mitigation should be proportional to impacts of NOAA trust resources and offset those impacts to the full extent provided by NOAA authorities. Restoration in the Salish Sea is intended to provide the habitat lift that is necessary to recover species. Mitigation and/or conservation offsets are intended to offset impacts under ESA and Essential Fish Habitat consultation, not provide habitat lift.

⁷ Residual applicant-generated credits from a replacement project cannot be used as credits for a different debit project.

⁸ Partial structure removal is limited to distinct portions that can be removed as a standalone project without increasing the environmental risk associated with the remaining portion of the structure.

Creosote Treated Timber Removal

Enter creosote treated timber removal in the *Overwater Structures* and/or the *ShorelStab* tabs. When removing creosote-treated piles associated with overwater structures, enter the total weight of the creosote-treated wood in tons in the *Overwater Structures* tab. The *Creosote Tonnage Estimator* at the bottom of the *Overwater Structures* tab can aid in estimating the weight.

Additionally, enter the number and size of removed piles in the green-colored Removal Entry Block. Enter creosote piles functioning as shoreline armoring in the Removal Entry Block of the *ShorelStab* tab as the length of the armoring structure itself and also enter the weight of creosote-treated timber proposed to be removed.

Documentation Needed for Creosote Removal

Conservation offsets for creosote removal apply only if sufficient documentation is provided. Provide the following information with the consultation initiation package when proposing to remove creosote for conservation credit:

1. Pictures of the creosote structure(s) prior to removal,
2. Design drawings clearly indicating dimensions and location of creosote,
3. Number of piles proposed for removal,
4. Documentation of the average diameters for piles or dimensions of non-pile creosote treated timber proposed for removal (diameters may be different on the top and bottom of piles). Sufficient documentation could include photos showing the diameter of piles against a measuring tape.
5. A rationale for the conservative estimate of the length of piles. Estimates may be based on as built designs, substrate data, or experience/data of average break off rate and length. Piles are typically driven an additional half of the length that is above the mud line. For example, a pile with 20 feet above the mudline could have a total length of 30 feet.
6. Documentation of determination of the weight of the creosote-treated wood proposed for removal. Enter weight in tons in the *Overwater Structures* and/or *ShorelStab* tabs.

How to Determine the Weight of Creosote-Treated Wood

Use the *Creosote Tonnage Estimator* starting in row 156 of the *Overwater Structures* tab to determine the weight of creosote to be removed. This can be used to estimate the weight in tons from creosote-treated timber piles (quantity, diameters, and lengths are needed) as well as the weight in tons from the volume (cubic feet) of non-pile creosote material.

Residential creosote piles usually weigh $\frac{1}{2}$ a ton or less, rather than the 1 ton for industrial-sized, 70-ft-long piles. Many projects use shorter piles when in shallow water and on smaller/residential structures. Long wood piles often vary in diameter between top and bottom. Use the average pile diameter for weight estimation.

Verification of Creosote Weight Following Removal

To confirm estimates of conservation credits gained from creosote removal, the Services require documentation of the actual weight of removed creosote. Our preferred method for verification is the submission of dump disposal receipts and a picture of the dump truck on the scale. Disposal receipts must contain actual weight of the total removed creosote. Creosote weight verification may also be accomplished with other methods, if necessary (for example, using a crate or similar equipment with an arm scale and submitting time stamped photos of both the scale on the crane and the material being lifted). Final Nearshore Calculator outputs may require adjustment if the estimated creosote removal weight is less than the actual disposed quantity.

Removal Credits

The Nearshore Calculator is set up to determine credits for the removal of existing structures and creosote. This includes the removal of a structure that will be replaced.

Enter replacement structures twice (both under removal and replacement), for all structure tabs. This is not automated in the Nearshore Calculator as often replacement structures are smaller and better designed than the structure they replace.

For existing structures, we make the average standard estimate that, at the time of permit application, the existing structure would remain in lawful and structurally sound condition for a period of 10 more years. If structures are non-functioning, deteriorated and/or falling apart, or otherwise not in good condition as required by their permit, removal credit is generally not justified.

A request for an emergency authorization usually indicates that a structure is not in good condition. Conservation credit for the removal of structures under an emergency authorization may apply only in very limited circumstances. Projects that received an emergency authorization from the US Army Corps of Engineers (USACE) may receive credits for the removal of the old/existing structures if the structure was in good condition at the time of permit application and dated pictures can be provided.

Removal of Derelict Vessels

For conservation offsets within the Nearshore Calculator, we currently do not credit the removal of derelict vessels if their removal is funded in any way through a restoration or cleanup program like the Derelict Vessel Program that is administered by the Washington State Department of Natural Resources (WDNR). If removal is not funded through any cleanup or restoration program, it can be entered as rubble removal in the *BoatR*, *Jetty* tab. Before pictures (clearly showing the size of proposed to be removed boats), after pictures, and GPS locations of the vessels are required to get conservation credits for this action.

Other Mitigation

Some restoration actions are not currently quantified in the Nearshore Calculator. We welcome mitigation actions outside those quantifiable in the Nearshore Calculator so long as they provide

benefit to ESA-listed Salish Sea species. Please book a virtual office hours meeting discuss mitigation ideas. We will work with you to develop mitigation that adequately offsets adverse project impacts.

Preservation of Existing Habitat

Stay tuned for February 2025, we are working on this.

Service Area

To effectively offset impacts, credits must originate from within the same service area as debits. We have divided Puget Sound into five service areas: North Puget Sound, Strait, of Juan de Fuca, Whidbey, Hood Canal, and South Central Puget Sound (as seen on the Puget Sound Partnership map on our [Nearshore web page](#)). Credit providers, also listed on our webpage, may have varying service area. Please see the web page for information on conservation credit providers and their specific service area maps.

General Information - Applicable to All Structure Entries

Replacements, Repairs, Minor Maintenance

For the purposes of SSNP, replacements, repairs, and minor maintenance are part of individual activity categories. “Repair or replace an existing structure” includes: Aids to navigation; boat houses; covered boat houses; boat garages; breakwaters; commercial, industrial, and residential pier, ramp, and floats; float plane hangars; floating walkways; groins and jetties; house boats; boat ramps; wharfs, port, industrial and marina facilities; dolphins, float storage units, debris booms, etc.

“Minor maintenance of an existing structure” is a separate SSNP activity category and includes: Pile resets, replacement of rubber strips, encapsulation of flotation material, replacement of fender piles that do not contribute to the structural integrity of the structure, capping of piles, replacement of flat stops, height extension of existing piles. Minor maintenance, which does not meaningfully extend the life of a structure, does not require conservation offsets.

For filling out the Nearshore Calculator, replacement means reconstruction of an identical or highly similar structure in the same location as the structure being replaced. In general, the structure that is being replaced has to be in the environment at the point of permit application for an installation to be considered a replacement. Further, to receive removal credit for the existing structure, the existing structure has to be in good condition. For more information on removal credits, review the Removal Credits section above.

For filling out the Nearshore Calculator, repair means to conduct partial reconstruction or rehabilitation of a structure that meaningfully extends the life of that structure. Repairs have impacts on habitat that are similar to the impacts of replacements. Like replacements, repairs extend the duration of an impact to the nearshore into the future. Such repairs include:

Resurfacing boat ramps and encasing bulkheads. Most repairs have very similar or the same environmental effects as replacements. Thus, removal credits apply to most repairs even if the existing structure is not removed for the same reasons as discussed above in Removal Credits.

“Piece by Piece” approach for replacements and repairs: Only the element to be repaired or replaced is entered into the Nearshore Calculator. For example, if an area of X square feet of a boat ramp are proposed to be replaced, only that same area (X square feet) are entered.

In more detail, to quantify impacts from repairs and partial replacements:

1. Enter the area (square feet) of the existing structure element that is proposed to be repaired or replaced into the Entry Block: Removal. Structure elements to be repaired are generally eligible for removal credit.
2. Enter the area (square feet) of the proposed replaced/repaired structure element (which should not exceed the existing footprint) in Entry Block: Replacement. Include partial replacements, repairs, and design changes or improvements, like an increase in grating, when filling out Entry Block: Replacement.
3. “No Double Offsets” when replacing structurally overlapping elements. This mostly applies to overwater structures and is discussed in more detail below.

When filling out the Nearshore Calculator, minor maintenance activities do not have to be entered. Minor maintenance means carrying out minor servicing at an existing structure that we have determined at this time does not meaningfully extend the life of the structure. Maintenance activities include pile resets, capping of piles, replacement of rubber strips, replacement of float stops, encapsulation of existing floatation material, height extension of existing piles, and replacement of fender piles that do not contribute to the structural integrity of the structure.

Further, for filling out the Nearshore Calculator, minor maintenance includes the repair and replacement of previously mitigated elements during the first half of their design life. This includes unexpected damages caused by a force majeure, if it occurs during the first half of the structure’s design life. For these situations, the Nearshore Calculator does not have to be used. If a structure or elements of a structure for which conservation offsets were previously provided must be repaired or replaced for any reason during the second half of their design life (i.e. over 20 years for most structures or 25 years for armoring), it is considered a replacement and should be entered into the Nearshore Calculator.

Entry of Unique Structures

Sometimes structures do not exactly fit the descriptions in the Nearshore Calculator entry boxes. In those cases, enter a unique structure as the structure type whose function and habitat effects it most closely resembles. Here are a few examples: a solid deck (for dining etc.) jutting out waterward over armoring would be entered as a solid pier; a floating debris boom is entered as a float; a tall concrete slab holding up a segment of pier is entered as a large diameter pile. Describe your rationale for entry of these structures in the *ProjectD* tab.

Entering Length and Width

Entering floats, boat ramps, and jetties into the Nearshore Calculator generally requires input of length and width parameters, rather than simply area. In addition to impacts related to area of a structure, these structures have a physical buffer with added impacts factored into the final credits/debits (based on Ono et al. 2010). To correctly determine buffers, enter the longer side of the structure into the length field, regardless of orientation. Exceptions for overwater structures spanning several zones are discussed in the *Overwater Structures* section.

Replacement vs. New

If the area of a replacement structure exceeds the area of the existing structure, the difference is considered to be new/expanded structure. This determination is made by structure type and shore zone.

Example – If a replacement jetty is reduced in width but extended into the LSZ where there previously was no jetty, all area of the jetty in the LSZ is considered new/expanded.

Example – If a boat ramp is replaced with a jetty, the jetty is considered to be a new structure.

A detailed discussion and more examples of expanded overwater structures can be found in the *Overwater Structures* section.

A structure must be entered as new if a previous structure has been absent for more than one year,⁹ and the replacement permitting process not initiated during that year. Further, structures that are not in functioning condition at time of consultation request which includes structures that have been absent for more than a year, don't qualify for removal credit. These types of structures must be entered as new with no removal credit.

Increased Credits for Removals with Site Protection

The time horizon for credit determination associated with structure removal and no site protection on the property (e.g., a deed restriction or conservation easement) is 10 years. However, the Nearshore Calculator is set up to credit removals of structure where site protections are in place for time horizons longer than 10 years. If proposing structure removals with site protections (following the USACE regulations specific for nearshore structures¹⁰ and

⁹ Consistent with

https://wdfw.wa.gov/sites/default/files/about/advisory/hcicag/documents/implementation_guidance/2017%20Marine%20Overwater%20Structures%20SOP.pdf

¹⁰Components of a Mitigation Plan:

<https://www.nws.usace.army.mil/Portals/27/docs/regulatory/Forms/Key%20Elmts%20of%20the%20FedRule%20and%20Jnt%20Ag%20Gdnc%20on%20Mit%205-3-16.pdf?ver=2016-05-24-110431-220>

deed restrictions associated with compensatory mitigation¹¹), contact the Services for help determining credits. If you would like an immediate estimate of increased credits based on a site protection, you may use the Entry Block: Replacement on the appropriate tab. Enter the dimensions of the structure to be removed as though you were installing a replacement structure; the resulting negative credits reflect the positive credits you would receive for a 40-year (design life for overwater structures and boat ramps) easement.

For shoreline armor removal, the Services credit easements for a time of up to 50 years (limit based on sea level rise). Please email PSNearshoreConservation.WCR@noaa.gov for help with determining increased credits for armor removal with easements following USACE regulation.

See the *Riparian Zone (RZ)* tab section below for more information about riparian site protections.

Hiding Tabs

Tabs that are not in use can be hidden to make your Nearshore Calculator more user-friendly. Simply right click on the tab at the bottom and select “Hide.” To unhide tabs, right click on any existing tab, click “Unhide” and select the tab to unhide.

Advanced users: For visual ease only, we have hidden background tabs that contain NHVM and HEA calculation and the rarely used *Beach N* tab. The background tabs are the gears that build and populate the user-friendly Nearshore Calculator you see. Using the “unhide” method described here will allow you to get into the Nearshore Calculator mechanics if you wish to dig deeper.

Puget Sound Nearshore Calculator Tabs

The Nearshore Calculator consists of different entry tabs for different types of actions. The tabs include:

1. Summary
2. ProjectD: For recording project specific details and entering site adjustment factors.
3. RZ: Riparian Zone
4. Overwater structures
5. ShorelStab: Shoreline stabilization
6. MDredging: Maintenance Dredging
7. BoatR, Jetty: Boat ramps, Jetties, Rubble
8. BeachN: Beach Nourishment (This tab is hidden as it is rarely used)
9. SAV Planting
10. Ref.: References

¹¹ <https://www.nws.usace.army.mil/Portals/27/docs/regulatory/Forms/DeedRestrictionHandout.pdf?ver=2016-06-06-150203-510>

11. ReadMe

The following sections describe different components of the Nearshore Calculator and provide guidance for entering project information so that the outputs will be accurate and consistent.

Summary Tab

{Red Tab}

This tab lists credits and debits from all six project entry tabs including applicable adjustment factors. Balances (sums) are provided for each project category and the total across all project categories is provided in row 31 (Habitat Loss/Remaining Conservation Offsets Needed). Column C displays conservation offsets from all tabs and the project total is at the bottom. Column D displays DSAYs, which are conservation offsets divided by 100.

