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MAINE'S COASTAL WETLANDS:

II. RECOMMENDED FUNCTIONAL ASSESSMENT GUIDELINES

by

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INTRODUCTION

Introduction

Guidelines for the functional assessment of intertidal coastal wetlands were developed to help standardize functional assessments in coastal wetlands required by the Natural Resources Protection Act (NRPA). NRPA requires wetland functional assessments from professional consultants for projects impacting 500 square feet or more of coastal wetlands but does not provide any assessment methodology for the consultant to follow. This lack of guidance has caused confusion for consultants about DEP assessment requirements and caused misunderstandings between licensing staff and consultants. Also as a result of the lack of guidelines, DEP receives a variety of different types of assessments with different concentrations and approaches statewide for similar types of activities and impacts.

This report addresses the problem of inconsistent assessments and requirements by providing sampling methods for the completion of a functional wetland assessment. It does not substitute for any other NRPA requirements, such as the application and alternative analysis, for full permits. The following provides functional assessment guidelines only for intertidal coastal wetlands. Guidelines for subtidal activities are not addressed because most subtidal projects already receive adequate assessment and review. Furthermore, environmental variation, poor visibility and strong currents subtidally, often call for individual flexible sampling approaches that should be designed with consultation from DEP Division of Environmental Assessment staff.

The guidelines are intended to assess the most critical functions and values of coastal habitats and identify vulnerable environments and resources with the least amount of sampling effort possible to provide DEP licensing staff and biologists with enough information to make informed decisions to prevent the loss and degradation of coastal wetlands. A majority of the method is qualitative and can be conducted with the minimal amount of sampling equipment and expense. The guidelines are based on the review of past assessments by consultants throughout the state, review of numerous intertidal sampling protocols (Baker 1987; US Army Corps of Engineers 1995; Adamus et al. 1987; Larsen and Doggett 1981; Bryan et al. 1987; Diaz 1982; Bowen and Small 1992; LaSalle and Ray 1992; ME DMR 1998; Nelson 1987; and Puget Sound Estuary Program 1991), extensive field and laboratory research and discussions with staff biologists, consultants, DMR regional biologists and University of Maine marine science professors. The quantitative methods require a greater deal of time, effort and expense but are only suggested for activities that have the potential to cause greater impacts to the marine environment.

The guidelines are broken into six parts: Sampling Guidelines, Definitions, Methods and Analysis; Survey Checklist; Photograph and Habitat Mapping Guidelines; Wetland Functions and Values and Permit and Planning Considerations; the optional Field Card and two completed Examples.

The Sampling Guidelines, Definitions, Methods and Analysis Section provides the basis for what can be done and how to do it. The Sampling Guidelines outline suggested

methods that may be used to assess the functions and values of each type of impact and/or activity. Smaller, less damaging projects only merit qualitative sampling, mapping and photographing of the entire site. Larger projects may warrant greater sampling effort including quantitative analysis of the benthic infauna. Additional information or requirements may be added to this list by the consultant or the DEP staff analyst on a project by project basis. The Methods and Analysis section provides the definitions needed to complete the Checklist and Field Card as well as outlining sampling techniques, and laboratory and data analysis for each type of intertidal habitat. Definitions for intertidal and subtidal energy levels, intertidal and subtidal habitats, and sediment grain size are from A Classification System of Marine and Estuarine Habitats in Maine (Brown 1993) and Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Definitions for energy levels in channels are from The Geology of Maine's Coastline (Maine State Planning Office 1983).

The Checklist is the major component of the functional assessment. It contains a list of entries that may be completed in the field and in the office. A computerized version is available to facilitate the reporting of data. The Checklist asks for the standard site and marine survey information, information on zoning and classifications, state agencies concerns, historical information, plus detailed information on the habitat, species composition and geology. In addition it requests discussion on the impact of the site, mitigation, and compensation. Any additional information that was overlooked in the design of the Checklist can be added to the assessment by the consultant.

The Photograph and Habitat Mapping Guidelines suggests ways to take photographs and design a habitat map of the site. The habitat map is intended to be a simple computerized drawing or a well-drawn sketch of the habitat and the areas of impact.

The Wetland Functions and Values and the Permit and Planning Considerations are a series of questions used to assist the consultant in completing the Survey Checklist and aid the permit analyst in thoroughly reviewing the application for state and federal regulations. The Wetland Functions and Values address biological, commercial, and educational functions and values. The Permit and Planning Considerations address physical, geological, chemical, biological, seasonal, aesthetic, recreational, educational, and licensing considerations that may apply to permitted activity. In addition, at the end of the section, there is a list of questions by activity type that may also be helpful in determining impacts and creating mitigation plans. All questions do not have to be individually addressed for each application. The listing is only intended as a guide, to elucidate functions and values and potential effects that may not have been considered by the consultant or the licensing staff.

The Field Card is an optional component of the wetland assessment that may be used when qualitatively describing the algae, plants and animals of the habitat. It is intended to provide the marine biologist and the DEP reviewer with a simple listing and relative abundance of most organisms that live within the intertidal zone. Over time, it can be used easily by DEP staff to compare different sites, learn about the diversity of various locations and evaluate the functions and values of site locations. This listing should be

especially helpful to biologists and DEP staff less familiar with the diversity and distribution of benthic infauna and epifauna. The abundance categories and definitions are the same as the definitions used within the Checklist.

The final part of the guidelines contain two completed examples. Example #1 is for a pier with a float and ramp and Example #2 is for a lobster pound. All portions of the assessment including benthic analysis are represented in Example #1. Example #2 contains everything but the Field Card. It may be helpful to consultants to use these examples to guide them through the assessment process.

INTERTIDAL SAMPLING GUIDELINES, DEFINITIONS, METHODS AND ANALYSIS

Timing of Survey Work:

Month and Tidal Height:

We prefer that surveys are conducted between May and November during the height of productivity to facilitate adequate site assessment.

If the activity extends into the low intertidal and/or shallow subtidal than we prefer that surveys are conducted on negative or zero tides (new moon or full moon). Allow for adequate time in the low intertidal and shallow subtidal to complete a thorough survey.

Daily Timing:

Surveys may be conducted on an ebb or flood tide. Make sure to allow adequate time to sample all intertidal zones in the area of impact.

Definitions of Energy Levels:

Energy Levels - Intertidal:

Exposed:	areas highly exposed to oceanic swell and wind waves. Wind fetch is virtually unlimited (e.g. Pemaquid Point, Cape Neddick, West Quoddy Head State Park).
Partially exposed:	areas where the oceanic swell are attenuated by offshore reefs, islands, or headlands, but the shoreline is substantially exposed to wind waves.
Semi-protected:	areas where the shorelines are protected from sea swell, but it may receive waves generated by moderate fetch (e.g. Boothbay Harbor).
Protected:	areas where there is no sea swell, little or no currents, and a restricted wind fetch (e.g. all mudflats).

Energy Levels - Subtidal

High energy:	regions exposed to oceanic swell or very strong currents.
Moderate energy:	areas exposed to wind waves or moderate currents (e.g. cobble and gravel fields).
Low energy:	areas only exposed to very weak currents and little wave action (e.g. unconsolidated muddy sediments).

Energy Levels - Channels:

Low energy channel:	tidal channels where water velocities are less than one meter per second. Channels are usually lined with mud.
Medium energy channel:	tidal channels where water velocities are between one and two meters per second. Channels are usually lined with mud, sand or bedrock.
High energy channel:	tidal channels where water velocities exceed two meters per second. Channels are usually lined with pebbles, cobbles or bedrock (e.g. Cobscook Bay Reversing Falls and Blue Hill Falls).

Definitions of Drainage on Intertidal Flats:

Drains completely:	little or no standing water is present on flat
Standing water:	some standing water is present after ebb tide
Pools:	numerous pools of standing water are present
Streams/Channels:	fresh or salt water stream or channel present

Types and Definitions of Intertidal and Subtidal Habitats:

Sand Beach: exposed environments containing at least 75 % sand
Boulder Beach: exposed environments dominated by boulders
Sand Flat: protected and semi-protected environments dominated by sandy sediment
Mixed Coarse and Fines: semi-protected flats consisting of a mixture of rocks, boulders, gravel, sand, cobbles, and mud
Salt Marsh: persistent nearshore emergent grass habitats
Ledge: stable bedrock in protected and unprotected locations
Mud Flat: protected environments containing at least 75 % mud

Subtidal Unconsolidated Sediments: submerged environments composed of fine clays, silt, mud, sand, gravel and organic matter
Subtidal Mixed Coarse: shallow submerged habitats comprised of larger rocks such as cobble and boulder
Subtidal Ledge: submerged stable bedrock in protected and unprotected locations

Definitions of Sediment Grain Size:

Sediment Type	Grain Size or Description	Comments
Ledge	rock > 3 m (~10 ft) in diameter	Very stable.
Boulder	rock >256 mm (10 ") < 3 m (~10 ft) in diameter.	Stable. Cannot be rolled by wave action.
Cobble	rocks < 256 mm (10 ") > 64 mm (2.5").	Unstable. Rolled by wave action.
Gravel	2 mm (.04") - 64 mm (2.5").	
Sand	.06 - 2 mm.	Small granules (sometimes quartz).
Mixed Coarse and Fine	boulders, cobbles, gravel, sand and mud	
Mud	<.06 mm - fine particles of silt and clay	Usually mixed with organic matter.
Organic	peat, sawdust, wood chips, leaf litter	
Manmade	Rip-rap, concrete, logs, piers, tires, shipwreck	

Delineation of the Intertidal Zones:

Since all marine intertidal habitats display an intertidal zonation, it is suggested that the surveying and reporting follow the biological boundaries of each intertidal zone.

Before completing the habitat description portion of the Checklist and the Field Card, the area of impact should be separated into different intertidal zones. For example, if the area of impact extends the entire length of the intertidal zone then the intertidal zone can be separated into three intertidal zones (low, mid and high). If it extends into the subtidal then this region should also be sampled and reported separately.

Record the results of the survey, in order, from high tide to low tide or low tide to high tide depending on your approach. On the Checklist, list the zone surveyed (high, mid, low or shallow subtidal) then describe the fauna and flora present (see Examples).

Due to tidal range, wave exposure, competition and many other factors, the intertidal zones on flats and rocky shores will from vary from site to site. Approximate delineation of the low, mid and high intertidal zone can be based on the consultant's experience and knowledge of the marine environment and the following guidelines:

Soft Sediment Habitats (all flats and beaches):

High intertidal: this zone will be located approximately near mean high water, have drier sediments, lower diversity and abundance, a wrack line and may include fringing salt marsh. Soft-shell clams, sand worms, ribbed mussels, hydrobia snails, common periwinkles (on rocks), and beach fleas are characteristic of this area.

Mid-intertidal: this zone will fall in the middle of the flat between the high and low intertidal zones. Soft-shell clams, Baltic clams, sand worms, thread worms (Capitellids), blood worms, and periwinkles on rocks and mussels are commonly found within this zone.

Low intertidal: this zone will be located around mean low water, characteristically have less compacted sediments and more diversity. Eelgrass may be present along with sand shrimp, mud dog whelks, moon snails, mussels, isopods, hermit crabs, blood worms and bamboo worms. Exposed beaches have numerous amphipods located in this zone.

Shallow subtidal: this zone is seaward of the low intertidal zone and rarely, if ever, exposed to the atmosphere. Sediments can be very soupy or muddy. Quahogs, sand shrimp, lobsters, scallops, blood worms, amphipods and flat fish may inhabit this zone.

II. Guidelines for Specific Habitat Types

A. Soft Sediment Habitats (all flats and beaches)

Qualitative Epibenthic and Benthic Survey:

Following the guidelines, complete the Checklist, the Field Card (optional), Habitat Map, and take photographs. See the Habitat and Photograph Guidelines and Field Card for additional instructions. Use only one Field Card per site.

Checklist Guidelines

Qualitative Survey Methods (on an ebb tide):

1. Walk throughout the sampling area and note the location and measurements of all dominant habitat types. Complete a draft of the Habitat Map. Take photographs.

2. Epifauna survey: search throughout each intertidal zone (low, mid and high) of the entire sampling site, turn over rocks, wood, boulders, and algal mats, and look in the salt marsh, algae, and eelgrass. Record the species (exception for bryozoans) present on the surface of the habitat in the Checklist and estimate their relative abundance (see definitions). Attempt to identify animals to the lowest possible taxonomic level.

3. Infauna survey: using a clam rake or shovel over-turn sediments throughout each intertidal zone, identify to species (exception for small nematodes, oligochaetes or bryozoans) and estimate relative abundance. Record information on the Checklist.

4. Record any other diagnostic features on the flat such as the presence or absence of worm holes, clam holes, fecal piles and amphipod burrows.

Quantitative Benthic Infauna Survey:

In addition to the Checklist and Field Card (optional), some projects may warrant quantitative benthic analysis of the sediment.

Field Sampling:

Each intertidal zone (high, mid and low) should be sampled for benthic analysis:

- Projects > 1 acre should have three cores (10 cm) / zone / acre (9 total)
- Projects between 1/2 - 1 acre should have two cores / zone (6 total)
- Smaller projects < 1/2 acre should have a minimum of three cores; one core collected per intertidal zone (3 total).
- For major projects (e.g. cargo port), additional cores and sampling strategy may be requested by DEP project managers and Division of Environmental Assessment staff on a case by case basis.

The first site can be at the low water line within 1/2 hour of the lowest tide. Using a core 10 cm in diameter (a one pound coffee can or PVC pipe will suffice), randomly toss onto the sediment and push down to 10 cm or resistance. Remove the core, place in a bag or jar, label and put in cooler. For projects greater than or equal to an acre, randomly take additional cores in a similar fashion from different representative areas within the zone and place in cooler.

Repeat this random sampling method in the mid and high intertidal zone. Cores are not needed in salt marsh habitats unless specified by DEP staff analyst.

Record the sample number and the location of all cores collected on the Habitat Map and in the Checklist.

If you are comparing one flat with another flat, collect samples at approximately the same time and tide level from each flat.

If you are asked to sample the same flat at a later date, follow the same sampling scheme as the first sampling and label the samples so that is clear where and when the samples were collected.

Lab and Data Analysis:

In the lab, sort the sediments through a 1.0 mm sieve and remove all organisms. Sort, identify and enumerate all animals to species if possible or, at minimum, to family level. Only identify and count organisms with heads and animals that were alive before preservation. Do not enumerate empty shells (e.g. clams, snails). When identifying organisms it is better to lump (e.g. to genus) then to miss-identify species. Oligochaetes, nematodes, and colonial bryozoans do not have to be identified to species.

Create a reference collection of at least one or two individuals of each species identified. Store individuals in 70 % ethanol. This reference collection should be available to DEP biologists if requested. Save any "lumped" or uncertain identifications in the reference collection.

Create a spreadsheet, like the example below, for each core. List species in order from the most abundant to the least abundant.

For data analysis include:

List of species and count ranked in order of abundance
Cumulative number
Percent species composition
Cumulative percent
Functional group
(predator, deposit feeder, suspension feeder, filter feeder, scavenger, omnivore or grazers) (see Fauchard and Jumars 1979 for worm diets)

Total number of species
Total number of individuals
Total number of individuals per m^2
Number of functional groups
Area of core (m^2)

Project Name:_____
Site Location: _____
Date Collected:_____
Core Number:_____ Intertidal Zone Sampled:_____
Habitat / Sediment Type:_____

Scientific Name	Rank	# of Individuals	Cumulative Number	Percent	Cumulative Percent	Functional Group
	1					
	2					
	3					
	4					
	5					

Total Number of Species:
Total Number of Individuals:
Individuals per m^2:
Total Number of Functional Groups:

Area of core (m^2) =

B. Mixed Coarse and Fine Sediments

Epibenthic and Benthic (Qualitative and Quantitative):

1. Follow the same protocol for soft sediment habitats addressing the Checklist, Habitat Map, photographs, Field Card (optional), and quantitative analysis using the cores and covering all zones within the intertidal area.

    - Make sure you look under rocks and boulders in low intertidal environments for adult and juvenile lobsters. Record the number of lobsters found on the Checklist or Field Card. Measure and map the lobster habitat on the Habitat Map.

    - If the sediments are too coarse to use a corer then use a shovel or grab within a quadrat (e.g. .25 m^2) to sample sediment down to 10 cm. Make sure you know the area of the quadrat sampled.

C. Ledge

Describe the characteristics of the habitat, fill out the Checklist and Field Card (optional), draw the Habitat Map and photograph the site.

No quantitative sampling of ledges is suggested under theses guidelines but may be requested by DEP on a case by case basis.

1. Walk throughout the entire sampling site. Measure and draft a map of the habitats specified in the Habitat Mapping Guidelines.