ProjectD (Project Details) Tab

{Yellow Tab}

This tab must be filled out for every project. Site-specific adjustment factors and aquatic vegetation scenarios applicable to all tabs must be selected in the *ProjectD* tab to accurately calculate the habitat impacts and benefits associated with a project. Each project entry tabs use these data to calculate credits and debits.

This is also the place to document your work and reference external sources you used to derive input values. For example, if you are using pictures at low tide to support your aquatic vegetation category selection, add a note referencing the pictures and your conclusions or copy and paste the pictures into the *ProjectD* tab. Please provide enough information in the *ProjectD* tab so that the reviewing biologist can understand the entries in other tabs and has sufficient evidence supporting those entries.

If a project has multiple locations with different site-specific factors, please fill out and submit multiple separate Nearshore Calculator files. The summary output from these files can be summed during consultation.

In this tab, provide substantial rationale and supporting documentation such as screenshots, project drawings, and quotes from biological assessments. A Nearshore Calculator file should be self-contained such that any user can open the *ProjectD* tab to understand all elements relevant to the entry of the project.

Site-Specific Adjustment Factors

For habitat conditions that are especially important for PS Chinook and Hood Canal summer-run chum, the final credits or debits are multiplied by a factor. The Nearshore Calculator only applies these site-specific adjustment factors to aspects of the project that would affect the important habitat condition. Table 1 shows how the site-specific adjustment factor apply to certain project elements.

1. Major Estuary Zones: A map of [Puget Sound Natal & Pocket Estuaries](#) is available on the [PS Nearshore web page](#). We are using the historical extent of PS Chinook salmon natal river deltas plus a 5-mile buffer (as the fish swims), as per the PS Chinook Salmon Recovery Plan nearshore chapter (Redman et al. June 2005). For Hood Canal summer-run chum, we are using a 1-mile buffer around natal rivers and rivers where re-introduction was successful based on the first priority level for recovery actions of the Hood Canal summer-run chum recovery plan (Brewer et al. 2005).
2. Pocket Estuary or Embayment: See the [Puget Sound Natal & Pocket Estuaries map](#)
3. Feeder Bluff: We currently use the Washington State Department of Ecology (WDOE) [Coastal Atlas map](#) with coastal landforms data layer to determine the location of feeder bluffs.
4. Forage Fish Spawning: We rely on WDFW's [Forage Fish Spawning map](#) and surveys to determine presence and extent of Pacific herring, Pacific sand lance and surf smelt. If questions arise for a specific location, USACE, USFWS, or NMFS staff will clarify presence in consultation with WDFW.
5. Shoreline armoring that is located within the same drift cell and updrift of forage fish spawning habitat. Use the WDOE [Coastal Atlas map](#) to determine drift direction.

While the GIS layer for “Major Estuary Zones” and “Pocket Estuary or Embayment” is depicted as a band (this is an artifact of how the GIS layer was created), these landscape-scale site-specific adjustment factors apply to all zones and the entire structure. In other words, if any part of a structure overlaps or is waterward of location that is mapped as either “Major Estuary Zones” and/or “Pocket Estuary or Embayment,” this adjustment factor applies to all parts of that structure not just the parts that are located on the band shown on the GIS layer; also see Table 1.

Nearshore Impact	Major Estuary Zone	Pocket Beach	Feeder Bluff	Sand lance or surf smelt spawning	Updrift of FF spawning within same drift cell	Herring spawning
Shoreline armoring	XX	XX	XX	XX	XX	In rare cases
Piers and ramps	XX	XX				
Piles depending on zone	XX	XX	XX	XX		XX
Floats (USZ)	XX	XX		XX	In rare cases	
Floats (LSZ)	XX	XX				XX
Floats (DZ)	XX	XX				depends
Creosote Piles WQ benefit ¹	X	X		X		X
Boat ramps & Jetties (USZ)	XX	XX	XX	XX	In rare cases	
Boat ramps & Jetties (LSZ)	XX	XX				XX
Boat ramps & Jetties (DZ)	XX	XX				
Beach Nourishment	XX	XX		XX	XX	
Riparian	XX	XX	XX	XX		

Table 1: Project-specific application of site-specific adjustment factors.

Aquatic Vegetation

SAV density informs site-specific habitat service values in the Nearshore Calculator. The user needs to select the SAV scenario number (1, 2 or 3) for the upper and lower shore zones. The number is determined by the average percent cover of any attached or rooted aquatic vegetation (including algae) under and within 25 feet of the structure regardless of species or if it is native or non-native. Drift (unattached) vegetation and algae is only counted towards the percent cover in herring spawning areas. If surveys do not specify if vegetation is drift or attached, it is assumed to be attached. If eelgrass or kelp are present, a higher scenario is applicable. See Table 2, below, for percent cover and scores. Table 2 is included in the *Ref* (reference) tab.

Use the WDFW [Eelgrass/Macroalgae Habitat Interim Survey Guidelines](#) to conduct SAV surveys and follow the USACE “[Components of a Complete Eelgrass Delineation Report](#)” for eelgrass delineations. Report SAV survey results in percent (%) cover. SAV is generally located in the LSZ but may extend into the USZ. SAV surveys must include the landward margin of eelgrass or macroalgae habitat. Also document upper intertidal vegetation located in the USZ if present. When a survey shows that only eelgrass is present (no other macroalgae or vegetation), we also accept an Eelgrass Delineation Report based on the Components of a Complete Eelgrass

Delineation Report developed by Dr. Deborah Shafer Nelson, U.S. Army Engineer Research and Development Center; Special Public Notice May 27, 2016¹².

If surveys are conducted outside of the SAV survey window (June 1 - October 1), NOAA may increase the SAV number in the Nearshore Calculator to account for the likely underestimate of coverage outside of the main growing season. This decision depends on additional site-specific information like site specific growth patterns, temperature regime of the area, and WDFW area habitat biologist input, as available.

What if I don't have a SAV survey?

Though the Services prefer that an aquatic vegetation survey is conducted, we do not require SAV surveys for projects that use the Nearshore Calculator. For most small size replacement projects, SAV information can be provided without a new survey by using a combination of other data sources. Please consult the following materials and provide rationale in the *ProjectD* tab for the scenario entered if no survey is available.

1. Old surveys from the same location
2. Surveys from adjacent properties
3. Pictures at extreme low tides, underwater photos, or underwater video taken during the SAV survey window (June 1 – October 1)
4. Aerial imagery – especially a review of historic imagery on google earth from July 1 to October 1.
5. The eelgrass and kelp layers on [WDOE's Coastal Atlas map](#)
6. [WDNR Puget Sound Seagrass Monitoring map](#)
7. [WDNR WA State Floating Kelp Mapper](#)
8. [Pacific Marine and Estuarine Fish Habitat Partnership West Coast Eelgrass Habitat Map](#)
9. Information from [WDFW area habitat biologists](#)

Special note on the Deeper Shore Zone and vegetation: The DSZ has no aquatic vegetation and is deeper than -10 MLLW. Both of these criteria must be met to enter structures into the DSZ. If aquatic vegetation data is not available, and there is a chance that SAV may occur in the area, structures deeper than -10 ft MLLW must be entered in the LSZ.

¹²<https://www.nws.usace.army.mil/Portals/27/docs/regulatory/RGPs/RGP6/SPN%20and%20Components%20of%20Eelgrass%20Delineation%205-27-16.pdf?ver=2017-02-07-230332-347>

Table 2: Delineation of LSZ and USZ vegetation scenarios (categories). SAV is defined as rooted vascular plants and attached macroalgae. Drift algae are not included when determining cover percentage unless *Ulva spp.* occurs in documented herring spawning areas.

Delineation of Lower Shore Zone SAV Scenarios		
VEGETATION SCENARIO	<i>Native Eelgrass and/or Kelp occurs within 25 feet of project area</i>	<i>Other SAV occurs within 25 feet of project area (no native eelgrass or kelp present)</i>
Scenario 0	N/A	≤ 10%
Scenario 1	1-25% Combined SAV	11-25%
Scenario 2	26-69% Combined SAV	26-75%
Scenario 3	≥ 70% Combined SAV	> 75%
Delineation of Upper Shore Zone Vegetation Scenarios		
VEGETATION SCENARIO	<i>Macro algae and saltmarsh vegetation (such as <i>Salicornia sp.</i> and <i>Distichlis sp.</i>)</i>	
Scenario 0	Less than 5% of cover	
Scenario 1	Between > 5% and < 30% of cover	
Scenario 2	Between > 30% and < 60% of cover	
Scenario 3	Over 60% of cover	

Aquatic Vegetation on Piles

Plants growing on structures that are elevated vertically from the substrate (such as piles) do not need to be considered when determining the shore zone or SAV coverage. However, SAV growing on bottom substrates including rubble or a derelict structure needs to be considered when determining the shore and included for calculating the percent SAV cover.

RZ (Riparian Zone) Tab

{Green Tab}

Vegetation changes that occur within the Riparian Zone (130 feet landward of HAT) as part of a project are entered into the RZ tab. According to Brennan et al. (2009), various nearshore functions are supported by adjacent riparian habitat. They reviewed published literature, recommended buffers, and Forest Ecosystem Management Assessment Team curves to evaluate each of these functions and propose different riparian buffer widths to maintain a minimum 80% effective function. NOAA considered the information provided in this review and designated the area within 130 feet above HAT as the riparian area for the Nearshore Calculator. This width is focused on supporting shade, large woody debris recruitment, litter/organic matter inputs, water quality, and habitat function which we believe are the most impactful for aquatic ESA listed species in the region.

RZ Tab Entry

Enter riparian area (square feet) in the Before and After scenario in columns E and G. The total area in the Before column (E) needs to equal the total area in the After column (G). Only enter those riparian areas for which changes in cover type are proposed, not the total riparian area.

There are four cover type categories: Trees, Shrubs, Herbaceous, and Impervious/Unvegetated. Riparian cover type categories are represented in the RZ tab with highest ecological value on top, descending to the lowest. A shift of area from impervious (in Before column E) to trees (in After column G) represents the most habitat benefit. Base the determination of the vegetation type on the largest/tallest vegetation. For example, if there are trees with blackberries underneath, only where there is no canopy cover does herbaceous vegetation apply. Think of the project from a bird's eye view – the vegetation types seen from above are those that are entered.

Example 1: A new sidewalk is proposed and would displace 100 square feet of lawn/herbaceous, enter 100 in cell E15 (herbaceous before) and 100 in cell G16 (impervious After).

Example 2: An applicant proposes to plant a total of 1,030 square feet of vegetation (Figures 6 and 7 below). Herbaceous and impervious cover will be converted to shrubs, trees, and a small amount of herbaceous. Note that the “crossed out” 130 in the after entry is correct in this case because impervious becomes herbaceous. In most cases, there will be no entry in the “after” entry field immediately to the right of the “before” entry field because the RZ tab only accounts for changes in habitat type. Don't forget to fill out the Discounting Factors below the vegetation types, these factors can dramatically impact the result.

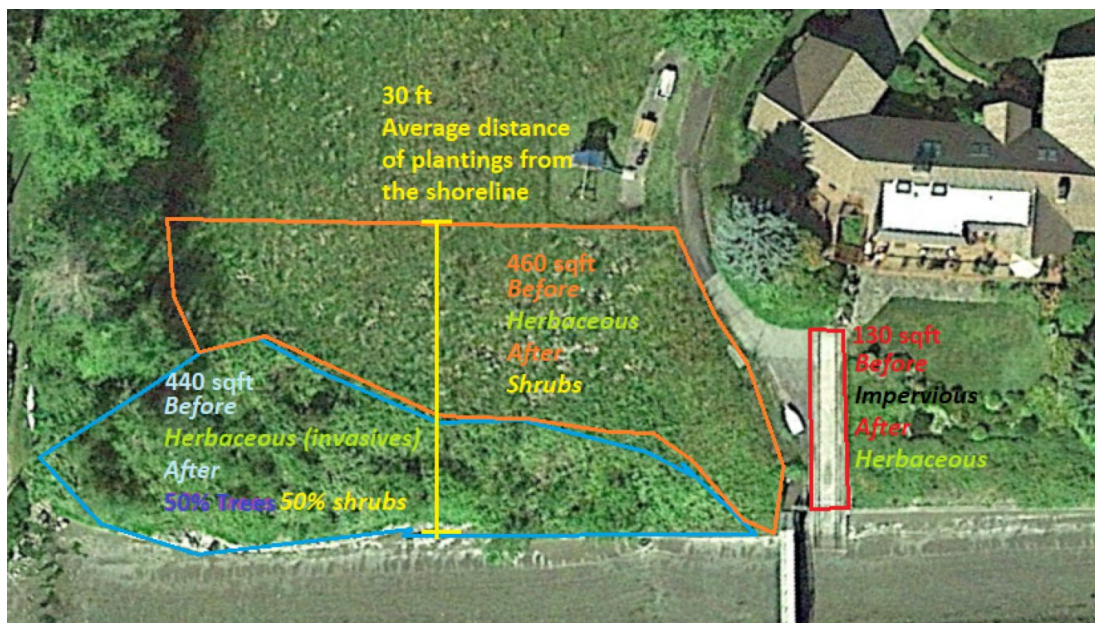


Figure 6: Riparian planting showing changes in vegetation types (before and after)
Google, 2022, Landsat / Copernicus - modified with polygons and text

Indicators of Physical Habitat		Before		After	
Riparian Habitat Vegetation Cover Types	Riparian Habitat Value	Area [sqft]	Habitat Value times discounting factors	Area [sqft]	Habitat Value times discounting factors
TREES: Enter the area of trees (native woody vegetation) within the riparian zone that will change.	0.55	0	0.23	220	0.23
SHRUBS: Enter the area of shrubs (native woody vegetation) within the riparian zone that will change.	0.40	0	0.17	680	0.17
HERBACEOUS: Enter the area of lawn, herbaceous vegetation, or invasive vegetation within the riparian zone that will change. Include invasive vegetation in this category, regardless of type/size.	0.10	900	0.04	130	0.04
IMPERVIOUS SURFACE or UNVEGETATED: Enter the area of mostly impervious surface (like pavers, gravel, concrete, wood decking) within the riparian zone that will change.	0.00	130	No discounting factors apply as value already 0.	0	No discounting factors apply as value already 0.
Discounting Factors Related to Distance and Connectivity	Answer Format				
Enter the distance (ft) between riparian vegetation and the shoreline, bulkhead, or HAT for natural shoreline.	0 ft to 130 (ft)	30	0.84	30	0.84
Do structures between vegetation and shoreline reduce connectivity and function of native woody vegetation? Enter a number [1-100] to indicate the percentage of the riparian zone that is disconnected before and after project.	0 to 100 (percent)	0	1.00	0	1.00
Is riparian vegetation disconnected from upper intertidal via armoring?		Yes	0.50	Yes	0.50
Total affected riparian zone area (sqft). Before and After areas need to be the same.		1030.00	0.04	1030.00	0.17

Figure 7: RZ tab entry

There may be locations in which woody vegetation extends below HAT or overhangs the water, especially in areas with stabilized shorelines. In those locations, the woody vegetation may be entered in this tab.