2. Using the Checklist and Field Card, record the species and relative abundance of animals and algae in each intertidal zone. Because shore communities vary depending on scour, salinity, and currents, consider vertical zonation as well as horizontal variation when surveying. Include tidepools in your survey. Search under algal mats, in crevices, under kelp holdfasts (without removing kelp) and under rocks to locate all species.

3. When identifying organisms it is better to lump (e.g. to genus) then to miss-identify species. Keep a reference collection of unusual or unidentified animals.

D. Salt Marsh

Describe the characteristics of the habitat, fill out the Checklist, draw the Habitat Map and photograph the site.

DEP guidelines do not request sediment sampling within salt marsh habitats unless specified by the DEP biologists or analysts.

E. Boulder Beach

To survey a boulder beach, complete the Checklist and Field Card (optional), take photographs and draw a Habitat Map. In addition, we request sampling from underneath individual boulders throughout the site.

1. Walk throughout the entire sampling site. Measure dominant habitat types, draw a draft Habitat Map and take photographs.

2. Record the species and relative abundance of all epifauna and flora in the low, mid and high intertidal zones.

3. Turn over algal mats and small rocks in each zone and record species and relative abundance.

4. When identifying organisms it is better to lump (e.g. to genus) then to miss-identify species. Keep a reference collection of unusual or unidentified animals.

<u>Boulder Sampling:</u>

1. Randomly choose a specified number (see below) of moveable boulders from each intertidal zone at the site.

   - 9 boulders per acre (5 low intertidal, 2 mid intertidal, 2 high intertidal)
   - 7 boulders for 1/2-1 acre sites (4 low intertidal, 2 mid intertidal, 1 high intertidal)
   - 5 boulders for sites < 1/2 acre (3 low intertidal, 2 mid intertidal)

2. Before disturbing the boulder, describe the epifauna and flora on the top and sides of the boulder. Over-turn the boulders (this may require a crowbar) and look underneath. Be careful not to miss mobile animals. Identify and enumerate species. Include animals on or under smaller rocks under the boulder. Identify to species, enumerate, and record on a spreadsheet from most abundant to least abundant.

3. Keep a reference collection of unusual or unidentified animals.
4. Record the location and the number of the boulders sampled on the Habitat Map.
5. After sampling, return boulders to their original location and orientation.

Create a table for each boulder with the following information for each boulder sampled:

Project name:_____
Site location: _____
Date collected:_____
Boulder number:_____ Intertidal zone sampled:_____
Description of the epifauna:

_____
Description of the epiflora:

_____
Additional comments:

_____

_____

_____

Scientific Name	Common Name	# of Individuals found	Comments

ASSESSMENT SURVEY CHECKLIST

MDEP ASSESSMENT SURVEY CHECKLIST

Field Survey:

Date of survey: _____

Observer: _____

Name of Applicant: _____

Application Type: _____

Location (Township): _____

Latitude / Longitude (of the project center point. Only one lat/long per site):

Lat:_____Long:_____

Method (circle one): GPS / DGPS / Chart / Other _____

Start Time of survey: _____ End Time: _____

Time of Lowtide: _____ Height of Low Tide: _____

Size of the direct impact or footprint (sq ft):

_____

Size of the indirect impact (sq ft):

_____

Depth of sediment impact (e.g. dredge depth): _____

Energy (see definitions): protected / semi-protected / partially exposed / exposed

Drainage (see definitions):

drains completely / standing water / pools / stream or channel

Slope: > 20 % / 10-20 % / 5-10 % / 0-5 % / combination

Freshwater sources (creeks, streams, rivers, run-off etc.):

_____

Salinity range if less than 25 ppt (at high and low tide): High_____Low_____

Sediment consistency: (e.g. soupy, firm) _____

Depth that the average person sinks into the mud (inches):_____

Signs of shoreline or intertidal erosion?:

_____

Sediment color: _____ Sediment odor: _____

Depth to "anoxic" layer: _____

Recreational activity:

Fisheries:

Other commercial activity (e.g. aquaculture, shipping):

Does the site appear degraded, undegraded, recovering or previously altered ? Give a detailed description with size and type of impact, date of impact, and the condition of the habitat?

Describe development and location of development in the marine and upland area surrounding the site:

Describe pollution sources:

Description and location of sediment sample collection for infauna if requested (see sampling protocols):

Description, time and location of photographs taken of the site and sediments (see guidelines).

Other Useful Site Information:

Municipality zoning (if any): _____

Shoreland zoning: _____

Rare and endangered plants in area? (call Maine Natural Areas Program for maps or lists 287-8045)

_____

Maine DEP Water Classification (e.g. SA, SB, SC): _____

Maine IF&W Classification or Concerns (if available):

_____

_____

_____

Maine Dept. of Marine Resources Concerns (if available):

_____

_____

_____

National Marine Fisheries Service Concerns (if available):

_____

_____

_____

US Fish and Wildlife Concerns (if available):

_____

_____

_____

EPA Concerns (if available)

_____

_____

_____

Measurements of Critical Habitats:

Record the dimensions and percent cover of major features of the area of disturbance (direct + indirect impact):

Major features	**Area (sq ft)**
Salt marsh	
Eelgrass cover	
Rockweed cover	
Kelp beds	
Irish moss cover	
Mussel bars	
Oyster bars	
Boulder habitat	
Ledge	
Lobster habitat	
Other	
Other	
Other	
Other	

Geological Description:

1. Using the habitat types and the sediment type or size, classify the site (see definitions of habitat type and sediment grain size). Include the entire area of direct and indirect impact in the discussion. Some sites may have more than one habitat type.

2. Describe in detail the geology, the geographic features of the general area (e.g. presence of fringing salt marsh, peat salt marsh, adjacent terrestrial environment), sources (e.g. bluff and dune erosion, deposition from offshore especially during summer, upland sources, longshore transport into the region, beach nourishment) and sinks (e.g. offshore loss especially during storms, longshore transport, wind and wave erosion, ice scour, dredging) of sediment.

Habitat Description:

1. Write a detailed description of the natural characteristics of each intertidal zone (low, mid, and high). Include a description of the habitat type, epifauna and epiflora. Describe the presence or absence of fecal mounds, worm and clam holes, worm tubes, amphipod burrows and other signs of life. In rocky areas, sample tide pools, crevices and under piles of rocks and vegetation.

2. Describe the benthic habitat, infauna and inflora. Does the habitat appear undegraded (e.g. high species diversity, many functional groups, diatom mats, high abundance) or degraded (e.g. high numbers of Capitellids, low species richness, loss of phyla or functional groups, bacterial mats)? Provide likely reasons for a degraded environment keeping in mind that very few intertidal areas are depauperate.

Description of Additional Wildlife and Other Functions and Values:

1. Describe any additional birds, fish or mammals seen at the site or known to use the area at any time of the year for nesting, over-wintering, feeding, roosting, staging, breeding, spawning or any other activities.

2. Address any other functions and values. Use the DEP Functions and Values questions as a guide.

Species List from Qualitative Field Survey:

Create a species list for the entire survey site and estimate relative abundance. List epifauna and flora followed by infauna. Attach additional sheets if necessary. An additional list should be included for quantitative benthic cores.

Common Name	**Scientific Name**	**Relative Abundance** Absent, Scattered, Common or Abundant	**General Location or Intertidal Zone**

Historical Information:

In general, what industrial, recreational, private or commercial activities have occurred at the site over the past 100 years? How long ago was the disturbance? The local municipalities may have pertinent information on the past and current uses of the region as well as land trusts, conservation commission and stewardship organizations.

Impact Assessment:

Discuss how the proposed activity will or will not affect the functions (e.g. physical, chemical, geological, biological) and values (e.g. commercial, recreational, educational) of the site. Use the DEP Permit & Planning Considerations as a guide. Consider positive as well as negative impacts.

Minimizing Environmental Impacts:

Describe steps taken to minimize environmental impacts by altering design plans and/or reducing construction activity or movement. Consider removing critical habitats or structure (e.g. boulders or rocks from a proposed boat ramp location) to enhance adjacent sites with the same sediment type.

Defend Unreasonable Impact

Write statements explaining the reason why you believe this activity should meet Natural Resources Protection Act (NRPA 38 M.R.S.A 480-A-480-Z Statute) Standards 480-D and Wetland Protection Rules (Chapter 310). Explain measures that are incorporated into the project design or compensation plan that support this claim.

Restoration Sites (if applicable):

List potential restoration sites and detailed information (e.g. size, location, habitat types, current condition, why the need to be restored and why would it make a good candidate) on each potential site. Attach additional information if necessary.

Problems and Comments

PHOTOGRAPH AND HABITAT MAPPING GUIDELINES

PHOTOGRAPH AND MAPPING GUIDELINES

The following provides guidelines for taking successful photographs of the site and mapping the geological and biological features of the site.

Photographs:

Color photographs of the entire site (areas of direct impact and associated potential indirect impact) and adjacent areas (360°) are suggested. Photographs should be taken on a negative or 0.0 tide if the impact extends into the low intertidal area. All photos should include a caption with the date, time, tidal height in photo, the compass direction, location and a brief description. The area of development or disturbance should also be indicated in the caption. It is suggested that for larger projects (e.g. > 1 acre of impact) aerial photographs can be taken on a low negative spring tide and included as part of the application.

In addition to the site photos, take a series of representative close-up photos of the undisturbed surface sediment (e.g. worm holes, fecal piles, mud) and marine life throughout the site. Indicate the zone (low, mid, or high) from which the photos were taken and the tidal height. Photograph any unusual features (e.g. polluted sediments, old structures, and deformed animals) or other signs of degradation.

Habitat Map or Sketch:

A habitat sketch of the area of direct and indirect impact should be included as part of the assessment process. A hand drawing or a computerized map with hand measured dimensions of specific habitats are suitable. GPS measurements are not required. See example assessments for examples of the habitat map and dimensions.

The map should include:

- terrestrial and marine features
  - forest, rivers, streams, creeks
  - marine channels
  - eelgrass*
  - salt marsh including fringing or patches*
  - mussel beds *
  - oyster bars *
  - kelp*
  - rockweed*
  - commercially important areas*
    - areas with lobsters
    - areas with sea cucumbers and sea urchins
  - Irish moss*

* should include the dimensions of habitat in square feet

Habitat Map or Sketch Guidelines (cont.):

- geological setting
  delineation of boulder fields, mud flat, cobble, ledge, sand flat etc.
- location of Mean High Water and Mean Low Water
- scale (e.g. 1" = 100')
- depth contours (if possible)
- direction of magnetic north
- sediment sample core locations (if collected)
- location of lobsters (note if juvenile)
- the location and type of potential point sources of contamination
- the location of other potential sources of contamination (e.g. parking lots)
- the general circulation (if known)
- road and boat access
- area of direct and indirect impact from the proposed activity
- and any other features or habitats considered noteworthy by the consultant

Additional Maps:

We prefer that a copy of the chart, topographical map and municipality tax map of the site with the location of the proposed activity indicated on the map accompany the habitat map and permit application.

COASTAL WETLAND FUNCTIONS AND VALUES & PERMIT AND PLANNING CONSIDERATIONS

COASTAL WETLAND FUNCTIONS AND VALUES

For Consultants Completing Functional Assessments:

Wildlife Functions and Values :

Diversity and Productivity

What is the marine diversity and abundance of the site?
Does the site have a high or low density of vegetation?
Does the intertidal or subtidal area have high or low number of species?

Does the habitat at the site have the potential to contain a high population of benthic and epibenthic invertebrates?

Does the coastal area support prey for higher trophic levels?

Does the site have a high abundance of predators (fish, mammals, birds) or the potential to contain a high population of predators?

Are deposits of unnatural sediments present (e.g. sawdust, wood chips)?
How does this affect the wildlife functions and values?

Sensitivity

Are there sensitive species (e.g. brittle stars, sea spiders, nudibranchs) present?

Seasonality

What species temporally utilize the habitat or adjacent waters for feeding or resting at different times of the year (e.g. winter habitat for lobsters, resting areas for sturgeon)?

Is it a spawning area for fish or a breeding area for birds or other wildlife?

Is it a nursery area for invertebrates (especially lobsters, urchins, clams), fish or birds?

Wildlife Use

Is it a travel corridor for fish, birds or mammals?

Are there signs of use by birds or mammals (tracks, prints, scat, and direct observation)?
If birds or mammals are present, could the potential development deter wildlife from continuing to use the area or adjacent regions?

Is it a known feeding ground, roosting site, resting area, critical migratory pathway or wintering ground for migratory or resident birds, fish or mammals?

If so, could the potential development interfere with one or more of these functions?

Does the habitat contain critical habitat for endangered or threatened species?

Recreational, Commercial and Educational Values:

Recreational and Commercial

Is it an open clamming, fishing (recreational and/or commercial), algae harvesting or hunting area? If so, is the town managing the flats?

Does the coastal wetland have any seeded clam flats or does it contain shellfish (e.g. oysters, mussels, clams) or finfish aquaculture sites?

Is there public access and/or boat access?

Is it located near highly populated areas?

Educational

Do school groups use the area for educational purposes?

Are there research sites or monitoring sites present?

PERMIT AND PLANNING CONSIDERATIONS

For DEP Licensing Staff Use During Permit Review

Federal, State and Local Classifications and Considerations:

Maine State Regulations

Have all of the Maine Department of Environmental Protection, Natural Resources Protection Act (NRPA) Statues and Wetland Protection Rules (Chapter 310) been considered in the planning, design, site selection and application process?

What is the classification of the area (SA,SB or SC) under the Maine DEP Water Classification Program (38 MRSA Article 4-A). Will the construction of the site, the proposed use of the site or any materials used to create the site violate the Maine water quality standards (DEP Water Classification Program)?

Has the applicant obtained an NPDES permit if applicable (e.g pipe discharge)?

How does the Maine Department of Inland Fisheries and Wildlife classify the shoreline (see Habitat Consultation Areas Mapping Project (HCAMP)?

Essential / Significant Wildlife Habitat
Waterfowl and Wading Bird Habitat (High, Medium, or Low)
Coastal Wildlife Concentration Areas

Are there any rare, endangered or threatened plants or significant natural communities that have been identified by the Dept. of Conservation Maine Natural Areas Program in the adjacent terrestrial environment and/or the marine habitats?

Has the site been identified by the Maine Department of Marine Resources as a significant commercial, traditional or recreational fishery habitat?

Has it been mapped by MDMR as eelgrass habitat (see GIS maps or contact DMR Boothbay Lab)?

Does MDMR believe that the proposed development will cause significant loss of marine habitat, or interfere with traditional fisheries or navigation?

Has the proposed activity and the location been addressed by the Maine Geological Survey?

What are their recommendations?
Has the area been mapped for bluff stability by MGS?
Do they have historical aerial photos of the project location?

Has the site location and activity been approved by the Department of Conservation, Bureau of Public Lands?

If applicable, has a submerged lands lease or easement been obtained?

Federal Regulations

Has the site location and activity been approved by the U.S. Army Corps of Engineers?

As comment agencies to the U.S. Army Corps of Engineers, have the National Marine Fisheries Service, US Fish and Wildlife Service, and/or Environmental Protection Agency approved of the proposed activity?

Has the area been designated as Essential Fish Habitat (EFH) by Fishery Management Councils (ask NMFS or see EFH maps)? If so, have EFH conservation recommendations been written by NMFS? (States are not required to consult NMFS on EFH but , if NMFS learns about a project that would adversely affect EFH, they are required to provide recommendations to the state agency. The recommendations are advisory and non-binding).

Local Regulations

How do the local municipalities classify the region (e.g. productive clam flat, recreational area)?

Check with local marine resources committee or the clam warden.

For Consultants Use When Completing Impact Assessment

For DEP Staff Use When Evaluating Permits

Physical Considerations:

Is the area well flushed? Is this a concern?

How will the development impede or divert tidal flows to rivers, estuaries, bays, channels or other watercourses?

How will the development prevent tidal flushing in any areas?

How will these alterations directly or indirectly effect vulnerable marine, estuarine or riverine habitats?

How will the development alter the natural flow of currents?

Will any aspect of the project result in a change in salinity?

How will the development alter flat or marsh drainage?

Will the alteration of circulation patterns prevent or encourage the exchange of waters and larvae from coastal waters, out migration of larvae and juvenile fish, or the flushing of terrestrial and estuarine detritus and nutrients? Could this lead to a change in the community (e.g. from estuarine species to brackish water species, intertidal to subtidal?)

Will the bottom topography be altered?

If so, how will this change the current velocity or direction or other physical circulation patterns?

Could it enhance water circulation into rivers and estuaries?

Long Term Considerations:

Sea level is currently rising statewide at approximately 2.0 mm/yr (see www.opsd.nos.noaa.gov/seatrnds.html).

Is this or should this be considered in the development plan?

How will sea level rise and the associated physical and geological changes increase or decrease potential impacts?

Has storm surge been considered (currently being modeled by FEMA)?