Temporary Loss of Woody Vegetation

If woody riparian vegetation is proposed to be removed and to be replanted, please fill out one Nearshore Calculator for the removal and a second Nearshore Calculator for the replanting. Nearshore Calculator # 1 should have the Before conditions (ex. trees and shrubs) and After conditions as herbaceous. This will calculate temporary habitat loss. In Nearshore Calculator # 2, Before conditions are herbaceous and After conditions are the new vegetation cover (ex. more trees and shrubs). The sum of these two RZ tabs will give the result of total riparian habitat benefit or loss.

Entering Trees and Shrubs

Enter trees and shrubs into the After column of the RZ tab as their full/mature crown size (area in square feet as seen from above), rather than the size when planted. The HEA model has time built into these categories and accounts for additional years needed for woody plants to reach their full size.

To find mature tree crown area (square feet), please use the [Washington State University's PNW Plants website](#).

1. On the PNW plants website, find the “Width” of the tree on the right hand “Plant Characteristics” box.
2. Divide the width in half to obtain the radius of the tree crown.
3. Use the formula for area of the circle $A = \pi r^2$ where A is the area (the total crown area in square feet as seen from above), π is pi (3.14159), and r is the radius obtained in #2 above.

Overstory and Understory

Native plantings provide overstory and understory conditions. In the *RZ* tab, enter only the total area. In other words, do not “double count” overlapping areas of different vegetation categories. Instead, enter the area (square feet) for the highest value (tallest) condition present. For example, if trees are planted with native herbaceous vegetation below, enter only the area associated with the trees in the After column. Native shrubs and/or herbaceous vegetation under trees is generally expected and integral to natural conditions.

Deed Restrictions and Easements for Riparian Plantings

Site restrictions must be in place (such as a deed restriction or easement) for all riparian planting plans over 1,000 square feet. This is required for assurance that plantings will remain on site and provide the considered habitat benefit to the marine nearshore. Currently, county zoning regulations alone do not suffice as riparian protection.

The default riparian habitat benefit duration is 10 years (cell D7), unless a conservation easement or deed restriction is proposed. If a site has a deed restriction, the years of impact in the *RZ* tab (cell D7) can be increased to reflect the years on the restriction, up to 50 years maximum. If a formal conservation easement is obtained, protecting restored areas in perpetuity, cell D6 “are project impacts permanent?” can be marked with “Yes” for in perpetuity site protection. See a biologist for assistance with selecting “Yes” for in perpetuity easements. Easements or restrictions must be complete before changing the number of years in the Nearshore Calculator. To be considered complete, a deed restriction must be on file with the local County Planning Department. A complete conservation easement must be signed and in effect or in draft version with a USACE special permit condition stating the easement will be in effect prior to construction.

See the *Increased Credits for Removals with Site Protection* section above, page 24, for USACE guidance on components of a mitigation plan and deed restrictions. An example of a Mitigation Monitoring Report for riparian plantings can be found [here](#).¹³ Submit a planting plan, performance standards, proposed monitoring plans, and site protection (if applicable) with your consultation initiation package.

Be sure to only propose plants native to the area and appropriate for the weather and salt water conditions!

¹³ <https://www.nws.usace.army.mil/Missions/Civil-Works/Regulatory/Forms/>

Overwater Structures Tab

{Blue Tab}

The Nearshore Calculator allows for determining the impact of overwater structures (OWS) including simple piers, ramps, floats, and other structures that shade nearshore habitats. Entering area for typical piers, ramps, and floats is straightforward, whereas entering measurements for more complex structures, like marinas and industrial structures, require more explanation which is provided below.

The Nearshore Calculator determines a buffer for floats based on length and width. If a float spans two zones, entering length and width for all zones would result in an additional buffer area based on the width at the zone break. The outlined entry method described below ensures correct buffer determination in that no buffer area is assigned to the width at the end of a zone. Because other overwater structures, such as piers and ramps, do not have buffers, this modification is not needed for those structures extending across shore zones.

Simple Float Entry

Enter the length and width of a simple float in the respective shore zone and grating category (solid or grated). Also see “Entering Length and Width” in the *General Information* section. Unlike piers and ramps, floats have associated buffers. In order to allow the Nearshore Calculator to correctly determine the buffer area of the float, the length and width must be considered. Always enter the longer side of a float into the length field, regardless of orientation.

Example: For installing a replacement 8 ft x 30 ft 50% grated float with 70% open space in the LSZ, in the *Overwater Structures* tab, enter 30 in cell E103, and 8 in cell E104.

In order to be entered as a grated float, floats must have at least 50% functional grating, with a minimum of 60% open space (consistent with WAC 220-660-140).

Simple Floats with Length and Width Spanning Two or More Shore Zones

If a float extends across more than one shore zone, the width entity must be adjusted to avoid double-counting a portion of the buffer. To do this:

1. Enter the float dimensions (L and W) for the portion of the float located in the more landward shore zone. Enter these zone-specific dimensions in the yellow entry cells for length and width.
2. For the adjoining waterward zone(s), enter only the length (in that zone) into the yellow entry field, leaving the width at 0. Then, manually enter the area (in square feet) for the applicable nearshore zone in the pink cell.

Example: For installing the replacement of a grated float spanning the LSZ and DSZ, first enter the length and width of the portion of the float that will be in the LSZ. The area will be calculated automatically in cell E108. Next, enter only the length of the portion that will be in the DSZ in cell E105, and enter 0 in cell E106 for the width. Last, manually enter the area of the portion in the DSZ in cell E109.

Complex Floats

Floats can have several “branches” or float components contributing to their overall shape. Enter T-shaped floats, L-shaped floats, comb-shaped floats, and other irregular-shaped floats into the Nearshore Calculator as complex floats. See further explanation in the sections below

Complex Floats with One Type of Decking

Floats with decking that is entirely grated or entirely solid can be entered as a “complex float” following these two steps.

1. Enter the total length and the width at the widest point into the appropriate nearshore zone (LSZ or DSZ) and grating category (solid or grated). This will allow for calculations of a simplified float buffer.
2. Determine the area of the complex float and manually enter the area (square feet) directly into the appropriate pink¹⁴ nearshore zone’s cell. Letting the Nearshore Calculator determine the area for complex floats results in an overestimate of the total area, as it simply multiplies length by width (Figure 8).

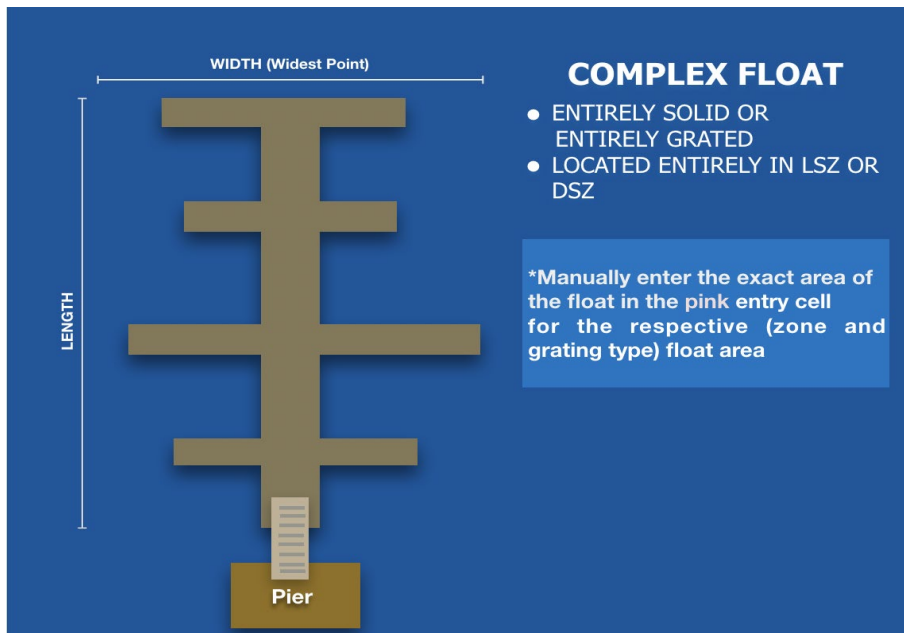


Figure 8: Complex Float with One Type of Decking located entirely in either the LSZ or DSZ.

Complex Floats with Solid Walkways and Grated Finger Slips

Some commercial and marina floats have a combination of solid and grated floats. Since there are different float types (solid and grated) within one structure, entry must be split between the solid and grated areas of the Nearshore Calculator.

¹⁴ Most entry cells in the Nearshore Calculator are yellow. This is one of the few cases where an area is manually entered into the pink float area cell.

When a complex float structure has a solid center “walkway” and grated fingers, enter it in the Nearshore Calculator following the example below.

Example:

1. Enter the solid main walkway as a simple solid float (as outlined above under *Simple Float Entry*: Enter the longest dimension in the length entry field and the shortest in the width entry field.)
 - a. For a replacement structure in the LSZ, enter length and width into cells E112 and E113 respectively (Figure 9).
2. Under grated float:
 - a. Enter the widest width of the entire complex float minus the center walkway as the width (the length of the longest finger floats on both sides of the center walkway, not including the center walkway, E104 (W1+W2 in Figure 10). Leave the length at 0 (E103).
 - b. Manually enter the total area (square feet) of the grated finger floats directly into the pink area cell (E108).

101	Grated Float to be Installed	Enter the outside dimensions of new floats with at least 50% grating and 60% or more open space as grated floats (Compliant with WAC 220-660-140). Grated floats are not split between grated and ungrated portions	USZ Outside dimensions of replacement float.	Length [feet]		Enter the length and width of the float in the appropriate shore zone. For complex floats, enter longest outside dimensions of the float. Solid floats have higher adverse effects on the nearshore environment than grated floats. We highly encourage applicants to grate overwater structures	
102				Width [feet]			
103			LSZ Outside dimensions of replacement float.	Length [feet]	0		
104				Width [feet]	60		
105			DSZ Outside dimensions of replacement float.	Length [feet]			
106				Width [feet]			
107	The area of a float in each shore zone is calculated from the length and width entered above. For complex floats, enter the area directly in the appropriate zone. Floats should not be located in the USZ and cannot ground out.		Grated Float USZ	SqFt	0	0.00	
108			Grated Float LSZ	SqFt	960	-33.98	
109			Grated Float DSZ	SqFt	0	0.00	
110	Solid Float to be Installed	Enter the length and width of the float in the appropriate shore zone. For complex floats, enter longest outside dimensions of the float. Solid floats have higher adverse effects on the nearshore environment than grated floats. We highly encourage applicants to grate overwater structures	USZ Outside dimensions of replacement float.	Length [feet]		Enter the length and width of the float in the appropriate shore zone. For complex floats, enter longest outside dimensions of the float. Solid floats have higher adverse effects on the nearshore environment than grated floats. We highly encourage applicants to grate overwater structures	
111				Width [feet]			
112			LSZ Outside dimensions of replacement float.	Length [feet]	80		
113				Width [feet]	10		
114			DSZ Outside dimensions of replacement float.	Length [feet]			
115				Width [feet]			
116	The area of a float in each shore zone is calculated from the length and width entered above. For complex floats, enter the area directly in the appropriate zone. Floats should not be located in the USZ and cannot ground out.		Solid Float USZ	SqFt	0	0.00	
117			Solid Float LSZ	SqFt	800	-52.60	
118			Solid Float DSZ	SqFt	0	0.00	
119	Sub-Total: Habitat Loss due to Replacement Structure Elements					-164.50	Adjust

Figure 9: Entries for a Replacement Complex Float with two types of decking (solid walkway and grated finger slips) in the LSZ.

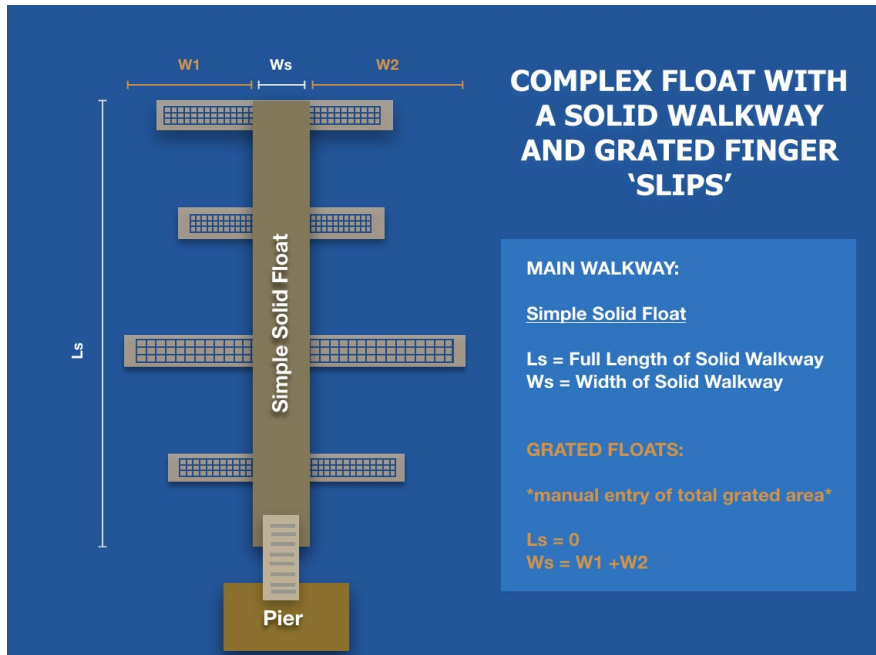


Figure 10: Complex Float with Two Types of Decking (grated finger slips and a solid walkway) located entirely in either the LSZ or DSZ.