Chemical, Nutrient and Water Quality Considerations:

Is the region a great source of organic detritus (e.g. salt marshes) for export to marine and estuarine habitats? If so, how would the development enhance or impede organic export?

Does the development include disposal of heated effluent, chlorinated effluent, freshwater, or discharges with high nutrient or toxic (metals) concentrations?
Is this a concern to the environmental quality of the site and region?

Does the activity require a discharge license?
If so, could this affect local communities of algae, eelgrass or fauna?
Could it increase turbidity, sedimentation, and/or introduce fouling organisms?
Could it affect dissolved oxygen levels?

Geological Considerations:

Is the area under consideration a "unique land form" in the region (e.g. the only delta at the mouth of an estuary)? If so, an alternate site should be chosen.

Has the region been mapped for bluff stability by Maine Geological Survey?
If so, how is the site rated (no bluff, unstable, stable or highly unstable)?

Is the proposed development on or adjacent to a sand dune?
Is the site to be located in an A-zone, B-zone, V-zone or on or seaward of a frontal dune?

<u>Erosion and Sedimentation</u>

Will the activity cause unnatural erosion (loss of habitat) or sedimentation at the immediate site or to adjacent habitats up or down the coast (e.g. removal of sediments may impact marshes or increased boating activity may increase erosion)?
How will this change the habitat and the plant and animal community?
What will be the potential losses or gains? (e.g. loss or gain of feeding or roosting sites for shorebirds)?

Could indirect or direct activities (e.g. increased turbidity and sediment deposition) from the development smother eelgrass beds, clam flats, mussels bars, rockweed, kelp beds, fringing marsh or other sensitive areas?

Will the temporary or permanent removal of soil or vegetation or indirect construction related activities (machinery vibrations, over excavation, use of heavy equipment) increase the risk of erosion or a landslide event? If so, how is this minimized?

Sediment Movement

How will the activity interfere with the natural flow of sediment from land to sea?

How will the activity interfere with the natural flow of sediment along the coast?

Could indirect or direct activities cause an increase in flooding of the site or adjacent regions?

Contamination and Hazards

Could the activity release toxic sediments or organic deposits into the water column?
If so, could this potentially lead to a demand for dissolved oxygen, eutrophication or direct toxic effects on sensitive species?
Have the sediments been tested for pollutants (e.g. PAHs, pesticides, heavy metals, RBs, butyltins, dioxins, furans, TOC, and bacteria)?

Are there geological hazards in or near the site (e.g. methane seeps, mud slides)?

Physical Disturbances of the Substrate

Will there be sediment removed from the site? If so, how much?
Has the sediment been tested for pollutants (e.g. see examples listed above)?
Has a disposal site approved by the DEP and ACOE been established? Where?
How will the material be removed from the site?

Will blasting occur at this site?
When and how much?
What temporary (e.g. disturbance of seal haulouts or birds) and permanent impact (e.g. destruction of habitat) on wildlife will be caused by this action?

Habitat and Wildlife Considerations:

Habitat Quality

Has the habitat been previously degraded by human activity?
If so, what is the extent of the development (e.g. 10%, 90%) or the pollution?
Are there current regional restoration programs in progress to restore the degraded habitats?

Habitat Impacts and/or Improvements

How will the activity increase habitat (e.g. mussels on pilings) or decrease habitat?
Is this significant or insignificant?

How will the activity directly or indirectly alter the uses of the environment in a positive (e.g. increase food resources or resting areas) or negative manner (e.g. avoidance by wildlife)?

How will the activity change the community structure of an area (e.g. from muddy to sandy or rocky)?

What are the positive or negative implications?

If birds or mammals are present, could the potential development or an increase in activity deter wildlife from continuing to use the area or adjacent regions?

Will the potential development interfere with roosting sites, feeding sites, wintering grounds, or critical migratory pathways for birds, fish or mammals?

Seasonal Considerations:

Geological and Physical

Have the site plans accounted for flooding, erosion, or other potential geological events that could occur if the area is hit by a winter storm or hurricane during high spring tides?

Is there a potential for landslides at this site during periods of heavy rain?

Landslides can occur on vegetated as well as unvegetated slopes.

In the winter does ice cover the region?

Is this considered in the development of the site plan?

How could this effect the physical, biological and geological nature of the site and the proposed alteration?

Biological

If the habitat was sampled in the fall, winter or early spring, discuss the difference in fauna and flora between the current survey and a summer survey.

What animals use this habitat at other times of the year?

For example, is it a shore bird wintering, roosting, or feeding area during other seasons? Endangered species nesting site? Wintering grounds for eiders and sea birds? Subtidal lobster wintering territories?

Aesthetics Considerations:

How will the activity affect the aesthetic quality of the region? Temporarily or permanently?

How will it block or alter views from land? For neighbors? Boaters?

How will the activity alter the natural scenic characteristics of a region as viewed from all points (e.g. water, land, across the bay)?

How will it increase or decrease noise in the area? Temporarily or permanently? At what times ?

How will it affect air quality in the region (e.g. increase air pollution)?

How will it affect current lighting conditions in the area?

Economic Considerations:

Will the activity affect the property values near and around the site? Positively or negatively?

How will the activity affect the economy of the region?

Does the applicant have the funds to maintain the structure and its associated activities over the long-term?

Will the applicant have the resources to dismantle the structure and restore that habitat if there is no more need for the structure or its associated activity?

Recreational, Commercial and Educational Considerations:

Commercial and Recreational

How will the activity interfere with commercial or recreational fishing or boating? Can timing restrictions be made to lesson this interference?

How will the activity interfere with licensed aquaculture sites?

How will the activity interfere with navigation?

How will the activity interfere with natural fish runs? Can timing restrictions be made to lessen this interference? Check with DMR and Atlantic Salmon Authority.

How will the activity interfere with public access to the intertidal and subtidal? Check with local clam warden or marine resources committee.

Educational

Will the proposed development preclude reasonable and safe educational use by school groups or researchers?

Cumulative Impact Considerations:

How many other similar developments exist in the adjacent regions (e.g. cove)?
Do you think that another activity could be added with minimal environmental consequences?

Could one or more of these previously developed sites (e.g. public pier) be used instead of building a new development?

Could the addition of one more structure preclude or discourage the use by birds, wildlife, or recreational users?

Mitigation / Licensing Considerations:

Minimization of Impact / Alternatives

Could the activity or development be moved to a less productive or less sensitive habitat (e.g. away from shading eelgrass and algae; or from a mud flat to gravel habitat)?

If applicable, could boulders (with or without rockweed cover) be moved off site to save productive assemblages without altering the existing adjacent habitats?

Could the design or construction of the development be altered to reduce impacts (e.g. pilings vs. granite or avoidance of subtidal environments)?

Compensation

Will there be a permanent loss of habitat, an alteration of substrate or any other permanent changes?
Has a plan been developed to compensate for these losses?

Is it likely that the habitat will be able to recover to its original state within a one or two years time? If so, compensation may not be required by DEP for temporary alterations.

Are there restoration sites or projects in the region to compensate for any losses?

Considerations for Specific Activities

Coastal Stabilization Considerations:

Have erosion control measures been developed?

Is there or should there be a silt fence built around the construction site to reduce environmental damage?

Have there or should there be long term maintenance plans developed to manage the placement of rip-rap, vegetation, geo-textile or other erosion control methods at there highest level of performance?

Has vegetative stabilization been given adequate consideration over hardening structures such as rip-rap?

Lobster Pound Considerations:

Does the design of the impoundment and the choice of location minimize damage to and intrusion into the marine environment?

What aesthetic considerations should be made?

How will the pound alter current flows and/or wave energy and increase or decrease deposition and erosion?

Could this impact adjacent salt marsh or other sensitive habitats?

Will the area attain adequate flushing to prevent a violation of the DEP water quality laws and losses of naturally occurring marine organisms?

Discuss how the addition of lobsters, food and the resulting organic waste will or will not alter the water quality of the area.

Is eelgrass present within the pound? How does this affect the conditions of the permit?

Will the impoundment be dredged or dragged at anytime of the year?

Could this be avoided or minimized to reduce environmental degradation?

Is salt marsh located at or near the site?

If so, do the plans allow for a buffer zone (often suggested by NMFS) between the pound wall and the salt marsh?

Is there dredging planned near the salt marsh? Could this cause erosion of the salt marsh?

Have arrangements been made to conduct monitoring of the marine environment for five years after impoundment if required by NMFS (e.g. escrow account, contracts with professional consultants)?

To reduce physical and biological impacts, can harvesting be limited to hand-picking only?

Waterfront Structure Considerations:

In order to design the least environmentally damaging structures, have the planners consulted environmental engineers or guidelines such as The Waterfront Construction Handbook; Guidelines for the Design and Construction of Waterfront Facilities (Maine State Planning Office, January 1997)?

Do the plans call for the use of CCA pressure treated wood?

Could untreated oak, high density plastic or other environmentally friendly material be substituted for the treated wood?

If treated wood is unavoidable, are there provisions made to air-cure and pre-cut the wood in the upland at least three weeks prior to placement in the marine environment?

Does the design plan call for the use of paints, primers, or other protective coatings?

What is contained in these materials (e.g. copper)?

Will this be completed on land weeks prior to its use in the marine environment?

If using concrete, has it been pre-cast before addition to the marine environment?

FIELD CARD

FIELD CARD
(Optional)

Field Cards are to be used in the marine functional wetland assessment process as an optional supplement to the Survey Checklist, sediment core analysis (if applicable), maps, photographs, alternatives analysis and other components of the permit process. They are not intended to stand alone as a habitat functional assessment. They are intended to offer the licensing staff a consistent measure of habitat composition and functions and to assist the observer during the site visit.

Field Cards are to be used to survey the area of direct and indirect impact. There is one card for each type of intertidal habitat. Each card is broken into three intertidal zones: low, mid, and high. If the project does not extend into all three zones then only survey the areas of impact.

The card should be completed on the same day as the Survey Checklist. The observer should complete the card after a close and thorough investigation of each zone. Low intertidal surveys will require a negative tide to accurately describe all species present. To determine the presence and abundance of infauna, use a clam rake and dig around the zone where there are signs of life (holes and casts). Make sure to add any species encountered but not listed on the Field Card to the Field Card and species list on the Checklist.

The relative abundance categories are defined in the Definitions Section. Use these definitions and survey methods to accurately complete the Field Card.

Since relative abundance scales are inappropriate or not precise enough for some species, additional information is requested for algae, eelgrass, salt marsh, lobsters, echinoderms and some mollusks. As indicated on the field card, algae, eelgrass, and salt marsh habitat should be measured (see Habitat Map). If lobsters are detected, a thorough investigation noting the number of lobsters or burrows found, their location (also indicated on the map) and the habitat area (ft^2) is requested. Echinoderms should be enumerated if found. If a mussel or oyster bed exists, measurement of the bed area (ft^2) is also requested and may be added to the habitat map.

A list of scientific names, on the back pages of this section, is matched with the common names for marine biologists, consultants or staff unfamiliar with common names of marine organisms.

FIELD CARD: MIXED COARSE AND FINES

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Enteromorpha: absent ☐ scattered or occasional ☐ common☐ abundant☐

Irish moss: absent ☐ patches ☐ or _____ area of bed (ft^2)

Coraline algae: absent ☐ scattered or occasional ☐ common☐ abundant ☐

Kelp: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other : absent ☐ scattered or occasional ☐ common☐ abundant☐

Eelgrass: absent ☐ patches ☐ or _____ area of bed (ft^2)

☐ annual or ☐ perennial _____condition

Lobsters: absent ☐ present ☐ _____ #

Sand shrimp: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sea cucumbers: absent ☐ scattered or occasional ☐ _____# found

Nudibranchs: absent ☐ scattered or occasional ☐ _____# found

Horseshoe crabs or molts: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____bed area (ft^2)

Soft shell clam or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clam or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Quahogs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Razor clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentified clam holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

American oysters: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____ bed area (ft^2)

Blood worm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Thread worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Tube worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Bamboo worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hydrobia snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Moon snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dogwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod : absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentified isopod : absent ☐ scattered or occasional ☐ common☐ abundant☐

Slipper shell: absent ☐ scattered or occasional ☐ common☐ abundant☐

Jingle shell: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Stalk bryozoans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Encrusing bryozoans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sponge: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

MID-INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other algae: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____ bed area (ft^2)

Soft shell clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Thread worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Hydrobia snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Moon snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk : absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Slipper shell: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Stalked bryozoans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Encrusing bryozoans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Soft shell/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Ribbed mussel: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Springtails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Shorebirds: absent ☐ present ☐ _____# seen

Wading birds: absent ☐ present ☐ _____# seen

Others: _____ absent ☐ present ☐ _____# seen

Others: _____absent ☐ present ☐ _____# seen

Mammals: _____ absent ☐ present ☐ _____# seen

COMMENTS:

FIELD CARD: MUD FLAT

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Enteromorpha or Ulva: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other : absent ☐ scattered or occasional ☐ common☐ abundant☐

Eelgrass: absent ☐ patches ☐ or _____ area of bed (ft^2)

☐ annual or ☐ perennial _____ _____condition

Lobsters: absent ☐ present ☐ _____# found

Sand shrimp: absent ☐ scattered or occasional ☐ common☐ abundant☐

Nudibranchs: absent ☐ scattered or occasional ☐ _____# found

Horseshoe crabs or molts: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____bed area (ft^2)

Soft shell clam/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clam or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Small bivalves or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Quahogs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Razor clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentified holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Lugworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Thread worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Tube worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Bamboo worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hydrobia snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Moon snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelks: absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Stalk bryozoans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sponge: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

MID-INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Enteromorpha or Ulva: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other algae: absent ☐ scattered or occasional ☐ common☐ abundant☐

Horseshoe crabs or molts: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____bed area (ft^2)

Soft shell clams/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Small bivalves or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Quahogs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Razor clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentifed holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Lugworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Thread worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Tube worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Hydrobia snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Moon snails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dogwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sponge: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Soft shell clam or holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clam/ holes: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Shorebirds: absent ☐ present ☐ _____# seen

Wading birds: absent ☐ present ☐ _____# seen

Others: _____ absent ☐ present ☐ _____# seen

Others: _____absent ☐ present ☐ _____# seen

Mammals: _____ absent ☐ present ☐ _____# seen

COMMENTS

FIELD CARD: SAND FLAT

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Irish moss: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other : _____ absent ☐ scattered or occasional ☐ common☐ abundant☐

Eelgrass: absent ☐ patches ☐ or _____ area of bed (ft^2)

☐ annual or ☐ perennial _____condition

Lobsters: absent ☐ present ☐ _____# found

Sand shrimp: absent ☐ scattered or occasional ☐ common☐ abundant☐

Nudibranchs: absent ☐ scattered or occasional ☐ _____# found

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other Crustaceans: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Soft shell clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Small bivalves: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Bloodworms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Lugworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dogwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock gunnel: absent ☐ present ☐ _____# found

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

MID INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other algae: _____ absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Soft shell clams : absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Small bivalves: absent ☐ scattered or occasional ☐ common☐ abundant☐

Acorn worm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Bloodworms : absent ☐ scattered or occasional ☐ common☐ abundant☐

Lugworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock gunnel: absent ☐ present ☐ _____# found

Others: _____scattered or occasional ☐ common☐ abundant☐

Others: _____scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Soft shell clams : absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic clams: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach Fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Shorebirds: absent ☐ present ☐ _____# seen

Wading birds: absent ☐ present ☐ _____# seen

Others: _____absent ☐ present ☐ _____# seen

Others: _____absent ☐ present ☐ _____# seen

COMMENTS:

FIELD CARD: SAND BEACH

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW -MID INTERTIDAL & SUBLITTORAL FRINGE:

Sea stars (Asteria): absent ☐ scattered or occasional ☐ common☐ abundant☐

Sand dollars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shimmy worm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentified oligochaete worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Unidentified polychaete worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore Isopods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Baltic Isopods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL:

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Ribbed mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Least Tern: absent ☐ present ☐ _____# seen

Other shorebirds: absent ☐ present ☐ _____# seen

Piping Plover: absent ☐ present ☐ _____# seen

Wading birds: absent ☐ present ☐ _____# seen

Other: _____ absent ☐ present ☐ _____# seen

Other: _____ absent ☐ present ☐ _____# seen

Mammals: _____ absent ☐ present ☐ _____# seen

COMMENTS:

FIELD CARD: LEDGE

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Irish moss: absent ☐ patches ☐ or _____ area of bed (ft^2)

Kelp: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other macroalgae: _____ absent ☐ scattered or occasional ☐ common☐ abundant☐