Complex Floats Spanning Two or Three Shore Zones

When complex floats extend across several nearshore zones (Figure 11), the float area as well as length and width entries for buffer calculations must be zone specific. To enter complex floats in more than one shore zone:

1. Enter the length of the complex float portion that exists in the most landward shore zone in the yellow entry field for its corresponding shore zone. Length, in this case, represents a portion of the longest dimension as it spans all shore zones.
2. Enter the maximum width of all the floats together (finger floats and walkways) in the yellow entry field for width in the most landward shore zone.
3. Manually enter the area of the float portion located in the most landward shore zone in the pink cell for area.
4. For the adjoining waterward zone(s), enter the total zone-specific length into the yellow entry field for float length. Manually enter a width of 0.
5. Manually enter the area of the float located in each waterward shore zone into the respective pink cell for area.

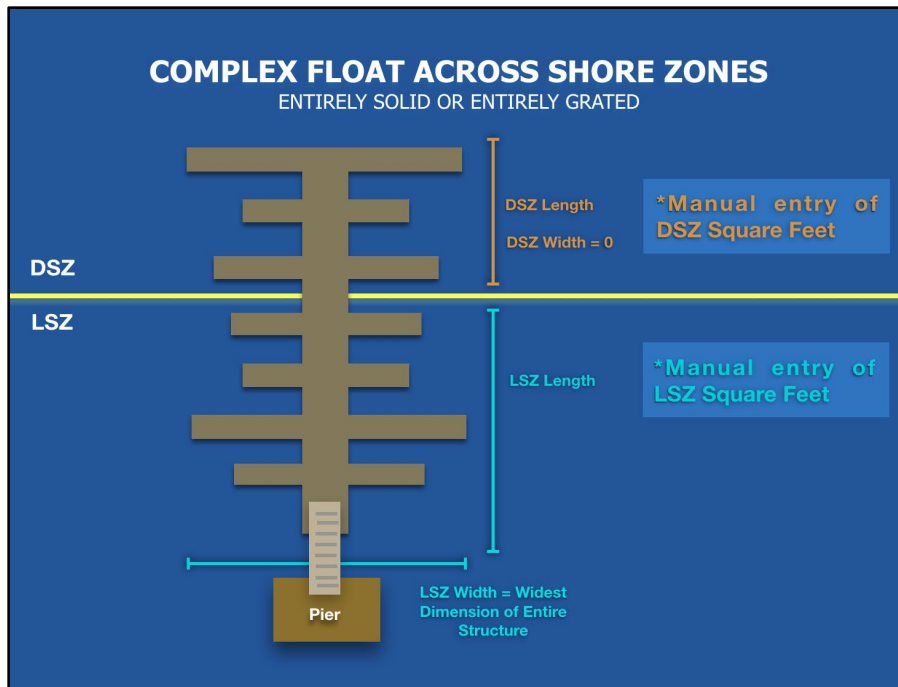


Figure 11: Complex Float with One Type of Decking (either solid or grated) extending across Multiple Shore Zone.

Nearshore Calculator entry instructions for complex floats spanning two or three shore zones with both grated and solid decking combine the approaches outlined above under *Complex Floats with Solid Walkways and Grated Finger Slips* and *Complex Floats Spanning Two or Three Shore Zones*:

1. Enter the length of the complex float portion in the most landward shore zone in the yellow entry field for length of a solid float in its corresponding shore zone. Length, in this case, represents a portion of the longest dimension as it spans all shore zones, LSZ length in Figure 11.
2. Enter the longest width of all the floats together (e.g., finger floats and walkways) in the yellow entry field for width of a grated float in the most landward shore zone, LSZ W1 in Figure 10.
3. Enter 0 for the remaining landward shore zone dimension fields (solid float width and grated float length).
4. Manually enter the area of the solid portion of the float in the landward shore zone in the pink field for solid area. And manually enter the area of the grated portion of the float in the landward shore zone in the pink cell for grated area.
5. For the adjoining waterward zone(s), enter the total zone-specific length into the yellow entry field for the length of a solid float, DSZ length in Figure 11. Manually enter a width of 0. Manually enter the area for both the grated area and solid area for the total waterward shore zone of the float.

Complex Floats in Marinas

Complex float entry (as well as simple float) includes consideration of buffer impacts around the float structure. The total area of impact is correlated with the float size (see “entering Length and Width” in this User Guide). A “u-shape” buffer is created around the complex floats described above. That buffer does not include the space in between finger floats due to possible overlap of the buffer impact area.

Large marina moorage systems often have multiple branches or docks. However, each mooring “wing” - aka branching structure with perpendicular finger float moorages - must be entered as a separate complex float (with its own L and W) to account for the buffer impact between each large wing (Figure 12). Each wing must be entered separately and requires using a new Nearshore Calculator files for each wing. Alternatively, you may request a Nearshore Calculator with multiple *Overwater Structures* entry tabs from PSNearshoreConservation.WCR@noaa.gov.

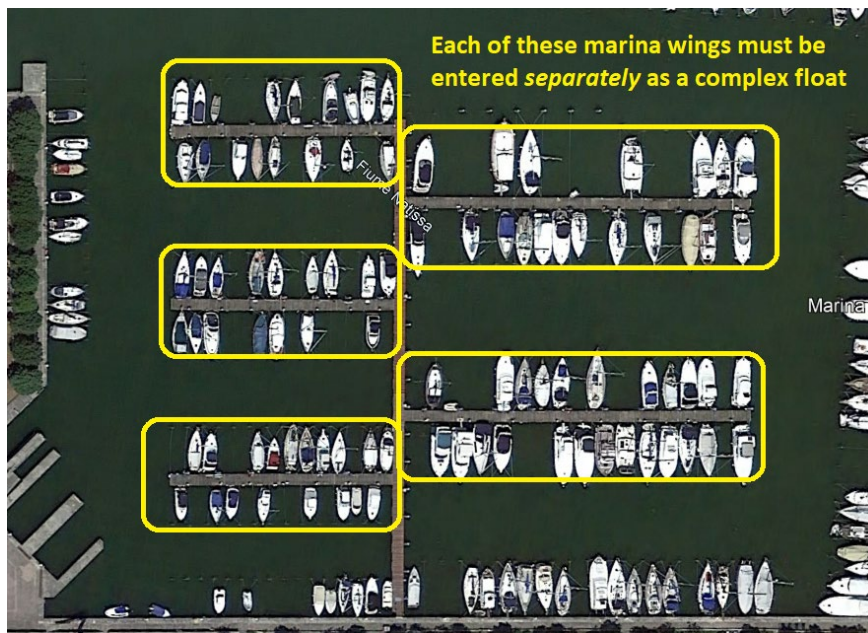


Figure 12: Photo of a marina showing multiple mooring “wings” or docks. Each one of the yellow boxed docks must be entered as a separate complex float. Google, 2022, Landsat / Copernicus - modified with polygons and text

Floating Breakwaters or Wave Attenuators

The intent of breakwaters is to keep debris away from structures like floats and boats and to reduce current and wave action. Breakwaters are like fences in the water, they extend from the surface to generally a few feet above the sediment (Figure 13).

Breakwaters should be entered as floats (or complex floats) with an additional area equal to half the largest shade producing wall, see section on 3D structures. The additional area accounts for their added impact (shading and migratory obstruction) compared to a standard float.

WAVE FENCE SECTION

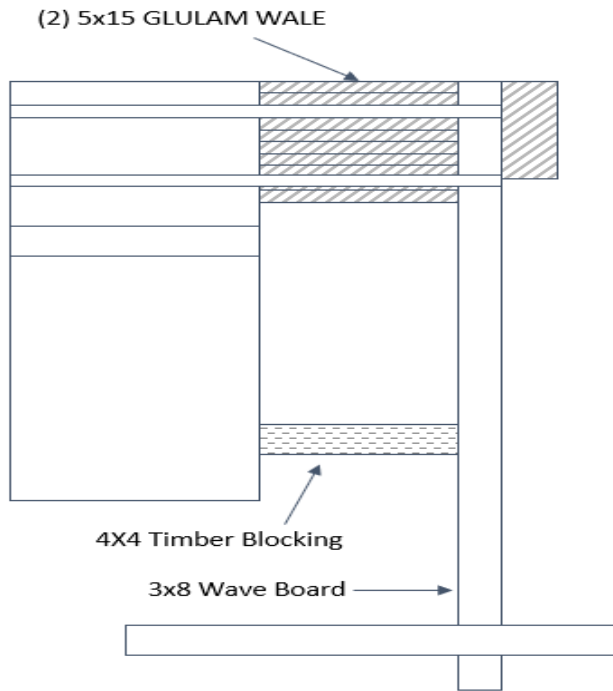


Figure 13: Cross section of a breakwater. The structure extends many feet down into the water column.
Figure by Monette O'Connor, NOAA Fisheries

Replacement vs. New Overwater Structure

If the area of a replacement overwater structure is larger than the area of the removed structure (Figure 14), the difference is entered in the Nearshore Calculator as new or expanded overwater coverage. The area entry for an expanded structure will be split between Entry Block: New/Expansion and Entry Block: Replacement and must be entered in the respective nearshore zone.

The Nearshore Calculator determines impacts/benefits based on the affected area in each shore zone. Thus, the determination of what is new or expanded coverage is zone specific.

Finally, to enter a structure element as a replacement, it must be a "like structure." Like structures are those that would be entered into the same structure category in the Nearshore Calculator. For example, piers and ramps are like structures. Grated floats, solid floats, buoys and pontoons are also like structures.

Typically, within a zone a replacement structure can be minimally realigned and still be considered a replacement. However, large shifts in location that cause increased habitat impacts should be entered as new structures (e.g., if a replacement pier is shifted 50 feet from its original location, and/or to an area with more aquatic vegetation).

Entering Replacements with Expansions (Figure 14)

1. Confirm the total area (in square feet) of each like structure category to be removed within each shore zone. This is your maximum replacement area. Enter this in Entry Block: Removal.
2. Enter the total area for the replacement structures in Entry Block: Repair and Entry Block: Replacement. This area must not exceed the values for zone specific areas entered above in Entry Block: Removal.
3. Enter any areas exceeding the removal area within a shore zone in Entry Block: New/Expansion. Enter zone specific expansions for each like structure in this same Entry Block.

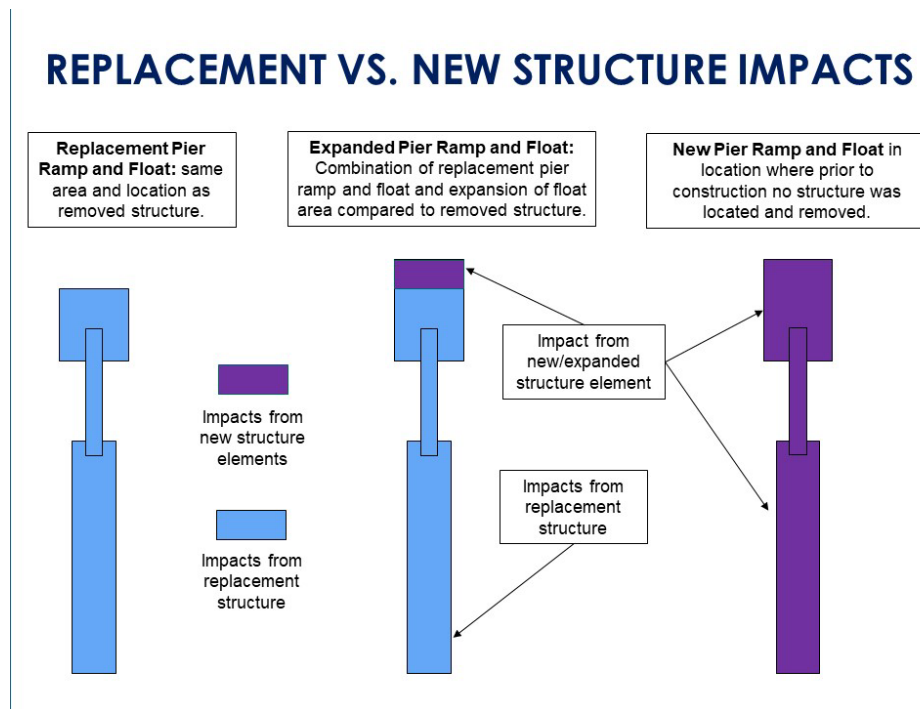


Figure 14: Replacement versus New/Expanded Structure Impacts

Example:

For a 30 ft x 8 ft grated float being replaced with a 40 ft x 8 ft grated float in the LSZ (50% grated, > 60% open space) (Figure 15):

- In the Entry Block: Removal, enter 30 and 8 as the length and width, respectively, under Grated Float to be Removed.
- In Entry Block: Repair and Replacement, enter 30 and 8 as the length and width, respectively, under Grated Float to be Installed.

- In Entry Block: New/Expansion, enter 10 for the length, leave the width as 0, and enter 80 square feet as the area of the new/expanded float.