Coraline algae: absent ☐ scattered or occasional ☐ common☐ abundant☐

Nudibranchs: absent ☐ scattered or occasional ☐ _____# found

Sea cucumbers: absent ☐ scattered or occasional ☐ _____# found

Tunicates: absent ☐ scattered or occasional ☐ common☐ abundant☐

Anemone: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sea stars (Asteria): absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood stars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Brittle stars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sea spider: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green sea urchin: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Scale worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Chink shells: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod:absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Chiton: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sponge: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

Four spined stickleback: absent ☐ present ☐_____# found

Grubby (little sculpin): absent ☐ present ☐_____# found

Three spined stickleback: absent ☐ present ☐_____# found

Lumpfish: absent ☐ present ☐_____# found

Pollock: absent ☐ present ☐_____# found

Rock gunnel: absent ☐ present ☐ _____# found

Shorthorned sculpin: absent ☐ present ☐_____# found

Winter flounder: absent ☐ present ☐ _____# found

Other fish: _____ absent ☐ present ☐ _____# found

MID-INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other macroalgae: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Polychaete worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelk: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Shore isopod: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Green crab: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rough periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Springtails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

Other: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site):

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Common eiders: absent ☐ present ☐_____# found

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Purple sand pipers: absent ☐ present ☐ _____# seen

Other shorebirds: absent ☐ present ☐ _____# seen

Other: _____ absent ☐ present ☐ _____# seen

Mammals: absent ☐ present ☐ _____# seen

COMMENTS:

FIELD CARD: BOULDER BEACH

Observer:_____
Location:_____
Name of Applicant:_____

Check and / or fill in blanks:

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Irish moss: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other algae: absent ☐ scattered or occasional ☐ common☐ abundant☐

Kelp: absent ☐ patches ☐ or _____ area of bed (ft^2)

Lobsters: absent ☐ present ☐ _____# found

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Nudibranchs: absent ☐ scattered or occasional ☐ _____# found

Sea cucumber: absent ☐ scattered or occasional ☐ _____# found

Tunicates: absent ☐ scattered or occasional ☐ common☐ abundant☐

Anemones: absent ☐ scattered or occasional ☐ common☐ abundant☐

Green sea urchin: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blood stars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Brittle stars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sea stars: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sea spiders: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____bed area (ft^2)

Horse mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sandworm : absent ☐ scattered or occasional ☐ common☐ abundant☐

Scale worms: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelk : absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Isopods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Jingle shells: absent ☐ scattered or occasional ☐ common☐ abundant☐

Slipper shells: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Chiton: absent ☐ scattered or occasional ☐ common☐ abundant☐

Stalked bryozoan: absent ☐ scattered or occasional ☐ common☐ abundant☐

Encrusting bryozoan: absent ☐ scattered or occasional ☐ common☐ abundant☐

Sponge: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Rock gunnel: absent ☐ present ☐ _____# found

Rock gunnels: absent ☐ present ☐ _____# found

Sculpins: absent ☐ present ☐ _____# found

Other: absent ☐ present ☐ _____# found

MID - INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☐ or _____ area of bed (ft^2)

Other algae: _____ absent ☐ scattered or occasional ☐ common☐ abundant☐

Green crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Rock crabs: absent ☐ scattered or occasional ☐ common☐ abundant☐

Blue mussels: absent ☐ scattered or occasional ☐ common☐ abundant☐ _____bed area (ft^2)

Sandworm: absent ☐ scattered or occasional ☐ common☐ abundant☐

Dog whelks: absent ☐ scattered or occasional ☐ common☐ abundant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Amphipods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Isopods: absent ☐ scattered or occasional ☐ common☐ abundant☐

Limpets: absent ☐ scattered or occasional ☐ common☐ abundant☐

Chiton: absent ☐ scattered or occasional ☐ common☐ abundant☐

Barnacles: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☐ or _____ area of bed (ft^2)

Green crab: absent ☐ scattered or occasional ☐ common ☐ abundant ☐

Common periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Smooth periwinkle: absent ☐ scattered or occasional ☐ common☐ abundant☐

Salt marsh snail: absent ☐ scattered or occasional ☐ common☐ abundant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ abundant☐

Springtails: absent ☐ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

Others: _____ scattered or occasional ☐ common☐ abundant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☐ present ☐ _____# seen

Cormorants: absent ☐ present ☐ _____# seen

Ducks: absent ☐ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☐ _____# seen

Gulls/Terns: absent ☐ present ☐ _____# seen

Shorebirds: absent ☐ present ☐ _____# seen

Wading birds: absent ☐ present ☐ _____# seen

Others: _____ absent ☐ present ☐ _____# seen

Others: _____ absent ☐ present ☐ _____# seen

Mammals: _____ absent ☐ present ☐ _____# seen

COMMENTS:

SPECIES LIST

Common Name	Scientific Name
Ascophyllum	*Ascophyllum nodosum*
Eelgrass	*Zostera marina*
Enteromorpha	*Enteromorpha intestinalis*
Fucus	*Fucus sp.*
Irish moss	*Chrondrus crispus*
Kelp	*Laminaria sp.*
Coraline algae	*Corallinales*
Amphipods	*Gammaridae*
Anemone	*Metridium sp., Tealia sp.*, others
Barnacle	*Balanus sp. , Chthamalus sp.*
Beach fleas	*Talitridae*
Bryozoan, stalked	Ectoprocta
Bryozoan, encrusting	Ectoprocta
Chiton	*Ischnochiton sp.*
Chink shell	*Lacuna vincta*
Clam, razor	*Ensis directus*
Clam, baltic	*Macoma balthica*
Clam, soft shell	*Mya arenaria*
Clam, small bivalve	*Gemma gemma, Tellina*
Crab, horseshoe	*Limulus polyphemus*
Crab, hermit	*Pagurus sp.*
Crab, green	*Cancinus maenas*
Crab, rock	*Cancer irroratus*
Isopod, baltic	*Idotea sp.*
Isopod, shore	*Jaera marina*
Limpet	*Acmaea testudinalis*
Lobster, northern	*Homarus americanus*
Mussel, blue	*Mytilus edulis*
Mussel, horse	*Modiolus modiolus*
Mussel, ribbed	*Modiolus demissus*
Nudibranch	*Phyyllirhoe*
Oyster, American	*Crassostrea virginica*
Periwinkle, common	*Littorina littoria*
Periwinkle, rough	*Littorina saxatilis*
Periwinkle, smooth	*Littorina obtusata*
Quahog	*Mercenaria mercenaria*
Sand dollar	*Echinarachnius parma*
Sand shrimp	*Crangon septemspinosa*
Sea cucumber	*Holothuroidea*
Sea spider	*Pycnogonum sp.*
Shell, slipper	*Crepidula fornicata*

Shell, jingle	*Anomia simplex*
Snails, Hydrobia	*Hydrobia minuta*
Snails, moon	*Lunatia heros*
Snail, salt marsh	*Melampus bidentatus*
Sponge	Demospongiae
Springtail	*Anurida maritima*
Star, blood	*Henricia sp.*
Star, brittle	*Ophiopholis sp.*
Stars, Asteriid	*Asterias sp.*
Tunicate, golden star	*Botryllus schlosseri*
Tunicate	Ascidiacea
Urchin, green sea	*Strongylocentrotus droebachiensis*
Whelk, mud dog	*Nassarius obsoletus*
Whelk, dog	*Nucella lapillus*
Worm, lug	*Arenicola sp.*
Worm, sand	*Nereis virens*
Worm, shimmy	*Nephtys sp.*
Worm, acorn	*Saccoglossus kowalewskii*
Worm, blood	*Glycera dibranchiata*
Worm, thread	*Capitellid sp.*
Worm, bamboo	*Clymenella sp.*
Worm, tube	*Spirorbis sp.*
Worm, scale	*Lepidonotus sp.*

EXAMPLE 1

PIER

MDEP SURVEY CHECKLIST EXAMPLE - HYPOTHETICAL SITE # 1

The following example is only meant to be used as a guide. It may not contain as much detailed information in some categories as will be required by DEP for an actual application. In addition, it contains sediment core analysis that is usually not required for piers.

Field Survey:

Date of survey: July 21, 1998 and 9/17/98 (fieldcard)
Observer: Alison Ward, Lee Doggett

Name of Applicant: Ms. Jane Smith
Application Type: Pile supported pier with seasonal ramp and seasonal float

Location (Township): Portland

Latitude / Longitude (of the project center point. Only one lat/long per site):

Lat: 43°45'.17 Long: 70°11'.25

Method (circle one): GPS / DGPS / Chart / Other

Start Time of survey: 1:30 pm End Time: 5:30 pm

Time of Lowtide: 4:00 pm Height of Low Tide: -0.2

Size of the direct impact or footprint (ft^2):

Pier = 200 ft x 8 ft = 1600 ft^2; Seasonal ramp = 6ft x 50 ft = 300 ft^2; Seasonal floats = 15 ft x 36 ft = 540 ft^2 Total: 1,600 ft^2 (permanent) and 840 ft^2 (temporary)

Size of the indirect impact (ft^2): 50 ft on all sides of float = 8,300 ft^2
Depth of sediment impact (e.g. dredge depth): Surface

Energy (circle, see definitions): protected / semi-protected / partially exposed / exposed

Drainage (circle one, see definitions):

drains completely / standing water / pools / stream or channel

Slope (circle, see definitions): > 20 % / 10-20 % / 5-10 % / 0-5 % / combination

Freshwater sources (creeks, rivers, run-off etc.):

No streams, rivers or inlets in the project area. Could received freshwater from limited terrestrial runoff

Salinity range if less than 25 ppt (at high and low tide): High Low

Sediment consistency (e.g. soupy, firm): soft sediments - sink ~1/2 ft down

Signs of shoreline or intertidal erosion?:
Slight natural erosion of embankment

Sediment color: dark grey Sediment odor: strong sulfur odor

Depth to anoxic layer: 2 mm

Recreational activity:

Habitat clammed (and wormed ?) and used by children and families for exploration

Fisheries:

Heavily used for the collection of clams and possibly worms. Many sediment piles and holes throughout the site.

Other commercial activity (e.g. aquaculture, shipping):

None known

Does the site appear degraded, undegraded or previously altered ? Give a detailed description with size and type of impact, date of impact, and the condition of the habitat?

No noticeable degradation besides holes and mounds from clamming activity.

Describe development and location of development in the marine and upland area surrounding the site:

No development in the coastal wetland or in the adjacent upland. Area surrounded by forest with nature trails.

Describe pollution sources:

No direct sources of pollution and no signs of non-point source pollution.

Description and location of sediment sample collection for infauna if required (see sampling protocols):

Benthic cores were taken from the low intertidal sand flat (#17, #18, and #19) and the mid-intertidal mixed fines (#14, #15, and #16). A one pound coffee can core (10 cm deep) was collected from three sites (northern, middle, southern) at each zone (see map). Lower intertidal cores were located near but not within the eelgrass bed. Samples were sorted within 24 hours using a 1 mm sieve, stained with Rose Bengal and preserved in 70% ethyl alcohol.

Photographs: record the time and location of photographs of the site and sediments (see protocol):

Photographs taken on 7/21 at 4:00 pm to the north, south, east and west. Photograph taken on 7/21 of sediment features, high intertidal wrack and salt marsh. Additional photos taken on 7/29 of catch from beach seine haul

Other Useful Site Information:

Municipality zoning (if any):
None

Shoreland zoning: None

Rare and endangered plants in area? (call Maine Natural Areas Program for maps or lists 287-8045)

None

Maine DEP Water Classification: SB

Maine IF&W Classification or Concerns:

1. Migrating shorebird feeding area.

2. Osprey nesting and breeding site on near by island

Maine Dept. of Marine Resources Concerns (if available):

1. Well known area for harvesting clams and worms 2. Activity shouldn't affect use of the site 3. Loss of soft bottom habitat will be minimal.

National Marine Fisheries Service Concerns (if available):

n/a

US Fish and Wildlife Concerns (if available):

n/a

EPA Concerns (if available)

n/a

Measurements of Critical Habitats:

Record the dimensions and percent cover of major features of the area of disturbance (direct + indirect impact):

Major features	**Area (sq ft)**
Salt marsh	214
Eelgrass cover	8,500 (indirect disturbance)
Rockweed cover	3,500
Kelp beds	None
Irish moss cover	None
Mussel bars	75
Oyster bars	None
Boulder habitat	775
Ledge	
Lobster habitat	None
Other	
Other	
Other	
Other	

Geological Description:

3. Using the habitat types and the sediment type (see definitions). Include the entire area of direct and indirect impact in the discussion. Some sites may have more than one habitat type.

This site is an intertidal mixed coarse and fines environment. The subtidal blends into fine sandy unconsolidated sediments.

4. Describe in detail the geology, the geographic features of the general area (e.g. presence of fringing salt marsh, peat salt marsh, adjacent terrestrial environment), sources (e.g. bluff and dune erosion, deposition from offshore especially during summer, upland sources, longshore transport into the region, beach nourishment) and sinks (e.g. offshore loss especially during storms, longshore transport, wind and wave erosion, ice scour, dredging) of sediment .

The mixed coarse and fines intertidal habitat has cobble, rockweed covered boulders and ledge outcrops, a small patch of fringing salt marsh on the eastern shore, bare ledge and sandy mud in the lower intertidal. Eelgrass beds cover the subtidal portion of the site that may be indirectly impacted by the activity. There is no horizontal gradient at this site. Sediment sources are probably mostly derived by coastal sediment transfer from nearby coastal bluff erosion and offshore sources. Since there are no rivers or streams entering the flat except during heavy rains, little is probably derived for the adjacent terrestrial environment. The fringing salt marsh shows signs of coastal erosion.

The habitat experiences extensive ice scour in the winter that potentially removes surface sediments and scours plant and animals communities.

Habitat Description:

1. Write a detailed description of the natural characteristics of each intertidal zone (low, mid, and high). Include a description of the habitat type, epifauna and epiflora. Describe the presence or absence of fecal mounds, worm and clam holes, worm tubes, amphipod burrows and other signs of life. In rocky areas, sample tide pools, crevices and under piles of rocks and vegetation.

2. Describe the benthic habitat, infauna and flora. Does the habitat appear undegraded (e.g. high species diversity, many functional groups, diatom mats, high abundance) or degraded (e.g. high numbers of Capitellids, low species richness, loss of phyla or functional groups, bacterial mats)? Provide likely reasons for a degraded environment.

Low-intertidal: The low intertidal zone is teaming with life. The sediments consist of sandy mud covered in perennial eelgrass in the shallow subtidal area. At the lowest intertidal area the sandy region, without eelgrass cover, contains high numbers of hermit crabs, isopods, sand shrimp, green crabs, European oysters, mud whelks, Gammarid amphipods, bamboo worms, common periwinkles and clumps of blue mussels. The sediments are covered with small fecal piles, clam holes and bamboo worm holes. The eelgrass bed is a nursery area for small shrimp and fish. The epifauna and flora in the covered area is composed of high numbers of mud whelks, sand shrimp, unidentified juvenile schooling fish (Atlantic silversides ?), isopods, bryozoans, hermit crabs, sea lettuce, and sponge. The infauna (see data from core samples) contains capitellid thread worms, sand worms, polychaetes (Nephtys sp.), and soft-shelled clams. Due to the large number of razor clam shells found throughout the low intertidal, the area probably has a high potential as razor clam habitat.

Mid-intertidal: The mid-zone was also composed of a mixture of sand, gravel, cobble, shell fragments and rockweed covered ledge outcrops. The anoxic layer was about 2 mm deep. Due to the coarse nature of the sediments only soft shell clams, sandworms, and capitellid thread worms were found in the sediments. Numerous soft-shell clams holes and sandworm holes and fecal piles were dispersed throughout the zone. The epifauna consists of scattered patches of blue mussels, common periwinkle, springtails, mud whelks, barnacles, dogwinkles, common slipper shell and low numbers of green crabs. Bryozoans covered the Ascophyllum blades. Common and smooth periwinkles, barnacles, coraline algae, hydroids (Sertularia sp.), Gammarid amphipods, green crabs and dog winkles live on, within and under the algal mats.

High Intertidal: The high intertidal zone is composed of bare ledge outcrops partially covered in wrack composed of decaying eelgrass. Dry sediments are composed of mixed sands, gravel and cobble. Springtails are located in pools in ledge crevices. Common periwinkle, rough periwinkle, and sand fleas associated with wrack are also found in this zone. No animals were found in the sediment.

There are no signs of any habitat degradation in or on the sediments at this site

Description of Additional Wildlife and Other Functions and Values:

1. Describe any additional birds, fish or mammals seen at the site or known to use the area at any time of the year for nesting, over-wintering, feeding, roosting, staging, breeding, spawning or any other activities.

2. Address any other functions and values. Use the DEP Functions and Values questions as a guide.

One American crow, one osprey, black backed gulls, one common merganser, and herring gulls were noted flying in the near vicinity of the flat during the intertidal survey.