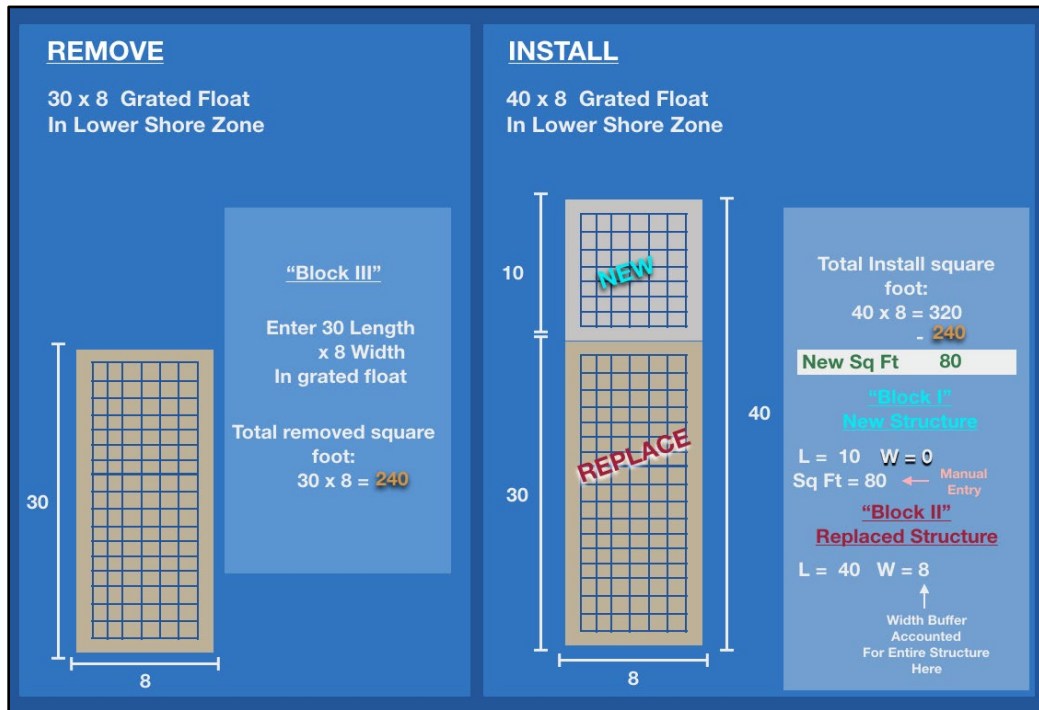


Figure 15: A 30x8 foot grated float is being replaced with a 40x8 foot grated float in the LSZ.

Mooring Buoys

Mooring buoys function similar to solid floats and should be entered into the Nearshore Calculator as simple solid floats. Enter the length and width into the yellow entry fields.

If a mooring buoy reduces or prevents ongoing adverse impacts, mooring buoys do not need to be entered into the Nearshore Calculator. This only applies in situations where vessels are currently moored in areas where they have adverse impacts and would likely continue to be moored and have negative impacts without a mooring buoy. This includes situations where mooring buoys would re-direct vessel moorage away from areas where vessels ground out, or where vessels impact dense SAV (SAV score 2 or more), or areas with any kelp, or any eelgrass. In these cases, the applicant should provide information and evidence of ongoing adverse effects and their reduction based on the placement of the mooring buoys.

Large Solid Decks/Piers

Generally, elevated decks and piers have a smaller impact than floats because side lighting reduces the amount of shading. However, the wider a deck is, the less effective the side lighting compared to a long and narrow deck (e.g., a pier). In wide decks, much of the center of the deck

is not affected by side lighting because light does not reach under the center of a wide deck (Figure 16).

To account for the dark center on wide decks, enter the deck area within 20 feet from the edge as a pier, and enter the remaining center deck area more than 20 feet from the edge as a float; enter the float area directly into the pink entry cell for solid floats.

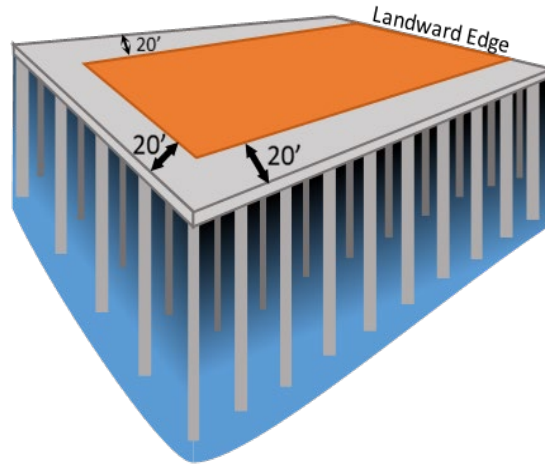


Figure 16: The orange center represents the area of a solid deck that is entered as a float due to the lack of light penetration from the sides. The 20 feet gray area is entered as an elevated solid deck. The blue gradient shows how lighting dims towards the center underneath a large deck.

Houseboats and Other 3-Dimensional Overwater Structures

Three-dimensional structures with solid vertical walls, including net sheds and houseboats, create a larger shadow than flat decks. To account for the larger shadow, add half of the area of the largest shade producing vertical wall to the area of the structure type (pier or float) derived from the horizontal coverage (Figure 17). Enter the half of the area of the largest shade producing vertical wall by structure type: pier = pier, float = float.

- Enter the total shade producing area as: $X*Y + \frac{1}{2}(A*B)$.
- Enter length and width of structure based on horizontal dimensions, only. Length = X, Width = Y.

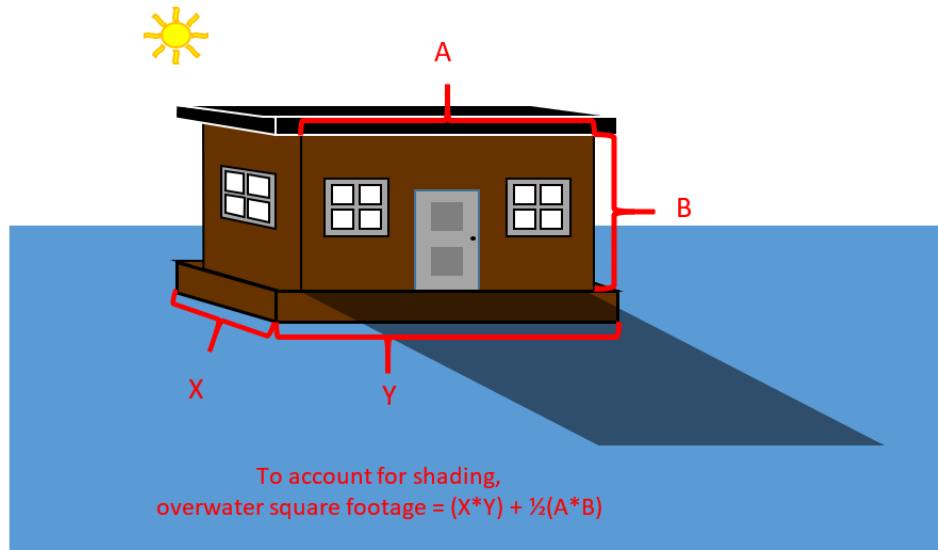


Figure 17: Houseboats: Three-dimensional Overwater Structure. For Nearshore Calculator entry, include height for determining the total shade producing area.

Boat Lifts

Boat lifts are generally entered as solid or grated piers. If the boatlift is covered, the covered area between the pontoons should be entered as a solid pier. Uncovered boat lifts are entered as grated piers. Dimensions of boats (even if stored in the lift) are not entered into the Nearshore Calculator. Piles associated with boat lifts are entered as piles.

Pontoons integrated within lifts that are permanently in contact with water should be entered as a complex float (see complex float entry above). Enter the longest length and width of both pontoons as the dimensions, then manually enter the pontoon area (Figure 18).

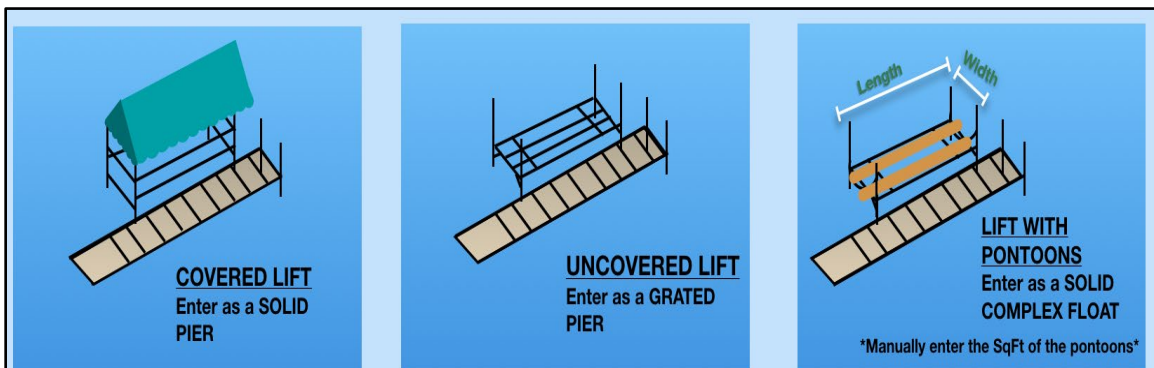


Figure 18: Different Types of Boat Lifts.

Overlapping Structural Elements

Overwater structures contain overlapping structural elements like float tubes, decking, and roofing. Since debits/credits are based on area impacts, enter overlapping areas once and select the type of entry based on maximum impact. Examples below inform entries for such situations.

1. For repairs to the float structural components, such as the frame, walers, or stringers, enter the entire float area (solid or grated surface as applicable) to determine impacts. If float tubes are replaced at same time, no extra entry is required for float tubes (in other words, no double offsets will be counted).
2. If proposing to replace decking on a float, enter the area of the decking unless:
 - a. Within the last 20 years (the first half the design life of a float) the frame and stringers or decking have been replaced, and conservation debits were provided for the entire float or proposed to be replaced element.
 - b. Solid well-functioning decking is being replaced with grated decking (see below).
3. Polycarbonate Roofing: Clear polycarbonate roofing transmits approximately 90% of light. Thus, enter 10% of the area of the polycarbonate roofing as a solid pier.

Example: A 500 square foot roof overwater (seen from a bird's eye view) would be entered as a solid deck of 50 square feet.
4. Covered Moorage: Enter the area of covered moorage, with vertical walls that prevent light from entering around slips, as solid float area. Enter the area of covered moorage without side walls as a solid pier. When entering covered moorage, subtract the area of floats or other structures below the roof area from the total covered area.
 - a. Scenario 1: For covered mooring with side walls, enter the roof area as a single solid float minus the area of any covered floats.
 - b. Scenario 2: For covered mooring without side walls, enter the roof area as a solid pier minus the area of any covered floats. Enter areas of covered moorage without side walls that are more than 20 feet from the edge of the structure as a float, similar to Figure 16.
5. Overstory and Understory: Follow the same principle as described in the *RZ* tab section above.

Replacement of Well-Functioning Solid Decking with Fully Grated Decking for the Purpose of Reducing Shading

If well-functioning solid decking on overwater structures (floats, ramps, and piers) is proposed to be replaced with fully grated decking (defined as a minimum of 60% open space, in compliance

with WAC 220-660-140), the decking replacement does not have to be entered¹⁵ if all of the following conditions are met:

1. The solid decking being replaced is in well-functioning condition with a remaining functional life of more than 10 years (dated photos of existing decking must be provided). If any solid surface on the overwater structure is proposed to be replaced with new solid surface decking, then this condition would not be met. In that case, both grated and solid replacement decking must be entered into the Nearshore Calculator because the replacement of the solid surface with solid surface suggests the decking was approaching the end of its design life and needed to be replaced. For example, if solid decking is proposed to be replaced with decking that has a “grated, solid, grated” pattern and all decking is replaced, then all decking replacement and removal would be entered in the Nearshore Calculator.
2. Decking replacement aims at reducing adverse effects from shading rather than extending the life of the structure.¹⁶ For example, state and local agencies or tribal entities often ask applicants to replace well-functioning solid decking with grated decking to reduce impacts. Such replacements would not have to be entered into the Nearshore Calculator if conditions 1 and 3 in this description are also met.
3. No other structural replacements on the subject structure beyond decking are proposed. If other replacements or upgrades (like the replacement of the frame, stringers, walers, or float tubes) are proposed at time of the decking replacement, or within the 10 years following the decking replacement, all elements must be entered into the Nearshore Calculator. The rationale is that the replacement of other elements at the same time or within 10 years suggests that at the time of decking replacement condition (#1 above) was not met and the structure, including the solid decking, had no more than 10 years of remaining functional life left.

If an applicant proposes to replace additional components of an overwater structure within ten years of replacing the solid decking, the evaluation of the later-proposed project would likely need to consider the long-term impacts of the previously replaced decking. In other words, the completed solid decking replacement will have to be entered into the Nearshore Calculator along with the proposed project at the time of the later replacement.

Example: If the upgrade of an old float includes the replacement of solid decking with grated decking along with replacement of a float tube, then all elements are entered in the Nearshore Calculator.

¹⁵ If the decking replacement is not entered into the Nearshore Calculator, there will be no removal credit for the removal of the solid decking. This is based on the fact that the removal credit for solid decking with a remaining life of approximately 30 years is about equal to the placement of the same area of grated decking with a design life of 40 years.

¹⁶ Expected remaining life is more than 10 years.

Example: If a float that had its solid decking replaced under this provision and proposes nine years later to replace a different float element, the replaced decking has to be considered retroactively as the replacement of other float elements suggests that the float including the solid decking had less than 10 years of remaining life left and did not meet the conditions above.

Piles

This section outlines specifics regarding entering different types of piles into the *Overwater Structures* tab of the Nearshore Calculator.

1. Enter structural piles - excluding batter piles and fender piles.
2. Entry elements: (a) the number of piles to be placed, replaced or repaired and (b) enter the diameter of piles.
3. Multiple pile sizes: If different pile sizes are being installed, enter the average diameter of all the piles. A quick-use calculator provided in the *Overwater Structures* tab at row 131 allows for easy determination of the average pile diameter for each nearshore zone.
4. Batter piles and fender piles: Enter installation of new but not replacement piles. This is a simplified approach to account for the frequent replacement of non-structural piles intended to be hit by vessels (more detail is provided below in section “Exceptions to Entering Piles”).
5. Creosote removal: See the Creosote Removal and Creosote Weight Estimation sections above.
6. Pile Repair: Pile repair (including adding sleeves/jackets) extends the life of a pile just like a replacement. Thus, enter the number of repaired piles including their increased diameter along with replaced piles. Removal credit applies to repairing piles.

Jacketing Piles – Pile jacketing increases the diameter of piles and extends their life. Enter the number and existing diameter (before jacketing) of the piles in Entry Block: Removal. Then, enter the final pile diameter and quantity for the jacketed piles in Entry Block: Repair and Replacement.

If creosote piles are repaired, enter only the weight of creosote treated wood that is proposed to be removed in the entry cell for “tons of creosote to be removed.” If strut repair is proposed, usually the bottom section of the creosote pile remains in place.

Application of a thin layer of epoxy coating onto piles is considered minor maintenance and no entry is needed for this activity.

Exceptions to Entering Piles

Piles that are intended to be frequently replaced may not need to be entered in the Nearshore Calculator. Because impact calculations are based on the design life of the larger structure, elements designed for frequent replacement during that design life don’t typically need additional conservation offsets. Pile resets never need to be entered.

The following elements do not need to be entered when replacing only a portion of a larger structure:

1. Piles meant to directly take regular hits/force from boat traffic. These are often called fender piles but may have other names. These piles are intended to be replaced more frequently than the structure, as a whole.
2. Overwater structural elements attached to fender piles that are also meant to be damaged and replaced on a more frequent basis than that of the entire structure. See Figure 19 for highlighted portions of a wingwall structure that would not need to be entered if replaced.

Replacement of an entire wingwalls, dolphins, or fender systems (not individual segments of a larger structure) should be entered, in their entirety, in the *Overwater Structures* tab of the Nearshore Calculator.

Structural piles that bear a vertical load or brace another structure in place should always be entered.

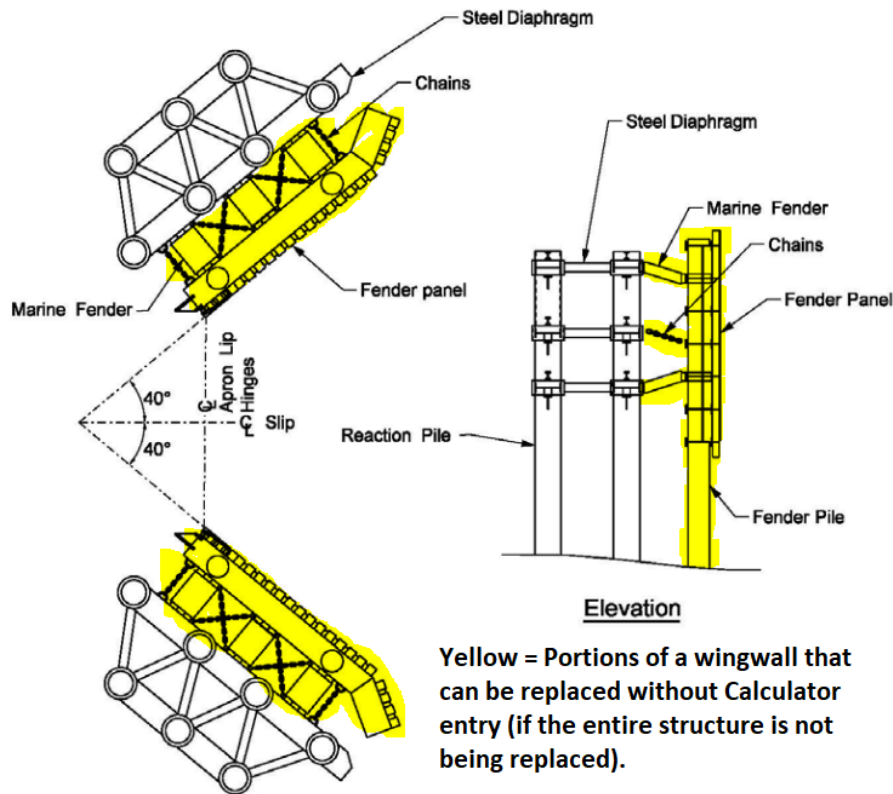


Figure 19: Example wingwalls with fender piles modified from the [Washington State Department of Transportation Terminal Design Manual](#), page 630-2. Highlights and text (bottom right) added.

Floats in Herring Spawning Areas

Floats in the DSZ in herring spawning and holding areas may have a herring factor applied depending on site conditions. The application of the herring spawning & holding factor to OWS

in the DSZ is based on the Services' consulting biologist's and WDFW's assessment of impacts related to the proximity of structure to holding and spawning areas, the size, type, and configuration of the proposed structure, and frequency and duration of use of the affected area.

ShorelStab (Shoreline Stabilization) Tab

{Gray Tab}

Hard Armoring Background Information

Shoreline armoring results in reducing the available nearshore habitat landward of hard armoring. Hard armoring cuts off access to the shallow nearshore area that is preferred early marine rearing habitat for juvenile PS Chinook salmon and Hood Canal summer run chum. This is called intertidal encroachment and is depicted in the Figure 20. Intertidal encroachment encompasses the area between the toe of armoring and the HAT. Critical habitat for PS Chinook salmon and Hood Canal summer run chum is listed under the ESA up to the HAT (50 CFR 226.212). Hard shoreline armoring can also reduce the habitat quality waterward of the hard armoring. Such adverse effects include reducing wrack and large wood accumulation (and thus food availability for juvenile salmonids), changing the wave regime (wave reflection), coarsening substrate, and lowering the beach profile as seen in Figure 21 (Dethier et al. 2016a; Dethier et al. 2016b; Heerhartz et al. 2014; Heerhartz et al. 2016; Prosser et al. 2018). The Nearshore Calculator evaluates the respective functional loss for the area of the intertidal encroachment and waterward of armoring.

To determine the area of intertidal encroachment when armoring is installed or replaced, NOAA developed a slope-based approach which is documented in more detail in Cereghino et al. (2023). NOAA developed tidal contour lines for the entire Puget Sound region outlining MHHW and HAT. We used NOAA tidal datum model outputs and a US Geological Survey (USGS) [high-resolution topobathymetric digital elevation model](#) to find beach and basin specific elevations. From these elevations, we developed typical average beach slope values for unarmored beaches stratified by marine basin and beach type. NOAA used the beach types described by MacLennan et al. 2017. The Typical Stratified Beach Slopes developed by Cereghino et al. (2023) are used in the *ShorelStab* tab of the Nearshore Calculator. Tidal contour lines are currently available on NOAA's GIS server as the "Beach Slope Reference Line".¹⁷

To convert the vertical distance between MHHW and HAT to a horizontal area of habitat impact due to armoring, we measured beach slope between MHHW and HAT at many unarmored ("typical") beaches. In this way, we do not rely on site specific evaluations. Site-specific horizontal distances between MHHW and HAT are subject to errors related to limited resolution (1 meter for recent USGS CoNED 2020 data), low confidence of the method at beaches with

¹⁷ <https://noaa.maps.arcgis.com/home/item.html?id=69c1c16ba7c8473d890e9eacd9fc6d4f#visualize>

steep slopes, inter-annual beach profile variability, and finally that site-specific distances between MHHW and HAT cannot consistently be determined at hydromodified sites.¹⁸

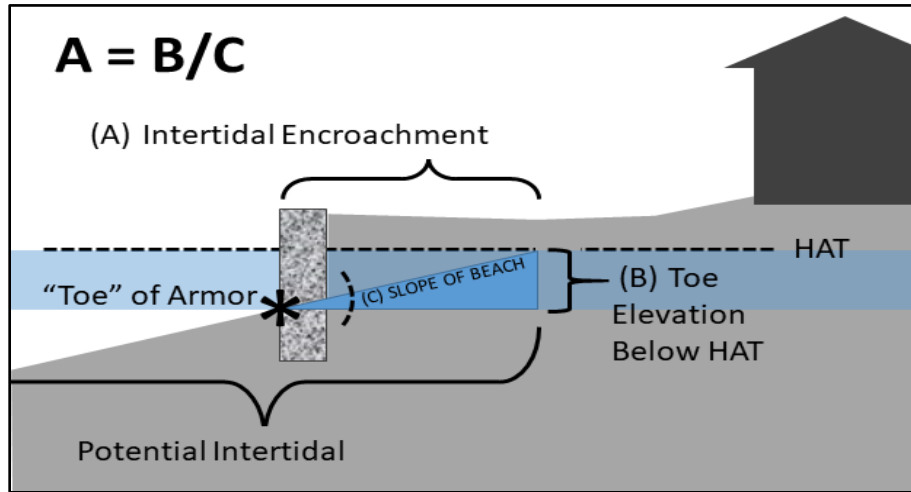


Figure 20: Intertidal encroachment. Figure by Paul Cereghino.

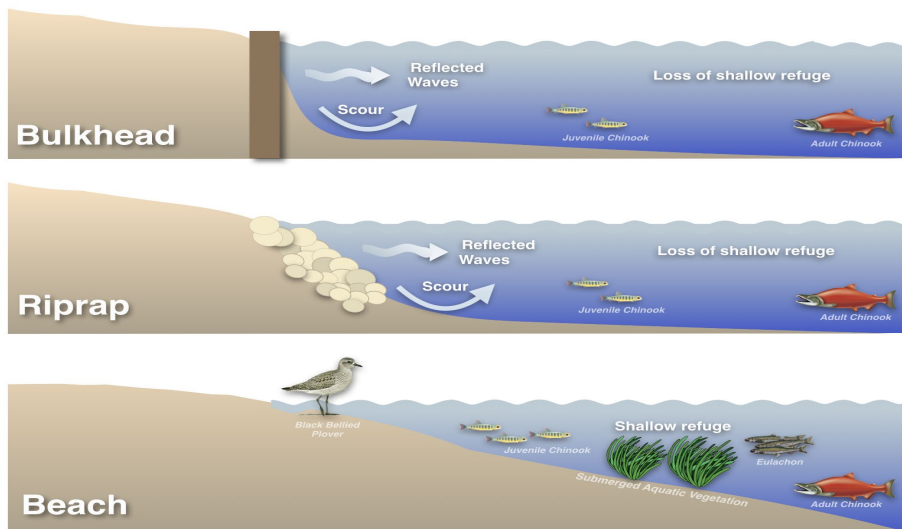


Figure 21: Effects of hard shoreline armoring adapted from Prosser et al. 2018.

Hard Armoring Entry

The following sections describe how to enter the removal and installation of hard armoring into the *ShoreStab* tab. The new installation of soft or hybrid armoring has insignificant adverse effects and therefore does not need to be entered into the Nearshore Calculator. Replacement of hard armoring with soft or hybrid armoring usually has habitat benefits that can result in

¹⁸ Hydromodified sites are sites where the beach profile has been altered by structures, for example existing bulkheads.

conservation credits. See the Soft and Hybrid armoring section below for more information and criteria.

Site-Specific Elevations, Beach Types, and Slope

To determine site-specific entries for cells C3 and C4, click on the [Beach Slope Reference](#) Line link (*ShorelStab* tab cell D3). In the NOAA ArcGIS window, click on the magnifying glass in the ribbon on the right and enter your site location. Then click on the green line to display the attribute box listing MHHW and HAT data for entry into cells C3 and C4. The box also displays the Marine Basin and Beach Type (Figure 22). Use this Marine Basin and Beach Type to determine the applicable site slope in the *ShorelStab* tab’s table on “Typical Stratified Beach Slopes.” To enter the applicable site slope in cell C5, link cell C5 with the applicable slope (in pink, column D) by entering the “=” symbol, then clicking the applicable slope and pressing enter. The Nearshore Calculator determines the horizontal distance (feet) between MHHW and HAT based on these entries and displays the result in C6.

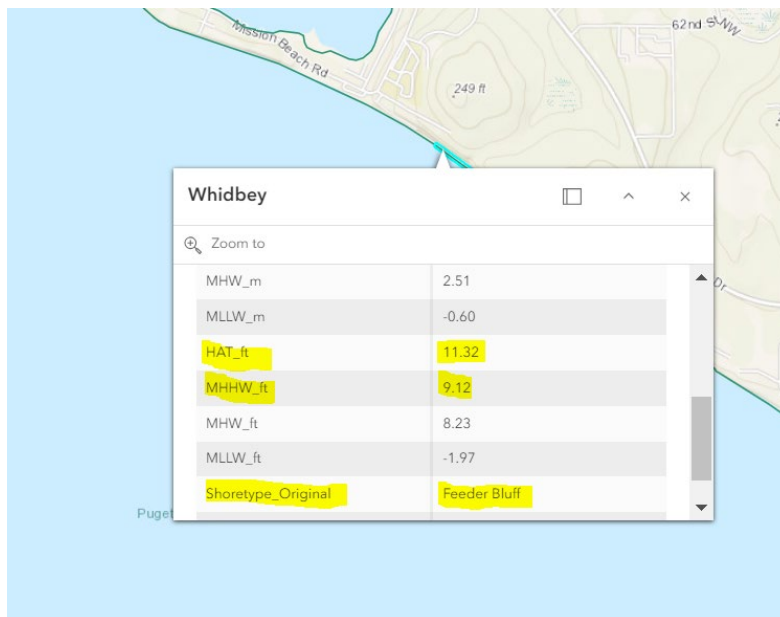


Figure 22: Beach Slope Reference Line Information Box. Beach type = shore type

What if my Beach Type isn't on the table?

Not every beach type in the Puget Sound is displayed “Typical Stratified Beach Slopes” table. Here are additional types you may encounter and directions for which slope to choose:

- Hydromodified: Use the nearest adjacent beach type for the slope.
- No appreciable drift: Use the lowest slope for that marine basin – typically this is the accretion slope. Such sites often do not need armoring; instead, consider a soft or hybrid approach.
- Pocket Beach: Use the nearest adjacent beach type for the slope.