There is a breeding pair of osprey with two chicks nesting on a small island approximately 150 feet to the north of the site.

This flat is used by migrating shorebirds as a feeding area but not a roosting site. Purple sandpipers winter at this site.

Species List from Qualitative Field Survey:

Create a species list for the entire survey site. List epifauna and flora followed by infauna.

Common Name	Scientific Name	Relative Abundance Absent, Scattered, Common or Abundant	General Location or Intertidal Zone
Fucus	Fucus sp.	Abundant	Mid
Eelgrass	Zostera marina	Abundant	Low
Hermit crabs	Pagurus sp	Common	Low
Isopods	Idotea baltica	Common	Low
Sand shrimp	Crangon septemspinosa	Abundant	Low
Green crabs	Carcinus maenas	Scattered	Low and Mid
European oysters		Scattered	Low
Mud whelks	Nassarius obsoletus	Abundant	Low and Mid
Amphipods	Gammarid sp.	Common	Low and Mid
Common periwinkle	Littorina littorea	Common	Low and Mid
Blue mussels	Mytilus edulis	Scattered	Low and Mid
Bryozoan	Phylum bryozoa	Abundant	Low
Sponge	Phylum porifera	Scattered	Low
Spring tails	Anurida maritima	Scattered	Mid and High
Barnacles	Balanus balanoides	Scattered	Mid
Dog whinkles	Thais lapillus	Common	Mid
Slipper shells	Crepidula fornicata	Scattered	Mid
Smooth periwinkle	Littornia obtusata	Scattered	Mid and High
Rough periwinkles	Littornia saxitilis	Scattered	Mid
Sand fleas	Talorchestia sp.	Abundant	High - wrack
Hydroids	Sertularia sp.	Scattered	Mid - under algae
Bamboo worms	Clymenella torquata	Scattered	Low
Soft-shelled clams	Mya arenaria	Common	Low and Mid
Thread worms	Capitellid	Abundant	Low and Mid
Sand worms	Nereis virens	Common	Low and Mid

Historical Information:

In general, what industrial, recreational, private or commercial activities have occurred at the site over the past 150 years? How long ago was the disturbance? The local municipalities may have pertinent information on the past and current uses of the region as well as land trusts, conservation commission and stewardship organizations.

No industrial, or private activities have occurred at this site. Site is a public area open to recreational activities, educational activities, sport fishing and commercial harvesting of clams and worms.

Impact Assessment:

Discuss how the proposed activity will or will not affect the functions (e.g. physical, chemical, geological, biological) and values (e.g. commercial, recreational, educational) of the site. Use the DEP Planning Considerations as a guide. Consider positive as well as negative impacts.

Shading from the pier may cause the most biological impact at the site. Shading may occur directly underneath the pier, seasonal ramp and floats. Rockweed, eelgrass and associated fauna may be negatively affected. Indirect impacts from boat scour and shading may also negatively impact the low intertidal portion of the site.

Use of the area by waterfowl, migrating shorebirds and other animals may be affected. The addition of a pier may increase human activity at the site, decrease area of undisturbed foraging sites and therefore decrease habitat value for wildlife. Animals frequently avoid developed sites and this addition may discourage the use of the site.

If pile supports are used, then the sediment and current flows should not be altered. The drainage of the flat will not be affected. Scour may not be increased or decreased due to construction of the pier. Water chemistry should not be affected unless pollutants such as gasoline are discharged from any boats using the pier. Sediment character should not be affected.

Displacement of infauna during construction should be minimal. Clam and worm populations should not be impacted except for directly under the floats. The floats may smother the flat during low tide possibly reducing infauna and epifauna.

Piles may provide additional structure for the settling of benthic organisms. The pier may provide a temporary roosting, resting and preening site for birds.

Minimizing Environmental Impacts:

Describe steps taken to minimize environmental impacts by altering design plans and/or reducing construction activity or movement. Consider removing critical habitats or structure (e.g. boulders or rocks from a proposed boat ramp location) to enhance adjacent sites with the same sediment type.

1. The location for the pier will be moved 25 ft south from the original location to minimize direct and indirect impacts. The new proposed site is located away from the eelgrass bed and the osprey nest and is not a shorebird feeding area.
2. The disturbance will be minimized in the low intertidal zone. The pier will only be used at the highest tides to reduce impacts to the shoreline communities.
3. The width of the pier will be reduced to 5.5 ft to reduce shading to rockweed. The permanent pier will be 13 feet high to minimize shading. The footings will be placed on bare ledge to minimize damage to vegetated areas. The decking for the pier will contain slats in-between the wood to allow light to penetrate throughout the day.
4. The seasonal ramp and float will only be in the water between June and August to minimize shading and smothering of the intertidal habitat.
5. The pier will be located at least 25 ft from the salt marsh to prevent direct and indirect impacts to the marsh.
6. CCA pressure treated wood will not be used in the construction of the pier.
7. Boulders, with and without rockweed cover, that are within the proposed location of the pier will be moved to adjacent sites to prevent shading and damage to animal communities.

Defend Unreasonable Impact:

Write statements explaining the reason why you believe this activity should meet Natural Resources Protection Act (NRPA 38 M.R.S.A 480-A-480-Z Statute) Standards 480-D and Wetland Protection Rules (Chapter 310). Explain measures that are incorporated into the project design or compensation plan that support this claim.

The activity should not cause any unreasonable impact to the marine environment because the pier has been relocated 25 feet south from the productive eelgrass habitat, osprey nest, shorebird feeding area and salt marsh. No shading, smothering or scouring of vegetation or marsh will occur at this new location.

The permanent structure (pier), with the modifications listed above to reduce impacts to the marine environment, should not unreasonably harm any marine habitats or fisheries. Some shading of rockweed under the pier will occur but damage will be minimal. It will not interfere with the natural flow of water or sediment, cause flooding, disrupt navigation or unreasonably interfere with recreational and commercial uses.

CCA pretreated wood is not being used. Therefore, this activity should not lower or affect water quality in any way.

Restoration Sites (if applicable):

List potential restoration sites and detailed information (e.g. size, location, habitat types, current condition, why the need to be restored and why would it make a good candidate) on each potential site. Attach additional information if necessary.

Not applicable

Problems and Comments:

FIELD CARD: MIXED COURSE AND FINES

Observer Alison Ward
Location: Jane Smith Property 9/17/98
Name of Applicant: Jane Smith

Check and / or fill in blanks:

FISH:

List any fish found using the area during high tide or as the tide receeds. The use of bucket samples, nets and general observations are acceptable.

Didn't sample on this date.

LOW INTERTIDAL & SUBLITTORAL FRINGE:

Enteromorpha: absent ☒ patches ☐ or _____ % cover

Irish moss: absent ☒ patches ☐ or _____ area of bed (ft²) & _____ % cover

Coraline algae: absent ☐ scattered or occasional ☒ common☐ dominant ☐

Kelp: absent ☒ patches ☐ or _____ area of bed (ft²) & _____ % cover

Other : Ulva | Fucus absent ☐ patches ☒ _____ % cover

Eelgrass: absent ☐ patches ☐ or _____ area of bed (ft²) & _____ % cover

☐ annual or ☒ perennial thinning, dying back condition

Lobsters: absent ☒ present ☐ _____ #

Sand shrimp: absent ☐ scattered or occasional ☐ common☒ dominant☐

Sea cucumbers: absent ☒ scattered or occasional ☐ _____# found

Nudibranchs: absent ☒ scattered or occasional ☐ _____# found

Horseshoe crabs or molts: absent ☒ scattered or occasional ☐ common☐ dominant☐

Rock crabs: absent ☒ scattered or occasional ☐ common☐ dominant☐

Green crabs: absent ☐ scattered or occasional ☒ common☐ dominant☐

Hermit crabs: absent ☐ scattered or occasional ☐ common☒

Blue mussels: absent ☐ scattered or occasional ☒ common☐ dominant☐ _____bed area (ft²)

Soft shell clam or holes: absent ☐ scattered or occasional ☒ common☐ dominant☐

Baltic clam or holes: absent ☒ scattered or occasional ☐ common☐ dominant☐

Quahogs: absent ☐ scattered or occasional ☒ common☐ dominant☐

Razor clams: absent ☐ scattered or occasional ☒ common☐ dominant☐

Unidentified clam holes: absent ☐ scattered or occasional ☒ common☐ dominant☐

American oysters: absent ☒ scattered or occasional ☐ common☐ dominant☐ _____ bed area (ft^2)

Blood worm: absent ☒ scattered or occasional ☐ common☐ dominant☐

Sandworm: absent ☒ scattered or occasional ☐ common☐ dominant☐

Thread worms: absent ☐ scattered or occasional ☒ common☐ dominant☐

Tube worms: absent ☒ scattered or occasional ☐ common☐ dominant☐

Shimmy worms: absent ☒ scattered or occasional ☐ common☐ dominant☐

Acorn worm: absent ☒ scattered or occasional ☐ common☐ dominant☐

Bamboo worms: absent ☐ scattered or occasional ☒ common☐ dominant☐

Hydrobia snails: absent ☒ scattered or occasional ☐ common☐ dominant☐

Moon snails: absent ☒ scattered or occasional ☐ common☐ dominant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☒ dominant☐

Rough periwinkles: absent ☒ scattered or occasional ☐ common☐ dominant☐

Dogwinkles: absent ☒ scattered or occasional ☐ common☐ dominant☐

Mud dog whelk: absent ☐ scattered or occasional ☐ common☐ dominant☒

Amphipods: absent ☒ scattered or occasional ☐ common☐ dominant☐

Shore isopod : absent ☒ scattered or occasional ☐ common☐ dominant☐

Baltic isopod: absent ☐ scattered or occasional ☐ common☐ dominant☒

Unidentified isopod : absent ☒ scattered or occasional ☐ common☐ dominant☐

Slipper shell: absent ☒ scattered or occasional ☐ common☐ dominant☐

Jingle shell: absent ☒ scattered or occasional ☐ common☐ dominant☐

Limpets: absent ☒ scattered or occasional ☐ common☐ dominant☐

Barnacles: absent ☒ scattered or occasional ☐ common☐ dominant☐

Stalk bryozoans: absent ☐ scattered or occasional ☐ common☐ dominant☒

Encrusing bryozoans: absent ☒ scattered or occasional ☐ common☐ dominant☐

Sponge: absent ☐ scattered or occasional ☒ common☐ dominant☐

Others: _____absent ☐ scattered or occasional ☐ common☐ dominant☐

Others: _____absent ☐ scattered or occasional ☐ common☐ dominant☐

MID-INTERTIDAL

Fucus/Ascophyllum: absent ☐ patches ☒ or _____ area of bed (ft^2) & _____ % cover

Other algae: absent ☒ patches ☐ _____ % cover

Rock crabs: absent ☒ scattered or occasional ☐ common☐ dominant☐

Green crabs: absent ☒ scattered or occasional ☐ common☐ dominant☐

Blue mussels: absent ☐ scattered or occasional ☒ common☐ dominant☐ _____ bed area (ft^2)

Soft shell clams: absent ☐ scattered or occasional ☐ common☒ dominant☐

Baltic clams: absent ☐ scattered or occasional ☑ common☐ dominant☐

Acorn worm : absent ☑ scattered or occasional ☐ common☐ dominant☐

Blood worm : absent ☐ scattered or occasional ☑ common☐ dominant☐

Sandworm : absent ☐ scattered or occasional ☐ common☑ dominant☐

Thread worms : absent ☐ scattered or occasional ☑ common☐ dominant☐

Shimmy worms : absent ☑ scattered or occasional ☐ common☐ dominant☐

Hydrobia snails: absent ☑ scattered or occasional ☐ common☐ dominant☐

Moon snails: absent ☑ scattered or occasional ☐ common☐ dominant☐

Common periwinkles: absent ☐ scattered or occasional ☐ common☑ dominant☐

Rough periwinkles: absent ☑ scattered or occasional ☐ common☐ dominant☐

Smooth periwinkles: absent ☐ scattered or occasional ☐ common☐ dominant☑

Dog whelk: absent ☐ scattered or occasional ☐ common☑ dominant☐

Mud dog whelk : absent ☐ scattered or occasional ☐ common☐ dominant☑

Amphipods: absent ☐ scattered or occasional ☐ common☑ dominant☐

Shore isopod: absent ☑ scattered or occasional ☐ common☐ dominant☐

Slipper shell: absent ☑ scattered or occasional ☐ common☐ dominant☐

Limpets: absent ☑ scattered or occasional ☐ common☐ dominant☐

Barnacles: absent ☐ scattered or occasional ☑ common☐ dominant☐

Stalked bryozoans: absent ☐ scattered or occasional ☑ common☐ dominant☐

Encrusing bryozoans: absent ☑ scattered or occasional ☐ common☐ dominant☐

Others: Scuds absent ☐ scattered or occasional ☑ common☐ dominant☐

Others: _____ absent ☐ scattered or occasional ☐ common☐ dominant☐

HIGH INTERTIDAL

Salt marsh: absent ☐ patches ☑ or _____ area of bed (ft^2) & 10 % cover

Green crabs: absent ☑ scattered or occasional ☐ common☐ dominant☐

Soft shell/ holes: absent ☐ scattered or occasional ☑ common☐ dominant☐

Baltic clams/ holes: absent ☑ scattered or occasional ☐ common☐ dominant☐

Ribbed mussel: absent ☑ scattered or occasional ☐ common☐ dominant☐

Sandworm: absent ☐ scattered or occasional ☑ common☐ dominant☐

Common periwinkles: absent ☑ scattered or occasional ☐ common☐ dominant☐

Rough periwinkles: absent ☐ scattered or occasional ☐ common☑ dominant☐

Smooth periwinkles: absent ☐ scattered or occasional ☑ common☐ dominant☐

Limpets: absent ☑ scattered or occasional ☐ common☐ dominant☐

Barnacles: absent ☑ scattered or occasional ☐ common☐ dominant☐

Beach fleas: absent ☐ scattered or occasional ☐ common☐ dominant☒

Springtails: absent ☐ scattered or occasional ☒ common☐ dominant☐

Others: _____absent ☐ scattered or occasional ☐ common☐ dominant☐

Others: _____absent ☐ scattered or occasional ☐ common☐ dominant☐

WILDLIFE (entire site)

Bald Eagles, Osprey, Peregrine Falcons: absent ☒ present ☐ _____# seen

Cormorants: absent ☒ present ☐ _____# seen

Ducks: absent ☒ present ☐ _____# seen

Great Blue Heron: absent ☐ present ☒ 4 # seen

Gulls/Terns: absent ☐ present ☒ 15 # seen

Shorebirds: absent ☒ present ☐ _____# seen

Wading birds: absent ☒ present ☐ _____# seen

Others: _____ absent ☐ present ☐ _____# seen

Others: _____absent ☐ present ☐ _____# seen

Mammals: _____ absent ☒ present ☐ _____# seen

COMMENTS:

- Used to be the site of an osprey - young fledged in late summer.
- Thousands of small holes & fecal piles in low intertidal
- Ascophyllum and associated fauna are dying back.
- Most dominate species is the mud dog whelk
- thick wrack line composed of rotting eelgrass.