Site Conditions Landward of Hard Armoring

This section assesses the value of the riparian habitat rendered inaccessible to fish via armoring. The inputs in *ShoreStab* tab cells C9 through C11 are a ratio used to determine the area weighted habitat value of the riparian habitat after installation (new or replacement) or repair of armoring. Enter the ratio of habitat types listed by entering a ratio or a whole number in these cells. If just one habitat type is present, it is sufficient to enter a 1 into the respective row. If there is a 50% split of the area between two habitat types, enter a 1 into each row for respective habitat types. For more complicated scenarios, enter respective area (square feet) for each habitat type.

For armor installation or repair, the conditions described must match the After conditions in the *RZ* tab (column G) if any changes in the riparian zone are proposed. Note: Evaluate riparian habitat changes (improvement or degradation) through actions like tree or shrub plantings separately in the *RZ* tab.

For standalone shoreline armor removal projects, describe the Before conditions in cells C9 through C11. Armor removal will likely result in changes to riparian zone cover type such as an area changing from unvegetated Before to shrubs After, which should be entered in the *RZ* tab.

Armoring Length

Enter the armoring length (linear feet) in cells C17 or C18 for removal and cells C32 or C33 for installations. There are separate boxes for vertical hard armoring, such as a sheet pile wall, and sloped armoring, such as a rip-rap revetment.

The length of armoring parallel to the shoreline should be taken from design plans. If armoring wraps into the upland or encircles features jutting out into the intertidal, still only enter the length parallel to the shoreline as shown in Figure 23.



Figure 23: Determination of Length of Shoreline Stabilization. Google, 2022, Landsat / Copernicus - modified with polygons and text.

Elevation of the Toe of Armoring

Enter the elevation of the toe of the existing armoring in C20 and for the proposed armoring in C35. Elevations for the toe(s) should be in NAVD 88. This is the most important applicant-determined entry because the location of the toe relative to MHHW is used to determine the area of intertidal encroachment.

The Nearshore Calculator adjusts the tidal elevations based on basin-specific intermediate sea level rise predictions (Sweet 2022). These calculations are displayed in the background tab *SLR*.

The toe of armoring, for the purpose of entry into the *ShoreStab* tab, is where the sand or other beach substrate naturally meets the armoring, at grade (see Figure 24).

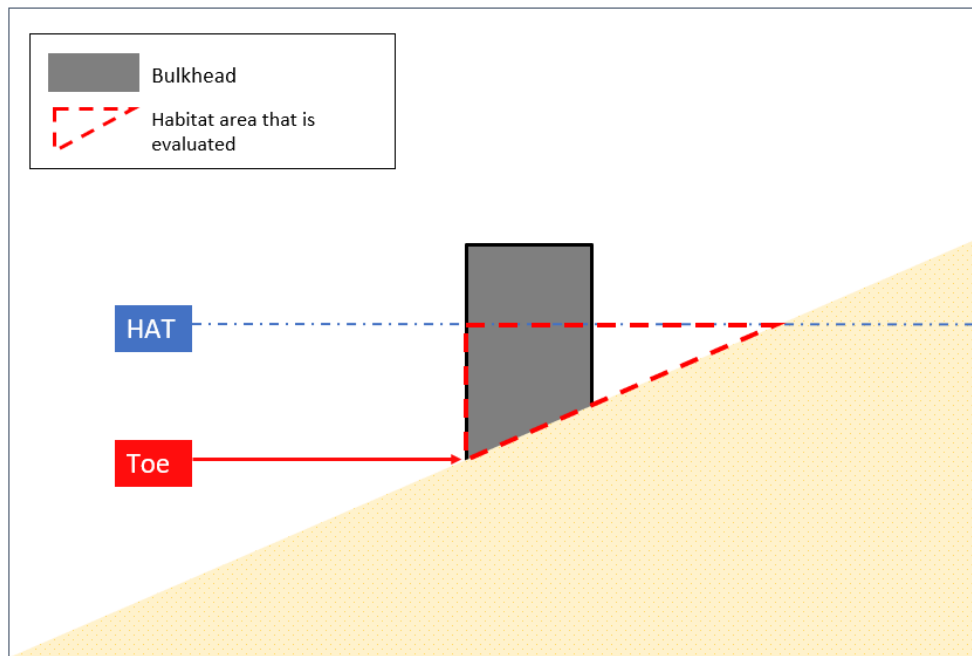


Figure 24: Example drawing showing the location of the toe of armoring for use in the *ShoreStab* tab.
Figure by Monette O'Connor, NOAA Fisheries

Determining the Toe Elevation

Use a beach survey to determine the elevation of the toe in NAVD 88. Distinctly different toe elevations can be entered either 1) in separate Nearshore Calculator files; 2) in one Nearshore Calculator using the length weighted-average toe elevation.

Example: If one segment of the armoring has an elevation of +8.5 feet over 40 linear feet parallel to the shore, and another segment has an elevation of +6.6 feet over 60 linear feet, you may enter into two calculators or enter into one calculator with the average elevation:

$$((40 \text{ linear feet} \times 8.5 \text{ feet}) + (60 \text{ linear feet} \times 6.6 \text{ feet})) / 100 \text{ linear feet} = 7.36 \text{ ft average}$$

If a beach survey with the elevation of the toe is not available, consult the section “*Alternative Method to Determine the Toe Elevation*” section below.

[Entering Armor Replacement with a Setback](#)

Enter setbacks or setforwards of replacement armoring using the horizontal distance (as viewed from above) to the original toe location in cell C36. If you are using cell C36, make sure to enter an NA in cell C35.

[Converting the Datum from Mean Lower Low Water to NAVD 88](#)

Entries of elevations in the *ShoreStab* need to be in a consistent datum. The [Beach Slope Reference Line mapper](#) displays elevations in NAVD 88. Figure 25 shows an example of elevations displayed on the mapper. To convert elevations from MLLW datum to NAVD 88, add the MLLW value (in feet NAVD 88) displayed in the mapper to elevations measured relative to MLLW. You will be adding a negative number, thus subtracting overall.

Example: Converting MHHW elevation from MLLW datum to NAVD 88 datum.

If MLLW is -2.13 feet (in NAVD 88 datum from the Beach Slope Reference Line, Figure 25), and project plans show MHHW at +11.25 feet (in MLLW datum), then MHHW is 9.12 feet NAVD 88. That is: $-2.13 + 11.25 = 9.12$.



Figure 25: Shoreline Mapper

[Other Circumstances when Entering Armoring](#)

[Adding Height to Existing Armoring](#)

Adding height to an existing bulkhead is entered into the Nearshore Calculator by using the existing elevation of the top of the bulkhead as the toe elevation. If the top of the current bulkhead exceeds the elevation of HAT, it does not need to be entered. However, if the purpose of the project includes stabilizing or repairing armoring (and not just adding height), then the

length of the proposed to be repaired or replaced structure must be entered as a replacement. Figure 26 shows habitat that becomes inaccessible when adding height to existing armoring.

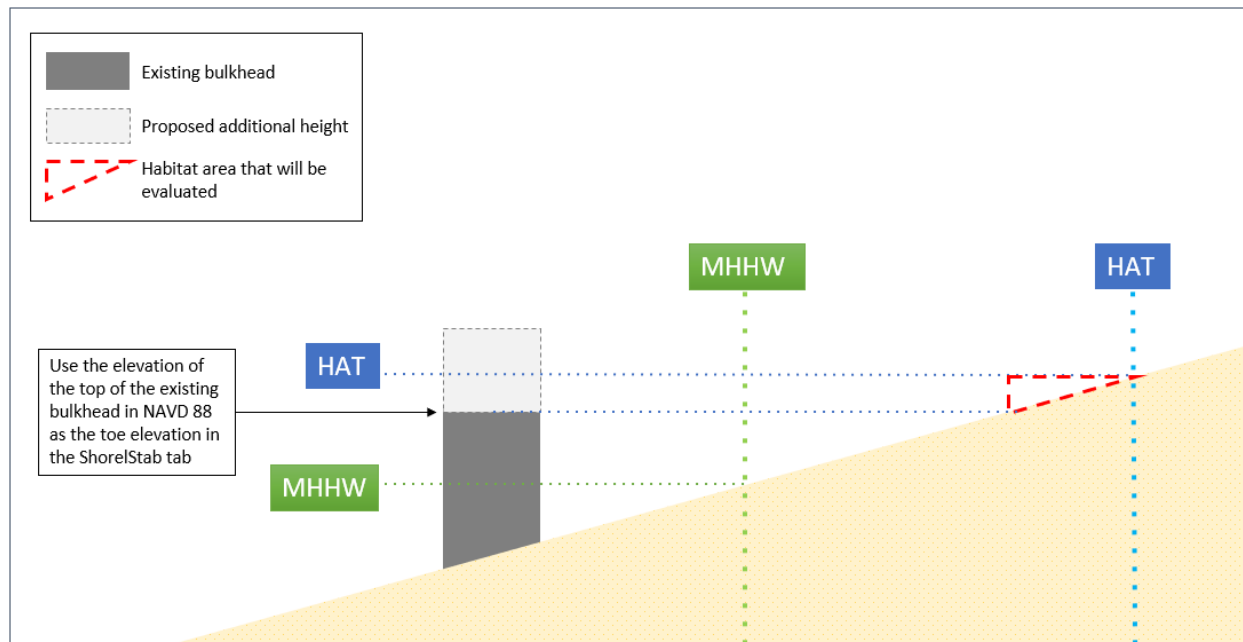


Figure 26: Habitat rendered inaccessible that will be evaluated when only adding height to an existing bulkhead. Figure by Monette O'Connor, NOAA Fisheries

Fill Waterward of an Existing Bulkhead

Replacement/addition of fill (like rip-rap, rocks, ecology blocks) waterward of an existing bulkhead should be entered into the Nearshore Calculator as a jetty in the *BoatR*, *Jetty* tab with dimensions equal to the birds-eye-view length and width (and/or area) of habitat covered by the fill.

However, depending on the site-specific scenario, the biologist will evaluate whether the amount and type of fill is functioning as a new bulkhead. In that case, the new fill may be entered as a bulkhead.

Materials Added to the Toe of an Existing Bulkhead

If new material, such as logs or concrete, is permanently affixed to the toe of an existing bulkhead to prevent scour or otherwise protect an existing bulkhead, the footprint of that material is entered into the *BoatR*, *Jetty* tab as “concrete footings” (‘No’ in *BoatR*, *Jetty* tab cell E10) in the Boat Ramp Installation entry block. Dimensions entered in the USZ are the birds-eye-view length and width of the attached materials.

Habitat logs with attached root-wads generally don’t have to be entered in the Nearshore Calculator. You should discuss the site-specific function of habitat logs with one of the Service’s project biologists. Depending on the site-specific scenario, the biologist will evaluate whether the amount and type of material anchored may function like a replacement bulkhead. If this is the case, materials anchored to the existing bulkhead toe may be entered as a replacement bulkhead.

Staircases on Bulkheads

Impacts to habitat caused by solid-structures¹⁹ along the shore, such as staircases, are similar to the adjacent bulkhead because the stairs themselves also function as a bulkhead. Solid/concrete staircases that are in line with a bulkhead (i.e., not extending waterward) are simply added to the total length of the bulkhead.

If stairs extend waterward of a bulkhead, either parallel or in another configuration, we expect additional adverse effects from the footprint of the stairs and landing. In that case, enter the entire bulkhead in the *ShorelStab* tab (if it is being replaced) and enter the length and width of the protruding stairs as a boat ramp in the *BoatR, Jetty* tab.

If stairs are inset landward of the bulkhead and eliminate less habitat than the adjacent bulkhead, you may either 1) enter the stairs as part of the bulkhead using the toe elevation of the bulkhead, 2) determine the length weighted average toe elevation as described above under “Determining the Toe Elevation” and use that average toe elevation for the entire bulkhead, 3) enter the stairs separately (in a new *ShorelStab* tab in a different Nearshore Calculator file) as a bulkhead with a different toe elevation.

Repair of Shoreline Armoring

If shoreline armoring is repaired in place, treat it the same as a replacement.

1. Fill in the metrics for replacement armoring in Entry Block: Removal and then in Entry Block: Installation.
2. Click “yes” for replacement.

If a shoreline armoring repair does not remove the old structure but places a replacement structure waterward of the existing armoring, or encases the existing structure with material to extend the life of the structure, treat it the same as a replacement as explained above. Enter the new and further waterward toe elevation in the Entry Block: Installation. You may enter the setforward distance between the old toe and the new toe (thickness of the new structure) in C36 in the *ShorelStab* tab.

Repairs of shoreline armoring consisting of creosote: When repairing or encasing armoring that contains creosote, creosote removal does not apply. Creosote removal credit applies only when physically removing creosote treated wood from the nearshore environment.

Soft and Hybrid Bank Stabilization

NMFS strongly encourages all land owners to install soft or hybrid shoreline treatment rather than replace or install hard armoring. Placement of soft or hybrid shoreline treatment currently does not incur debits as it mostly allows aquatic access and shoreline processes.

¹⁹ Meaning water is not able to flow freely under the staircase. Solid structure staircases are typically rock or concrete, but may be wooden.

Replacing hard armoring with soft or hybrid approaches can result in conservation credits. Enter the hard armoring to be replaced in the Entry Block: Removal, but nothing in the Entry Block: Installation. The WDFW “[Your Marine Waterfront](#)” guide is a valuable resource for minimizing environmental impact.

Soft and hybrid armoring are defined and necessary criteria are listed below.