Project Name: Example #1 Benthic Survey
Site Location: Jane Smith Property
Date Collected: 7/21/98
Core #: 14 Intertidal Zone Sampled: mid
Habitat/Sediment Type: mixed coarse and fines

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Mya arenaria	1	3	3	33	33	Filter feeder
Nereis virens	2	3	6	33	66	Deposit-feeder
Macoma balthica	3	1	7	11	77	Filter feeder
Littorina obtusata	4	1	8	11	89	grazer
Oligochaete	5	1	9	11	100	Deposit-feeder

Number of Species	5
Number of Individuals	9
Individuals per m^2	1146

** Cores = 7.853×10^{-3} m^2

Core #: 15 Intertidal Zone Sampled: mid
Habitat/Sediment Type: mixed coarse and fines

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Mya arenaria	1	3	3	60	60	Filter feeder
Macoma balthica	2	2	5	40	100	Filter feeder

Number of Species	2
Number of Individuals	5
Individuals per m^2	637

** Cores = 7.853×10^{-3} m^2

Project Name: Example #1 Benthic Survey
Site Location: Jane Smith Property
Date Collected: 7/21/98
Core #: 16 Intertidal Zone Sampled: mid
Habitat/Sediment Type: mixed coarse and fines

Species	Rank	Number	Cumulativ Number	Percent	Cumulativ Percent	Functional Group
Streblospio benedicti	1	16	16	57	57	Deposit-feeder
Nereis virens	2	4	20	14	71	Deposit-feeder
Polydora sp.	3	3	23	11	82	Deposit-feeder
Eteone longa	4	2	25	7	89	Carnivore
Capitella capitata	5	2	27	7	96	Deposit-feeder
Oligochaete	6	1	28	4	100	Omnivores

Number of Species	6
Number of Individuals	28
Individuals per m^2	3565

** Cores = 7.853 x 10^{-3} m^2

Core #: 17 Intertidal Zone Sampled: Low
Habitat/Sediment Type: mixed coarse and fines

Species	Rank	Number	Cumulativ Number	Percent	Cumulativ Percent	Functional Group
Heteromastus filiformis	1	8	8	32	32	Deposit-feeder
Clymenella torquata	2	4	12	16	48	Deposit-feeder
Polydora sp.	3	3	15	12	60	Deposit-feeder
Macoma balthica	4	2	17	8	68	Deposit-feeder
Leitoscoloplos sp.	5	2	19	8	76	?? Deposit-feeder
Eteone longa	6	2	21	8	84	Carnivore
Spionids	7	2	23	8	92	Deposit-feeder
Gammarid sp.	8	1	24	4	96	Omnivore
Nephtys incisa	9	1	25	4	100	Omnivore

Number of Species	9
Number of Individuals	25
Individuals per m^2	3183

** Cores = 7.853 x 10^{-3} m^2

Project Name: Example #1 Benthic Survey
Site Location: Jane Smith Property
Date Collected: 7/21/98
Core #: 18 Intertidal Zone Sampled: Low
Habitat/Sediment Type: mixed coarse and fines

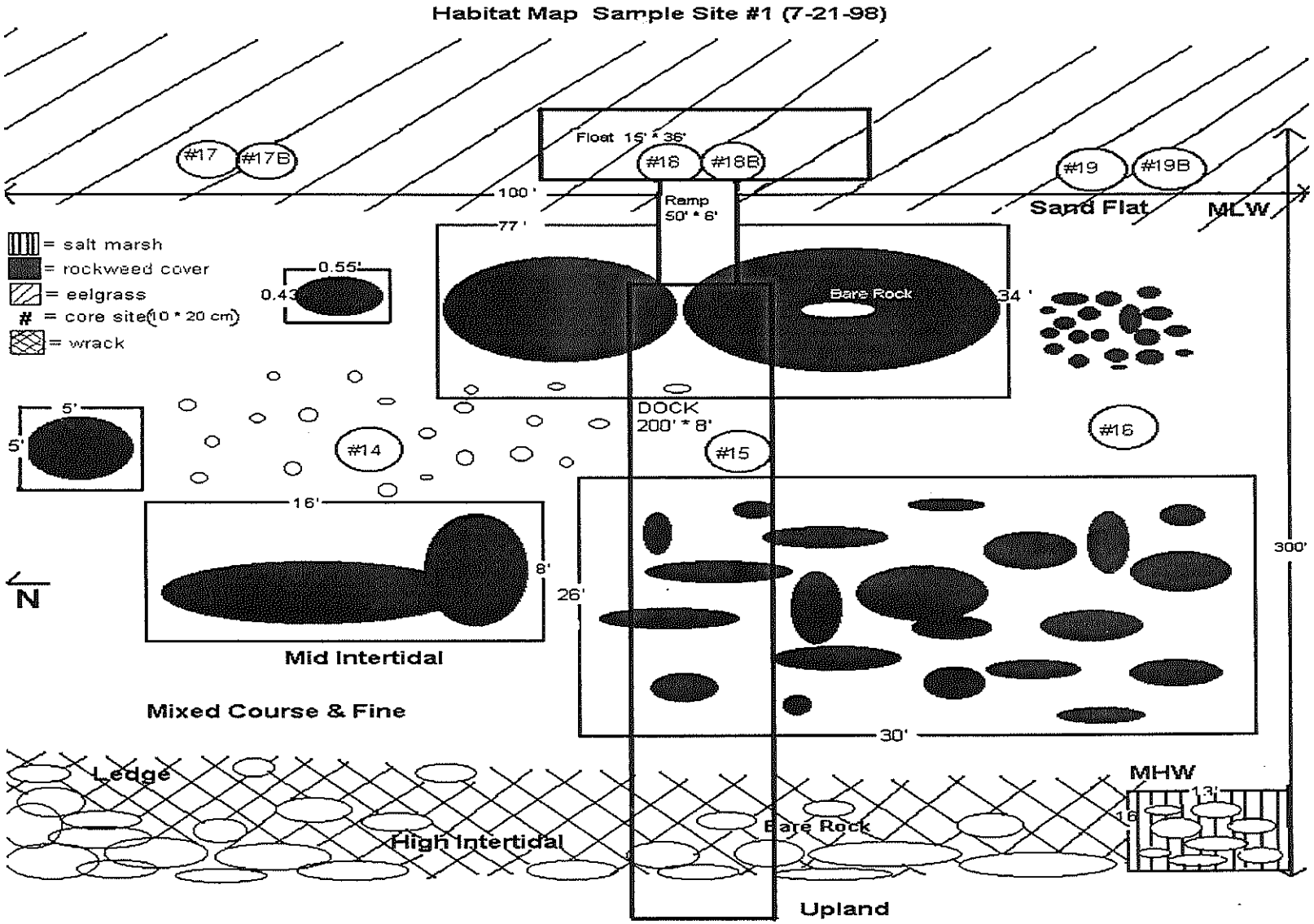
Species	Rank	Number	Cumulativ Number	Percent	Cumulativ Percent	Functional Group
Polydora sp.	1	3	3	25	25	Deposit-feeder
Clymenella torquata	2	2	5	17	42	Deposit-feeder
Spionids	3	2	7	17	58	Deposit-feeder
Leitoscoloplos sp.	4	1	8	8	67	Deposit-feeder ??
Capitella capitata	5	1	9	8	75	Deposit-feeder
Heteromastus filiformis	6	1	10	8	83	Deposit-feeder
Mya arenaria	7	1	11	8	92	Filter feeder
Littorina obtusata	8	1	12	8	100	Grazer
Number of Species		8				
Number of Individuals		12				
Individuals per m^2		1528				

** Cores = 7.853×10^{-3} m^2

Core #: 19 Intertidal Zone Sampled: Low
Habitat/Sediment Type: mixed coarse and fines

Species	Rank	Number	Cumulativ Number	Percent	Cumulativ Percent	Functional Group
Heteromastus filiformis	1	14	14	50	50	Deposit-feeder
Spionids	2	6	20	21	71	Deposit-feeder
Mya arenaria	3	4	24	14	86	Filter-feeder
Littorina obtusata	4	2	26	7	93	Grazer
Clymenella torquata	5	2	28	7	100	Deposit-feeder
Number of Species		5				
Number of Individuals		28				
Individuals per m^2		3565				

** Cores = 7.853×10^{-3} m^2


Habitat Map Sample Site #1 (7-21-98)
#17
#17B
Float 15' * 36'
#18
#18B
#19
#19B
100'
Ramp
50' * 6'
Sand Flat
MLW
77'
= salt marsh
= rockweed cover
= eelgrass
= core site(10 * 20 cm)
= wrack
0.55'
0.43'
Bare Rock
34'
5'
5'
DOCK
200' * 8'
#14
#15
#16
16'
8'
26'
300'
N
Mid Intertidal
Mixed Course & Fine
30'
Ledge
High Intertidal
Bare Rock
MHW
13'
16'
Upland

Example Site #1 - Mixed Coarse and Fines July 21,1998

Mixed coarse and fines, mid-intertidal. North

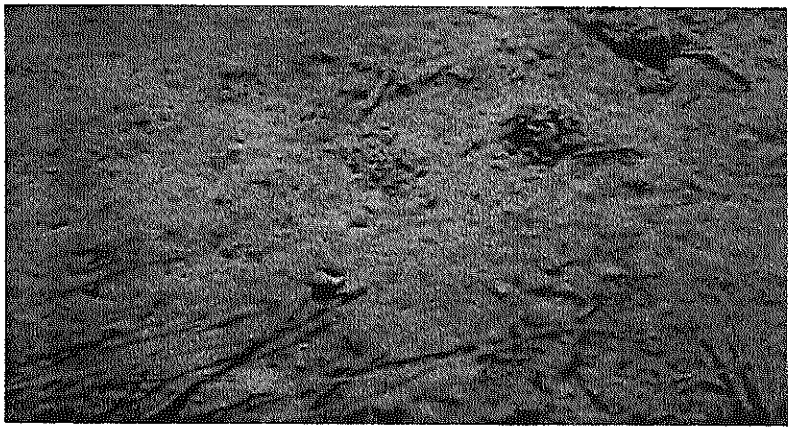
Mixed coarse and rockweed covered ledge. Location of pier. East.

Mixed coarse and fines and salt marsh. Mid / high intertidal. South

Wide view of adjacent upland and ledge to the south.

Example #1: Sediment Features

Worm hole in the lower intertidal zone covered by eelgrass



Fecal castes on the low intertidal muddy bottom

Small worm holes and worm castes covering low and mid intertidal zone

Worm fecal piles from Arenicola marina in the mid-intertidal

EXAMPLE 2

LOBSTER POUND

MDEP SURVEY CHECKLIST EXAMPLE - HYPOTHETICAL SITE # 2

The following example is only meant to be used as a guide. It may not contain as much detailed information in some categories as will be required by DEP for an actual application.

Field Survey:

Date of survey: Sept. 8, 1998
Observer: Alison Ward, Lee Doggett, Chuck Penney

Name of Applicant: Mr. John Jones
Application Type: Lobster Pound

Location (Township): Jonesboro

Latitude / Longitude (of the project center point. Only one lat/long per site):

Lat: 44°41'.15 Long: 67°34'.00

Method (circle one): GPS / DGPS / Chart / Other _____

Start Time of survey: 11:30 am End Time: 6:15 pm

Time of Lowtide: 6:30 pm Height of Low Tide: -1.6

Size of the direct impact or footprint:

4,845 ft^2 loss of rocky intertidal. 3,200 ft^2 loss of mud flat for the dike and landings. 16,000 ft^2 loss of freshwater wetland for road. Total footprint (marine): 8,045 ft^2. Total footprint (freshwater): 16,000 ft^2.

Size of the indirect impact (sq ft): Conversion from intertidal to subtidal: 2.3 acres
Depth of sediment impact (e.g. dredge depth): surface

Energy (circle, see definitions): protected / semi-protected / partially exposed / exposed

Drainage (circle one, see definitions):

drains completely / standing water / pools / stream or channel

Slope (circle, see definitions): > 20 % / 10-20 % / 5-10 % / 0-5 % / combination

Freshwater sources (creeks, rivers, run-off etc.):

No obvious permanent sources of fresh water originating from the upland environment. However, the presence of *Enteromorpha intestinalis* on the southeastern side may be indicative of freshwater run-off.

Salinity range if less than 25 ppt (at high and low tide): High _____ Low _____

Sediment consistency (e.g. soupy, firm):

Soupy. A person of average weight sinks 4" into the sediment in the high intertidal, 4.5" in the mid, and 5-6"in the low intertidal zone.

Signs of shoreline or intertidal erosion?

slight natural erosion of the banks of the freshwater wetland

Sediment color: grey Sediment odor: slight sulfur odor

Depth to anoxic layer: 2 cm

Recreational activity:

None, private property, no access except by boat

Fisheries:

Not believed to be a productive clamming area by DMR or the Jones family. Little signs of disturbed sediments or holes from diggers. During a NMFS visit the cove was being clammed for soft-shelled clams by a local digger.

Other commercial activity (e.g. aquaculture, shipping):

none

Does the site appear degraded, undegraded or previously altered ? Give a detailed description with size and type of impact, date of impact, and the condition of the habitat?

Undegraded, remote location, inaccessible except by boat

Describe development and location of development in the marine and upland area surrounding the site:

None

Describe pollution sources:

No point or non -point sources of pollution found near the site.

Description and location of sediment sample collection for infauna if required (see sampling protocols):

Eighteen cores (15 cm in diameter x 10 cm deep) were collected in the high, mid and low intertidal mud flat. Six cores were collected throughout the upper intertidal, 6 throughout the mid intertidal, and 6 across the low intertidal habitat (see habitat map). Many samples contained eelgrass. Samples were placed in bags, labeled and sieved the following day in the laboratory using a 1 mm sieve. Samples were stained with rose bengal and preserved in 70 % alcohol.

Photographs: record the time and location of photographs of the site and sediments (see protocol):

Photographs of the entire site (360°) and sediments were taken on 9/8/98 at 6 pm during low tide

Other Useful Site Information:

Municipality zoning (if any): _____

Shoreland zoning: water dependent use

Rare and endangered plants in area? (call Maine Natural Areas Program for maps or lists 287-8045)

No rare plants or rare animals were located at this site.

Maine DEP Water Classification: SB

Maine IF&W Classification or Concerns (if available):

Coastal Wildlife Concentration Area, Candidate Significant Wildlife Habitat, and Moderate value candidate Coastal Waterfowl and Wading Bird Habitat (WWH). MIF&W believe it is not a significant feeding or roosting area for migrating shorebirds. In addition, they suggest that impoundment of an individual cove will have "negligible effect on the value of the whole area" for birds. The site is not a deer yard. There are no Essential Habitats for endangered species at this site.

Maine Dept of Maine Resources Concerns (if available):

Few worms or clams were noted upon field examination by DMR. The mud flat is not believed to be a productive clam or worm habitat for commercial fisheries. DMR doesn't expect the project to be a significant impact to marine wildlife or fisheries.

National Marine Fisheries Service concerns (if available):

NMFS primary concerns are that the proposed activity may have an adverse environmental impact on the eelgrass beds and the salt marsh. They suggest ways to minimize impacts that includes a benthic monitoring survey of the mud flat to be conducted before and after impoundment for five years.

US Fish and Wildlife Concerns (if available):

unknown

EPA Concerns (if available):

unknown

Measurements of Critical Habitats:

Record the dimensions and percent cover of major features of the area of direct and indirect impact:

Major features	**Area (sq ft)**
Salt marsh	~26,165 ft^2
Eelgrass cover	~ 2 acres
Rockweed cover	~20,000 ft^2
Kelp beds	None
Irish moss cover	None
Mussel bars	Few patches only in salt marsh
Oyster bars	None
Boulder habitat	~6,000 ft^2
Ledge	~22,000 ft^2
Lobster habitat	None
Other	

Geological Description:

5. Using the habitat types and the sediment type to classify the site (see page 10 for definitions). Include the entire area of direct and indirect impact in the discussion. Some sites may have more than one habitat type.

The site is a mud flat with small areas of salt marsh, ledge, boulders and mixed coarse habitat. A low energy salt water channel runs down the middle of the mud flat extending from the salt marsh to the opening of the cove.

6. Describe in detail the geology, the geographic features of the general area (e.g. presence of fringing salt marsh, peat salt marsh, adjacent terrestrial environment), sources (e.g. bluff and dune erosion, deposition from offshore especially during summer, upland sources, longshore transport into the region, beach nourishment) and sinks (e.g. offshore loss especially during storms, longshore transport, wind and wave erosion, ice scour, dredging) of sediment .

The four acres of marine habitat are surrounded by an undeveloped forested and shrub/scrub freshwater wetland. There are no obvious persistent streams or creeks flowing through the freshwater wetland.

The habitat is dominated by mud flat 80 % covered by a thin layer of annual eelgrass. The annual eelgrass covers the mud flat from the low intertidal zone to the salt marsh. The mud flat contains a dense layer of Presumscot marine clay lying approximately four inches below the surface in the mid and upper intertidal flat. Ledge outcrops, approximately 90 % covered by *Ascophyllum nodosum* and *Fucus sp.*, lie to the north, south and east of the mud flat. A low energy boulder beach is situated on the northern edge of the cove. The beach contains a thick covering of *Fucus sp.* and *Ascophyllum nodosum*. Fringing salt marsh dominated by *Spartina alterniflora* is well established in the northern, southern and eastern portions of the cove. The largest patch of salt marsh, to the south of the cove, measures approximately 16,000 ft^2. The cove narrows at the opening to the Chandler River. At the opening, ledge lies adjacent to the mud flat. A mixed coarse habitat lies to the south at the opening of the cove.

New sources of sediments probably originate from the erosion of the Presumscot formation. Tides deposit new sources of fine sediments onto the flats and salt marsh. The mud flat becomes a sink for sediments and any other particulate matter that is carried in by the tides and settled out of the water column.

The site is scoured in the winter by ice.

During the time of the survey, there were no major signs of erosion of the shoreline or salt marsh.

Habitat Description:

1. Write a detailed description of the natural characteristics of each intertidal zone (low, mid, and high). Include a description of the habitat type, epifauna and epiflora. Describe the presence or absence of fecal mounds, worm and clam holes, worm tubes, amphipod burrows and other signs of life. In rocky areas, sample tide pools, crevices and under piles of rocks and vegetation.

2. Describe the benthic habitat, infauna and inflora. Does the habitat appear undegraded (e.g. high species diversity, many functional groups, diatom mats, high abundance) or degraded (e.g. high numbers of Capitellids, low species richness, loss of phyla or functional groups, bacterial mats)? Provide likely reasons for a degraded environment.

The low intertidal zone has the greatest water content and soupy grey mud. A thin layer of annual eelgrass covers the zone. The blades of the eelgrass are approximately eight inches or less in length. The blades and plants are narrower, less dense, and shorter than perennial eelgrass blades and beds. A few mud whelks are distributed across the flat. Common periwinkles are the most abundant epifauna, covering the eelgrass blades and mud flat. Small soft-shell clams and Baltic clams are the dominant infauna. Clam holes are noticeably distributed throughout the zone. Bloodworms and sandworms are also easily uncovered below the surface but are less abundant than clams.

The mid-intertidal zone has a similar assemblage of plants and invertebrates as the low intertidal zone. Mud flat sediments contain a lower water content then the low intertidal zone. Soft-shell clams and Baltic clams are the dominant infauna. A salt water channel flows through this zone and is lined by numerous large and small clam holes. Annual eelgrass covers the zone in light patches. Common periwinkles are the most common epifauna on the eelgrass and mud. Sandworms and bloodworms were commonly detected when sediments were overturned. Ledge and boulder habitats adjacent to the flats contain a think covering of *Ascophyllum nodusum and Fucus sp.* Amphipods, common periwinkles and smooth periwinkles are commonly detected underneath and within the algal mats.

The high intertidal is dominated by mud flat and salt marsh. The mud has less water content than the low intertidal mud. The salt marsh contains a few patches of blue mussels, common periwinkles and wrack. The wrack is composed of decomposing eelgrass blades, knotted wrack, and rockweed. Small numbers of beach fleas are found under the wrack. Scattered amounts of rough periwinkles are found on the bare ledge. The high intertidal mud contains a thick mixture of shell hash within the fine mud. A thick patch of *Enteromorpha intestinalis* (green filamentous algae) mixed with eelgrass lies to the southeast below the fringing salt marsh. Hundreds of clam holes line the narrow salt water channel. Common periwinkles are scattered throughout the zone but are not super abundant. A few single eelgrass plants are scattered in the upper reaches of the cove. Soft-shell clams and Baltic clams are the dominant fauna.

Description of Additional Wildlife and Other Functions and Values:

1. Describe any additional birds, fish or mammals seen at the site or known to use the area at any time of the year for nesting, over-wintering, feeding, roosting, staging, breeding, spawning or any other activities.

2. Address any other functions and values. Use the DEP Functions and Values questions as a guide.

During high tide all zones, especially the salt marsh, are habitat for mummichogs, three-spined sticklebacks, Atlantic silversides and sandshrimp. A greater diversity of fish probably exist but were undetected at this time.

Greater yellowlegs, semipalmated sandpipers, semipalmated plovers, ring-billed gulls, and herring and black-backed gulls were observed feeding in the exposed portions of the flat.

This region is known to be a feeding area for migrating shorebirds but, do to the small size of the cove and the close proximity of the freshwater wetland and potential predators, it is not believed to be a preferable shorebird habitat. The greater river system north of the site is known to be extensively used by thousands of migrating shorebirds.

It is not known to be a roosting area for shorebirds.

The area is also known as a MDIFW moderate value habitat for waterfowl. Interviews with long-time residents, hunters, and clammers report that the cove is not used frequently by waterfowl and, therefore, is an unproductive hunting area. This may be because the area lacks a persistent freshwater source. Buffleheads, common goldeneye, common eider, red-breasted merganser, oldsquaw, black ducks, and green-winged teals are known to use the sight at different seasons throughout the year.

Great blue herons are uncommonly spotted at this location.

Bald eagles and peregrine falcons hunt in the cove but the area is not considered an essential habitat for endangered species.

No marine mammals, terrestrial mammals or tracks were seen in the field during the site visits. However, some terrestrial mammals like raccoons may use the site for foraging.

Species List from Qualitative Field Survey:

Create a species list for the entire survey site. List epifauna and flora followed by infauna. Attach additional sheets if necessary:

Common Name	Scientific Name	Relative Abundance Absent, Scattered, Common or Abundant	General Location or Intertidal Zone
Eelgrass	Zostera marina	Abundant	High, Mid and Low
Green algae	Enteromorpha intestinalis	Scattered	High
Knotted wrack	Ascophyllum nodosum	Abundant	Mid and High
Rockweed	Fucus sp.	Abundant	Mid and High
Amphipods	Gammaridae	Scattered	Mid and High
Baltic clams	Macoma balthica	Abundant	High, Mid and Low
Beach fleas	Talitridae	Scattered	High
Blue mussels	Mytilus edulis	Scattered	High
Mud whelk	Nassarius obsoletus	Scattered	Low
Periwinkles, common	Littorina littoria	Abundant	High, Mid and Low
Periwinkles, rough	Littorina saxatilis	Scattered	High
Periwinkles, smooth	Littorina obtusata	Common	Mid
Sand shrimp	Crangon septemspinosa	Abundant	Low
Blood worms	Glycera dibranchiata	Common	Mid and Low
Sand worms	Nereis virens	Common	Mid and Low
Soft-shell clam	Mya arenaria	Abundant	High, Mid and Low
Atlantic silversides	Menidia menidia	Scattered	High tide
Mummichog	Fundulus heteroclitus	Common	High tide
Three spined sticklebacks	Gasterosteus aculeatus	Scattered	High tide

Historical Information:

In general, what industrial, recreational, private or commercial activities have occurred at the site over the past 150 years? How long ago was the disturbance? The local municipalities may have pertinent information on the past and current uses of the region as well as land trusts, ME Coast Heritage Trust and stewardship organizations.

No commercial activity besides occasional clamming and worming has ever occurred at this site. The area has been used recreationally, on occasion, by the family and long-time residence.

Impact Assessment:

Discuss how the proposed activity will or will not affect the functions (e.g. physical, chemical, geological, biological) and values (e.g. commercial, recreational, educational) of the site. Use the DEP Planning Considerations as a guide.

The area of fill for the dike and landings will be a loss of functions and values (8,045 ft^2).

The impoundment may have direct affects on the functions and values of the site. The impoundment will change an intertidal habitat to a subtidal environment. Rockweed living under the impounded water may die due to lack of light from turbid waters and sediment resuspension, and scouring by lobsters. This may lead the loss of intertidal species associated with the rockweed.

The impoundment should not affect tidal flushing to the salt marsh and high intertidal habitats but it may prevent flushing of the impoundment. Reduction of tidal flows, currents and mixing may decrease sediment input and sediment movement. Sandshrimp, that stir up sediments, may be restricted from entering the impoundment. Sediments may be stirred up and released into the water column by lobsters. This may lead to the hardening of the sediments and the loss of fine surface sediments. This scouring combined with predation by lobsters may also lead to the loss of benthic species such as bamboo and thread worms.

If the salt marsh receives proper tidal flushing, sediment input from tidal waters, is not eroded by the activity or lobsters escaping the impoundment and remains several feet from the impoundment, then there should be no loss of functions and values within the salt marsh.

The eelgrass and its associated community (see Eelgrass section Vol. I) may die-off. The eelgrass may die due to lack of light penetration from turbid conditions and greater water depths, deposition of sediments and food, and scouring by lobsters. Additions of lobster waste and food may increase nutrients causing a bloom of epiphytes, plankton or bacteria that will also shade and smother plants. Without the canopy structure and food resources from the plants, the fauna associated with the eelgrass may die.

The export of nutrient rich waters may negatively affect fauna off-site.

Foraging by subtidal species like sand shrimp and fish that move inland during high tide may be restricted. However, due to the small size of the cove in relation to the size of the river, this restriction may be negligible.

Foraging by migrating shorebirds may be affected even if the pound is opened and drained between April and November. The increase in human activity and the decrease in access to the cove may deter shorebird and waterfowl stop-overs. In addition, if benthic worm communities are damaged then no prey will be available for foraging birds. A decrease in eelgrass and its associated fauna may deter waterfowl, shorebirds and herons from foraging on the flat.

Gulls will probably be attracted to the site, which may increase prey for peregrine falcons and bald eagles.

New additions of hard substrates into the marine environment for the dike may add attachment sites for animals. Populations of mussels, barnacles and rockweed may colonize the rock. However, when the pound is drained in the spring and summer, the new populations may die due to reductions in feeding time, desiccation, and over-heating.

If the property owner opens the area to the public, the recreational values of the area may increase due to the development of the access road. Bird watchers may be able to easily access and view terrestrial and marine birds.

Minimizing Environmental Impacts:

Describe steps taken to minimize environmental impacts by altering design plans and/or reducing construction activity or movement. Consider removing critical habitats or structure (e.g. boulders or rocks from a proposed boat ramp location) to enhance adjacent sites with the same sediment type.

1. The dike will be designed as narrow and as short as possible. The fencing will extend above the dike to retain lobsters but allow maximum tidal flows.
2. All activity will be at least 25 feet from the salt marsh. A fence will be built along the impoundment to keep lobsters from damaging the salt marsh .
3. To reduce impacts to recreational and commercial fisheries, the pound will be open for clamming before the area will be impounded and during drawn-down periods.
4. To reduce impacts to the community of infauna, no dredging or dragging will occur in the cove. Lobsters will be hand picked only.
5. Only a limited number of lobsters will be allow in the impoundment to prevent overcrowding, changes in water quality and additional habitat destruction.
6. The amount of feed added to the impoundment will be minimized to prevent oiling of the surface waters and build-up of decaying organic matter.
7. Dissolved oxygen and bacteria monitoring will be voluntarily conducted to insure water quality.
8. The impoundment will be open for normal tidal flushing when not in use (April - November).
9. Monitoring of the epifauna, infauna, changes in sediment compaction and sediment type, and surrounding habitats will be conducted annually after impoundment for 5 years.

Defend Unreasonable Impact

Write statements explaining the reason why you believe this activity should meet Natural Resources Protection Act (NRPA 38 M.R.S.A 480-A-480-Z Statute) Standards 480-D and Wetland Protection Rules (Chapter 310). Explain measures that are incorporated into the project design or compensation plan that support this claim.

As long as the suggestions to minimize environmental impacts are adopted and the area of fill for the dike and landing and the area of the impoundment are fully compensated for, it will meet NRPA Standards for no net loss of functions and values of coastal wetlands.

Restoration Sites (if applicable):

List potential restoration sites and detailed information (e.g. size, location, habitat types, current condition, why the need to be restored and why would it make a good candidate) on each potential site. Attach additional information if necessary.

Listed below are a few restoration possibilities. The restoration site should be at least 16,000 ft^2 to compensate for the permanent losses of intertidal habitat.

1. Restoration of a restricted salt marsh involving the removal of an old farm road in Addison, ME.
2. Site stabilization, soil removal and clean-up of the marshes and flats around Gas Works in Portland, ME.
3. Removal of sawdust and woodchip accumulations from historic logging practices in the Penobscot River near Bucksport and in Machiasport.
4. Clean up of CSO's and opening of Sandy Beach in Rockland, ME.
5. Restoration of salt marsh in Scarborough Marsh previously ditched for mosquito control.

Problems and Comments:

Dense Presumscot marine clay lies about 4 inches below the surface in the mid and upper intertidal. Many samples contained this clay making it difficult to sort and inhospitable to some animals.

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 1 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Macoma balthica	1	16	16	80	80	Deposit-feeder
Scoloplos sp.	2	2	18	10	90	Deposit-feeder
Glycera dibranchiata	3	1	19	5	95	Deposit-feeder
Oligochaete	4	1	20	5	100	Omnivore

Number of Species	4
Number of Individuals	20
Individuals per m^2	2546

** Cores = 7.853×10^{-3} m^2

Core # 2 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Macoma balthica	1	55	55	77	77	Deposit-feeder
Heteromastus filiformis	2	6	61	8	86	Deposit-feeder
Oligochaete	3	4	65	6	92	Omnivore
Scoloplos sp.	4	3	68	4	96	Deposit-feeder
Eteone longa	5	2	70	3	99	Carnivore
Mya arenaria	6	1	71	1	100	Suspension-feeder

Number of Species	6
Number of Individuals	71
Individuals per m^2	9040

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 3 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Macoma balthica	1	28	28	55	55	Deposit-feeder
Oligochaete	2	17	45	33	88	Omnivore
Littorina saxatilis	3	4	49	8	96	Grazer
Glycera dibranchiata	4	1	50	2	98	Deposit-feeder
Scoloplos sp.	5	1	51	2	100	Deposit-feeder

Number of Species	5
Number of Individuals	51
Individuals per m^2	6494

** Cores = 7.853×10^{-3} m^2

Core # 4 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Oligochaete	1	24	24	42	42	Omnivore
Macoma balthica	2	22	46	39	81	Deposit-feeder
Heteromastus filiformis	3	6	52	11	91	Deposit-feeder
Scoloplos sp.	4	3	55	5	96	Deposit-feeder
Mya arenaria	5	1	56	2	98	Suspension-feeder
Littorina saxatilis	6	1	57	2	100	Grazer

Number of Species	6
Number of Individuals	57
Individuals per m^2	7257

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 5 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Oligochaete	1	163	163	59	59	Omnivore
Hydrobia sp.	2	59	222	21	80	Deposit-feeder
Macoma balthica	3	26	248	9	90	Deposit-feeder
Heteromastus filiformis	4	12	260	4	94	Deposit-feeder
Scoloplos sp.	5	7	267	3	97	Deposit-feeder
Eteone longa	6	7	274	3	99	Carnivore
Littorina saxatilis	7	3	277	1	100	Grazer

Number of Species	7
Number of Individuals	277
Individuals per m^2	35269

** Cores = 7.853×10^{-3} m^2

Core # 6 Intertidal Zone Sampled: High
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Macoma balthica	1	12	12	35	35	Deposit-feeder
Oligochaete	2	8	20	24	59	Omnivore
Scoloplos sp.	3	7	27	21	79	Deposit-feeder
Heteromastus filiformis	4	4	31	12	91	Deposit-feeder
Eteone longa	5	3	34	9	100	Carnivore

Number of Species	5
Number of Individuals	34
Individuals per m^2	4329

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 7 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Oligochaete	1	147	147	51	51	Omnivore
Hydrobia sp.	2	55	202	19	70	Deposit-feeder
Macoma balthica	3	31	233	11	81	Deposit-feeder
Heteromastus filiformis	4	22	255	8	88	Deposit-feeder
Eteone longa	5	12	267	4	92	Carnivore
Streblospio benedicti	6	7	274	2	95	Deposit-feeder
Scoloplos sp.	7	6	280	2	97	Deposit-feeder
Mya arenaria	8	4	284	1	98	Suspension-feeder
Littorina obtusata	9	2	286	1	99	Grazer
Littorina saxatilis	10	2	288	1	100	Grazer
Polydora sp.	11	1	289	0.3	100	Deposit-feeder

Number of Species	11
Number of Individuals	289
Individuals per m^2	36797

** Cores = 7.853×10^{-3} m^2

Core # 8 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	any to count				Deposit-feeder
Macoma balthica	2	167	167	77	77	Deposit-feeder
Oligochaete	3	17	184	8	85	Omnivore
Littorina saxatilis	4	15	199	7	92	Grazer
Heteromastus filiformis	5	6	205	3	94	Deposit-feeder
Scoloplos sp.	6	4	209	2	96	Deposit-feeder
Mya arenaria	7	3	212	1	98	Suspension-feeder
Littorina obtusata	8	3	215	1	99	Grazer
Eteone longa	9	2	217	1	100	Carnivore

Number of Species	9
Number of Individuals	217
Individuals per m^2	27629

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 9 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	61	61	50	50	Deposit-feeder
Littorina obtusata	3	44	105	36	86	Grazer
Mya arenaria	4	10	115	8	94	Suspension-feeder
Littorina saxatilis	5	2	117	2	96	Grazer
Nereis virens	6	2	119	2	98	Omnivore
Gammarid sp.	7	1	120	1	98	Omnivore
Scoloplos sp.	8	1	121	1	99	Deposit-feeder
Eteone longa	9	1	122	1	100	Carnivore

Number of Species	9
Number of Individuals	122
Individuals per m^2	15534

* 3 gammarid tails in sample
** Cores = 7.853 x 10^{-3} m^2

Core # 10 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	30	30	56	56	Deposit-feeder
Heteromastus filiformis	3	14	44	26	81	Deposit-feeder
Scoloplos sp.	4	4	48	7	89	Deposit-feeder
Eteone longa	5	2	50	4	93	Carnivore
Crangon septemspinosa	6	1	51	2	94	Carnivore
Gammarid sp.	7	1	52	2	96	Omnivore
Oligochaete	8	1	53	2	98	Omnivore
Streblospio benedicti	9	1	54	2	100	Deposit-feeder