Soft Shoreline Treatments - Soft shore approaches allow for the following functions:

- Connectivity between terrestrial and aquatic habitats
- Natural fine sediment transport or accretion rates (i.e., does not coarsen the substrate)
- Does not inhibit sediment transport from upslope sources
- Retains native vegetation
- Supports forage fish spawning
- Does not increase erosion on the project beach or on adjacent properties
- Does not cause lowering of beach elevation
- Allows for woody debris and wrack to accumulate

Criteria for soft shore approaches:

1. No, or minimal, use of artificial structural elements
2. Incorporate beach nourishment (sand and small gravel)
3. Incorporate riparian plantings or allow for recruitment of native vegetation, including overhanging vegetation
4. Incorporate or allow for large wood recruitment, including allowances for small toe erosion protection where necessary, but where the wood does not act as a berm or a crib.
5. Large wood may be chained as part of the design.
6. Boulders may be incorporated into the design, but must not be used as a primary slope stabilizing element.
7. Degradable fabric and support filters may be used but must be designed and constructed to prevent surface exposure of the material through time.
8. Cannot not resemble a wall in any respect

Hybrid Shoreline Treatments – Hybrid shore approaches allow for the following functions:

- The hybrid method itself does not inhibit sediment transport from upslope sources (e.g., an adjacent road that is not part of the project may inhibit sediment transport that would not reflect on the hybrid technique).
- Retains native vegetation
- Supports forage fish spawning
- Does not increase erosion on the project beach or on adjacent properties
- Minimizes lowering of beach elevation
- Allows for woody debris and wrack to accumulate

Criteria for hybrid approaches:

1. Contains artificial structure that allows for some biological processes to occur (such as forage fish spawning), but inhibits some ecological processes from fully occurring (such as suppressing some sediment transport, supply or accretion, but not fully ceasing the process as with hardened approaches).
2. Exposed rock, if used, must be discontinuously placed on the beach (i.e., not act as a berm or scour sediments)
3. For any individual project, a hybrid approach may not contain more than 30% of exposed rock as measured against the length of the project beach.
4. Buried rock may be used below grade where necessary to stabilize the toe of the slope, but must not form a wall or resemble rip rap, and must be covered with sand/small gravel mixes in such a way to minimize net erosion through time.
5. Incorporate beach nourishment (sand and small gravel) as needed to minimize lowering of beach grade and net erosion.

COMMON QUESTION: When does removal of existing armoring generate credit?

1. As with all structures that are proposed to be removed, removal credit²⁰ is tied to the structure being in functioning condition. For a bulkhead, that means the area landward of the structure is cut off from tides and aquatic access, preventing natural processes from occurring and aquatic use of that habitat.
2. Creosote bulkhead remnants that no longer function as a bulkhead anymore should be entered into the Nearshore Calculator as creosote removal only. See Figure 27 and Figure 28 for examples of non-functioning bulkheads that would not be considered in good condition.
3. Concrete bulkhead remnants that no longer function as a bulkhead should be entered into the Nearshore Calculator as rubble removal only.
4. Typically, bulkheads that are replaced will not generate additional offsets due to impacts associated with their replacement. Choose to replace with soft or hybrid armoring to generate habitat offsets.

²⁰ For a standard remaining life of 10 years.



Figure 27: Removal Credits for Old Creosote Bulkhead: Removal credit applied for creosote, not for remnants of bulkhead. Picture by and with permission from Doris Small, WDFW.



Figure 28: No Removal Credits for Non-Functional Shoreline Armoring that is not in good condition. Removal credits do not apply for horizontal pile stabilizer as there is no functioning bulkhead effect (like sediment retention behind the bulkhead or elimination of water exchange).

Alternative Method to Determine Toe Elevation

To determine the toe elevation when no beach elevation survey is available, a field method may be used. Determination can be based on field measurements compared to elevations predicted for an adjacent location as shown in Figure 29.

You may request a detailed description of this method from PSNearshoreConservation.WCR@noaa.gov.

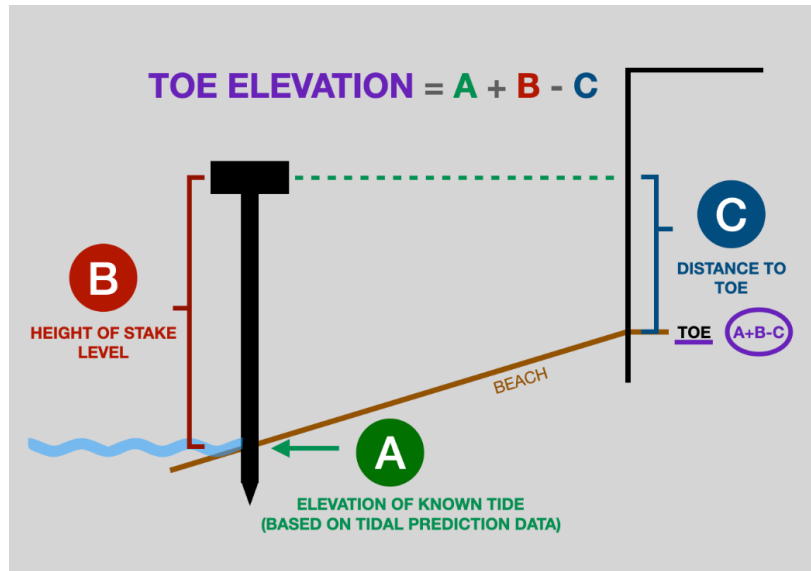


Figure 29: Alternative method to determine toe elevation. Figure by Maria Pazandak

Sea Level Rise

Climate Change will cause varying levels of sea level rise in Puget Sound. Sea level rise will cause bulkheads to cut off increasing areas of intertidal habitat from aquatic access. Sea level rise at sites with bulkheads means that the water level will move up on the bulkhead; MHHW and HAT will be higher on the beach while the toe of the bulkhead remains in the same location. Effectively, sea level rise lowers the elevation of the toe of the armoring.

The Nearshore Calculator includes consideration of sea level rise predictions for each marine basin when calculating effects of hard armoring.

- We used an intermediate sea level rise prediction scenario from NOAAs 2022 Sea Level Rise Technical Report (Sweet 2022, which can be viewed on the [NOAA Sea Level Rise Viewer](#)).
- Sea level rise is based on the intermediate prediction 3 degree centigrade increase in global mean surface air temperature in the years 2081-2100.
- We used the sea level rise scenario for 2050.

MDredging (Maintenance Dredging) Tab

{Brown Tab}

- The Nearshore Calculator currently does not evaluate new dredging/deepening projects.
- The zone is determined by the depth of the existing habitat, not the proposed dredge depth.
- If SAV exists in the dredge area before dredging (i.e. establishes between maintenance cycles), the respective SAV rating should be entered as before condition.
- Site-specific adjustment factors apply to maintenance dredging.

- Each dredging event must be entered as additional dredge area in the *MDredging* tab if dredging occurs more than 3 years apart²¹.

Example: If your proposed action is to dredge 2,000 square feet in year 1, then dredge that same area again in 5 years, enter a total area of 4,000 square feet.

- If two dredge sites in a proposed action have different site-specific factors or SAV scenarios, an additional dredge area Entry Block exists in the *MDredging* tab. For more than two sites fill out an additional Nearshore Calculator spreadsheet.

BoatR, Jetty (Boat Ramps and Jetties) Tab

{Purple Tab}

- Use this tab to calculate habitat impacts due to the removal or installation of boat ramps, groins, jetties and the removal of concrete, rubble and debris.
- Site-specific adjustment factors do apply to boat ramp, jetty and rubble removal work.
- Length and width must be entered in the USZ for boat ramps and jetties due to buffer impacts associated with the interruption of shoreline drift.

Marine Rails

Marine rails resting on the sediment should be entered in the *BoatR, Jetty* tab. Enter the area (square feet) of the solid metal rails as viewed from above – not the open space in between – as a boat ramp. If the area of the rail is unknown, use a default of 1 square foot for every 1 foot of length of the two parallel marine rails (based on measurements of terrestrial rails, see Figure 30).

Example: If a marine rail system is 50 feet long and 8 feet wide, enter 50 in the length of the boat ramp to be removed field and 1 (2 x 0.5 ft) in the width of the boat ramp to be removed. Enter the area of concrete footings and/or stub piles associated with the rails in the *BoatR, Jetty* tab under concrete footings.

Elevated rails should be entered in the *Overwater Structures* tab. Enter the length and width of elevated rails as a solid pier.

²¹ The effects of removal of sediment and invertebrate prey usually extend over two years (Boese et al. 2009, Dethier and Schoch 2005; Jones and Stokes 1998; McCabe et al 1998).

Maintenance dredging occurs at regular intervals; depending on the location every two to five years (pers. com Daniel Krenz, 2020). After dredging, the dredged area starts to silt back in and the habitat functions of the migratory corridor gradually increase. We chose a conservative impact duration for the reduction in migratory corridor function of four years. The average impact duration of three years used for the HEA analysis is based on these two time horizons.



Figure 30: Rail Width. Photo by Stephanie Ehinger

Boarding Floats over Boat Ramps

If a float is located in the water column directly above a boat ramp, habitat impacts are still calculated for each. Both structures in their entirety must be entered in the Nearshore Calculator if both are being installed new or replaced. Similarly, if only one is being installed/replaced, only that float or ramp would be entered. Entry for overlapping structures is no different than entry for non-overlapping structures. This calculation addresses the distinct habitat service values that are impaired by each structure.

Underwater Pipes and Outfall Splash Pads

Outfalls and other pipeline structures that extend from the shoreline should be entered into the *BoatR, Jetty* tab. If the pipe, housing, or similar utility structure is regularly inundated by tides, entered the area as a boat ramp. If it is taller and not typically entirely tidally inundated, enter it as a jetty. If a pipeline is buried under natural sediment and flush with natural or existing bathymetry, it does not need to be entered into the Nearshore Calculator.

Outfall splash pads (that prevent erosion at the base of an outfall) should be entered into the *BoatR, Jetty* tab as concrete footings.

Note on outfalls: repair of outfalls may have associated repairs or construction of shoreline armoring. Repair replacement, or installation of armoring surrounding an outfall must be entered in the *ShorelStab* tab. See the *ShorelStab* tab for rock/material placed at bulkhead toes and staircases on bulkheads.

BeachN (Beach Nourishment) Hidden Tab

For the 2024 Nearshore Calculator (Version 1.6), we updated the assessment of potential benefits of beach nourishment based on information collected from a literature review and expert solicitation presented in Lambert and Chamberlin (2023). They found that beach nourishment can be an effective restoration tool in situations where natural processes and functions exist. However, they concluded that there is little evidence that beach nourishment offsets effects from hard shoreline armoring.

It is generally not appropriate to use the Nearshore Calculator to quantify potential benefits of beach nourishment. Where beach nourishment is effectively used to minimize and offset short term impacts (“dressing”), the Version 1.6 Nearshore Calculator does not apply as it is limited to assessing long-term effects. Where beach nourishment is effectively combined with armor removal or shoreline softening, beach nourishment is an integral part of restoration and conservation credits should be quantified solely through the removal of armoring (not in the beach nourishment tab).

Considering the best available science presented in Lambert and Chamberlin (2023), we expect to see few, if any, proposals for beach nourishment at sites with hard armor. However, where beach nourishment is proposed as mitigation for effects from hard armoring, applicants have to provide a nourishment and monitoring plan demonstrating likely benefits. Site-specific nourishment and monitoring plans need to address concerns discussed in Lambert and Chamberlin (2023) and propose appropriate methods to determine appropriate quantities and frequency of nourishment. Plans must include methods to establish the duration of proposed benefits, and measures to avoid adverse impacts associated with placement.

Lambert and Chamberlin (2023) discuss potential improvements to beach nourishment practices that may warrant further study including better monitoring to track sediment movement, potentially increasing quantities and frequencies of nourishment, and avoiding disturbance with each placement. Lambert and Chamberlin (2023) found that the nourishment quantities suggested by Johannessen et al. (2014) in the WDFW Marine Shoreline Design Guidelines (MSDG) were generally ineffective and potentially too low. Also, they found that pre-2024 Nearshore Calculator versions were based on recommended quantities of nourishment much lower than those suggested by the MSDG. We updated the 2024 Nearshore Calculator following the recommended quantities of the MSDG, 1-2 cubic yards per linear foot of shoreline rather than the previous value of 4.5 cubic feet per linear foot of shoreline. This reduced conservation credits, for the very limited situations in which applicable, by a factor of 60. The beach nourishment tab in the 2024 Nearshore Calculator is hidden as we expect it to be used rarely.

Takeaways for use of the Nearshore Calculator for potential benefits from beach nourishment:

- Given the best available science, beach nourishment is generally not an effective mitigation measure for offsetting impacts from hard armor installation or replacement.

- While beach nourishment may be effective to offset construction impacts (“dressing”), the Nearshore Calculator is not designed to quantify minimization and mitigation of short-term impacts.
- Beach nourishment may be an effective and integral part of process-oriented shoreline restoration like armor removal, and the Nearshore Calculator quantifies beach nourishment for this purpose with conservation credits given for armoring removal. Therefore, beach nourishment should not be entered separately.
- In the rare situations where beach nourishment may be a standalone mitigation measure and appropriate to quantify with the Nearshore Calculator, we require approval by the Services consulting biologists, coordination with WDFW, a detailed mitigation and monitoring plan, and potential incorporation of measures like anchoring of large woody material to ensure likely retention of material for the assumed benefit periods.

SAV Planting Tab

{Aqua Tab}

To generate conservation credits for SAV planting, submit a planting plan, performance standards, a monitoring plan, and a site protection instrument where applicable with your consultation initiation package. You can find an example of a mitigation plan at: [Components of a Mitigation Plan \(4\) site protections instrument](#); information on deed restrictions associated with compensatory mitigation [here](#).²² and an example of a Mitigation Monitoring Report for riparian plantings can be found [here](#).²³

Ref. (Reference) Tab

{White Tab}

The Reference tab provides background information including:

- 1) The cover categories for SAV and USZ vegetation,
- 2) The delineation of shore zones,
- 3) Complex float length and width determination for *Overwater Structures* tab.

ReadMe Tab

In the *ReadMe* tab, we list all tabs included in the Nearshore Calculator and provide a short description of their function. While all but the entry tabs are hidden for easy use, this overview provides a list of background and infrequently used tabs.

²² <https://www.nws.usace.army.mil/Portals/27/docs/regulatory/Forms/DeedRestrictionHandout.pdf?ver=2016-06-06-150203-510>

²³ <https://www.nws.usace.army.mil/Missions/Civil-Works/Regulatory/Forms/>

Acknowledgements

The authors thank Maria Pazandak, Monette O'Connor, and Lee Corum for preparing many of the figures.

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