Number of Species	9
Number of Individuals	54
Individuals per m^2	6875

* One Crangon tail in sample
** Cores = 7.853 x 10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 11 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	68	68	42	42	Deposit-feeder
Heteromastus filiformis	3	26	94	16	58	Deposit-feeder
Scoloplos sp.	4	26	120	16	74	Deposit-feeder
Eteone longa	5	16	136	10	84	Carnivore
Polydora sp.	6	11	147	7	91	Deposit-feeder
Streblospio benedicti	7	7	154	4	95	Deposit-feeder
Crangon septemspinosa	8	3	157	2	97	Carnivore
Oligochaete	9	3	160	2	99	Omnivore
Nereis virens	10	2	162	1	100	Omnivore

Number of Species	10
Number of Individuals	162
Individuals per m^2	20626

* 3 Crangon tails in sample
** Cores = 7.853×10^{-3} m^2

Core # 12 Intertidal Zone Sampled: Mid
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	49	49	43	43	Deposit-feeder
Littorina obtusata	3	22	71	19	63	Grazer
Oligochaete	4	18	89	16	79	Omnivore
Littorina saxatilis	5	9	98	8	87	Grazer
Mya arenaria	6	8	106	7	94	Suspension-feeder
Nereis virens	7	3	109	3	96	Omnivore
Eteone longa	8	3	112	3	99	Carnivore
Scoloplos sp.	9	1	113	1	100	Deposit-feeder

Number of Species	9
Number of Individuals	113
Individuals per m^2	14388

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 13 Intertidal Zone Sampled: Low
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	52	52	42	42	Deposit-feeder
Heteromastus filiformis	3	39	91	32	74	Deposit-feeder
Oligochaete	4	17	108	14	88	Omnivore
Scoloplos sp.	5	4	112	3	91	Deposit-feeder
Nereis virens	6	3	115	2	93	Omnivore
Eteone longa	7	3	118	2	96	Carnivore
Littorina saxatilis	8	2	120	2	98	Grazer
Glycera dibranchiata	9	2	122	2	99	Deposit-feeder
Littorina obtusata	10	1	123	1	100	Grazer

Number of Species	10
Number of Individuals	123
Individuals per m^2	15661

* 4 Crangon tails in sample
** Cores = 7.853×10^{-3} m^2

Core # 14 Intertidal Zone Sampled: Low
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	70	70	64	64	Deposit-feeder
Heteromastus filiformis	3	18	88	16	80	Deposit-feeder
Scoloplos sp.	4	12	100	11	91	Deposit-feeder
Eteone longa	5	7	107	6	97	Carnivore
Oligochaete	6	3	110	3	100	Omnivore

Number of Species	6
Number of Individuals	110
Individuals per m^2	14006

** Cores = 7.853×10^{-3} m^2

Project Name: Example #2 Benthic Survey
Site Location: Jones Property
Date Collected: Sept 8, 1998
Core # 15 Intertidal Zone Sampled: Low
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Hydrobia sp.	1	too many to count				Deposit-feeder
Macoma balthica	2	40	40	68	68	Deposit-feeder
Oligochaete	3	4	44	7	75	Omnivore
Scoloplos sp.	4	4	48	7	81	Deposit-feeder
Heteromastus filiformis	5	3	51	5	86	Deposit-feeder
Nereis virens	6	2	53	3	90	Omnivore
Glycera dibranchiata	7	2	55	3	93	Deposit-feeder
Eteone longa	8	2	57	3	97	Carnivore
Clymenella torquata	9	2	59	3	100	Deposit-feeder

Number of Species	9
Number of Individuals	59
Individuals per m^2	7512

** Cores = 7.853×10^{-3} m^2

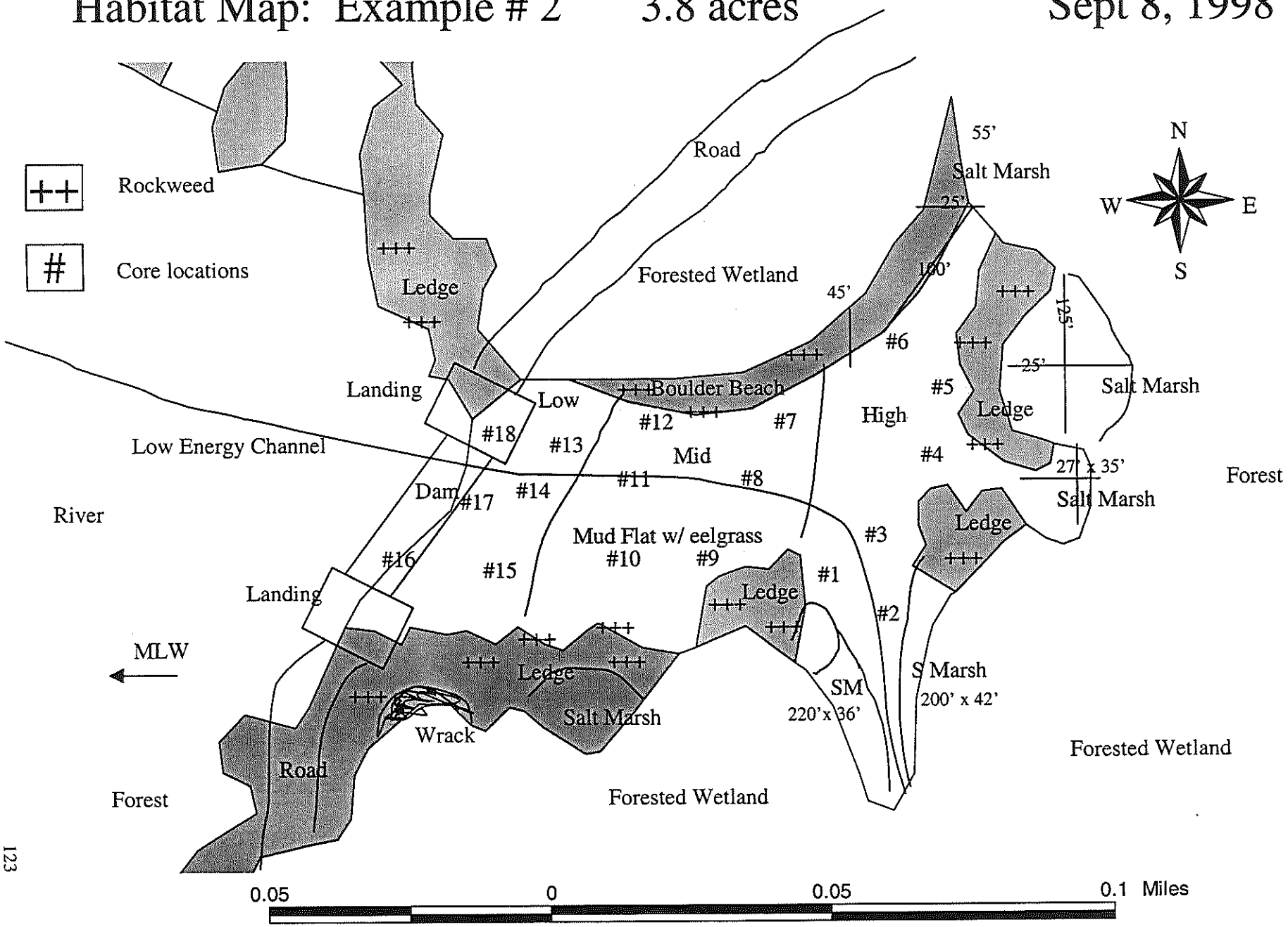
Core # 17 Intertidal Zone Sampled: Low
Habitat / Sediment Type: mud

Species	Rank	Number	Cumulative Number	Percent	Cumulative Percent	Functional Group
Macoma balthica	1	113	113	40	40	Deposit-feeder
Hydrobia sp.	2	84	197	30	70	Deposit-feeder
Heteromastus filiformis	3	47	244	17	87	Deposit-feeder
Nereis virens	4	12	256	4	91	Omnivore
Scoloplos sp.	5	12	268	4	95	Deposit-feeder
Eteone longa	6	10	278	4	99	Carnivore
Oligochaete	7	3	281	1	100	Omnivore

Number of Species	10
Number of Individuals	281
Individuals per m^2	35778

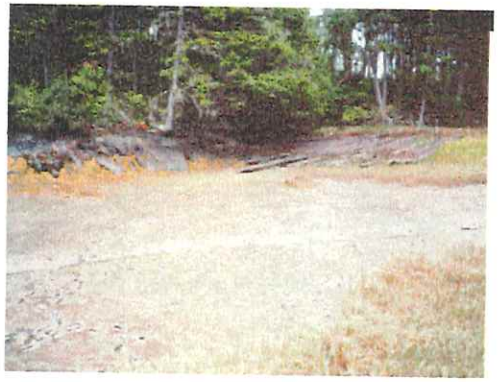
* 2 Crangon tails in sample
** Cores = 7.853×10^{-3} m^2

Habitat Map: Example # 2 3.8 acres Sept 8, 1998



Jones Lobster Pound, Jonesboro, -1.6 tides, 6:00 pm, September 8, 1998

High intertidal mudflat, rockweed covered ledge; east



High intertidal mudflat & saltmarsh; southeast

Salt marsh & low energy channel in mudflat; south

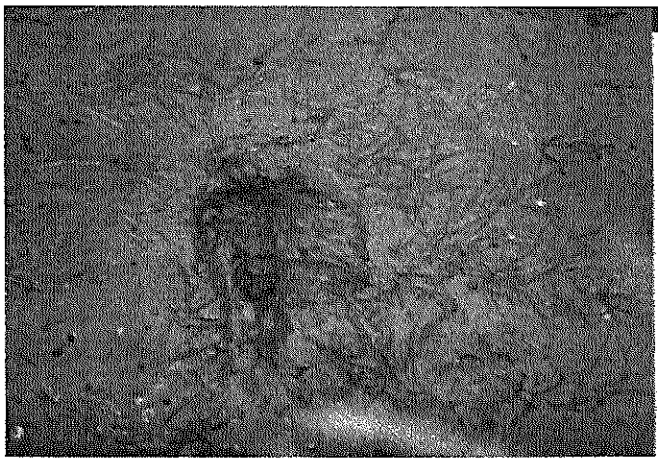
Opening to Pleasant River. Low intertidal mudflat. Rockweed & ledge. Northwest.

Mid-intertidal mudflat, rockweed covered ledge and boulders. North.

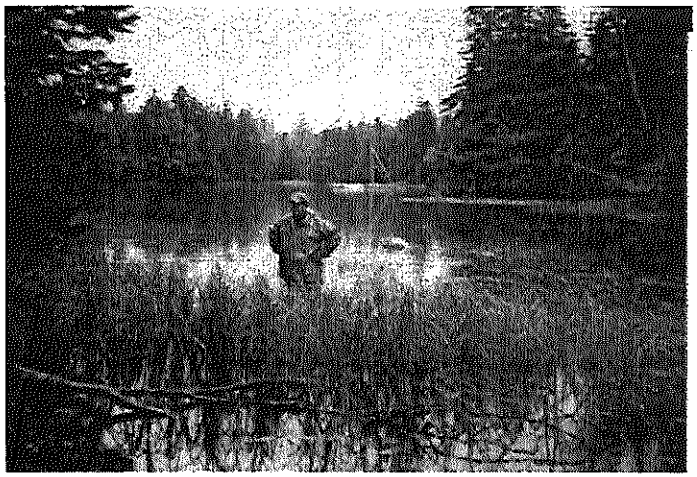
High-mid intertidal mudflat rockweed covered boulders and ledge; north. Saltmarsh in northeast cover.

Jones Lobster Pound, Jonesboro, -1.6 tides, 6:00 pm, September 8, 1998

Salt marsh, rockweed and ledge. South west.



Annual eelgrass cover over 80 % of mud flat.
Soft fine soupy sediments cover entire flat.



High Tide. 1:00 pm
Southern corner of the mudflat and salt marsh during high tides.

Habitat for mummichogs, sandshrimp, Atlantic silversides and other fish.

GLOSSARY

Amphipods: small shrimp-like crustaceans that live within the wrack, algae and on the sediments in all intertidal zones. Amphipods feed on detritus and algae.

Beach hoppers: small amphipods that live in high intertidal wrack.

Benthic species: animals or plants that live on or in the bottom sediments.

Biogeography: the science concerned with the geographical distribution of animal and plant life.

Bryozoans: sessile, colonial animals that form stalks or encrustations over rocks. They feed by capturing tiny particles of plankton or detritus from the water column.

Chiton: a single shelled mollusk in the Class Polyplacophora that attaches to hard substrates with a muscular foot. Chitons are grazers consuming algae and diatom films.

Coastal wetlands: All tidal and sub-tidal areas, including all vegetated areas tolerant of saltwater, and all swamps, marshes, bogs or beaches subject to tidal action.

Deposit feeders: animals that engulf and ingest large amounts of fine sediments.

Detritus: dead organic plant, algae and animal matter.

Ebb tide: the portion of the tide cycle between high water and the following low water. Also known as falling tide.

Echinoderm: marine spiny-skinned invertebrates in the Phylum Echinodermata that include sea urchins, sea cucumbers, sea stars, sand dollars and brittle stars.

Epibenthic species: animals or plants that live on the sediments.

Epiphyte: plant or algae living on another plant, algae, animal or substrate.

Epifauna: animal living on a plant, algae, animal or substrate.

Eutrophication: the process of becoming better nourished either naturally by processes of maturation or artificially by fertilization. Eutrophication often leads to algal blooms and/or alterations of natural marine communities.

Fecal mounds: coils of sediment deposited by deposit feeders on the surface of soft sediments.

Fetch: the distance waves travel across the ocean without obstruction by land.

Filter feeders: animals that filter large quantities of water and extract food particles.

Flood tide: That period between low water and the next high water. Also known as an incoming tide.

Footprint: the area of direct disturbance.

Fringing salt marsh: a narrow band or patch of salt marsh in the high intertidal.

Functions: biological, chemical, geological, or chemical properties within a self-sustaining marine environment (e.g. fish and wildlife habitat, sediment trap).

Functional group: a specific feeding type including predators, scavengers, deposit feeders, filter feeders, suspension feeders, and grazers.

Grazer: an animal that grazes on diatoms, algae, plants, and bacteria.

Habitat: a place where plants and animals live, breed, take shelter, and forage.

Habitat dependent species: species that are dependent on only one or a few types of habitats for reproductive success. They can not adapt to all habitat types. For example, some small crustaceans can only live in the low intertidal zone on high energy sand beaches.

Infauna: animals that live in the sediments (e.g. clams, worms).

Inflora: algae that live in the sediments (e.g. diatoms).

Intertidal zone: the part of the littoral zone above low-tide mark that displays a gradient of biological communities from low to high water.

Mean low water line: the mean of the low water heights observed over a specific 19 year cycle (National Tidal Datum Epoch) as defined by NOAA.

Nursery ground: a region where larvae or juveniles settle, seek shelter, feed and mature.

Opportunistic species: animals that can adapt to environmental changes and stresses and flourish.

Roosting area: an area where shorebirds sleep and preen during high tide. These protected sites are critical for shorebirds to maintain fat reserves, lower stress and reduce predation.

Sand fleas: small amphipods that live in high intertidal wrack on sand beaches and flats.

Scavenger: an animal that scavenges for and consumes, with little discrimination, live and dead algae and animals (e.g. lobster, sea gull).

Seabirds: birds that spend a majority of their lives living and feeding at sea or along the sea coast. Seabirds include cormorants, gulls, terns, fulmars, puffins, shearwaters, storm petrels, murres, and albatross.

Sediment sink: a region that stores sediments.

Sensitivity: animal and plant communities that are susceptible to small amounts of change within their environments.

Shelter: refuge for animals from predation, desiccation, wave and current action, sun light and other environmental stresses.

Shorebird: any sandpiper, plover, turnstone, godwit, curlew, dowitcher, and phalarope in the Order Charadriiformes.

Spring tide: tide of increased range which occurs about every 2 weeks when the moon is new or full.

Suspension feeders: invertebrates, fish or mammals that capture or strain small particles of food from the water column.

Staging area: an area where migrating shorebirds forage, increase weight, and rest for up to two to three weeks before embarking on their transatlantic migration.

Storm surge: the rise of salt water onshore above the normal water level on the open coast due only to the action of wind stress on the water surface.

Stormwater runoff: runoff from land caused by rain or melting snow.

Subtidal: area seaward of the lowest extent of the intertidal zone.

Value: a benefit or result of one or more biological, physical, chemical and/or geological functions that are of high importance to society (e.g. commercial fisheries, water quality) and/or are essential for maintenance of the ecological health of an environment (e.g. recycling of nutrients by bacteria results in the release of new sources of nutrients for plant growth).

Wading birds: Long legged birds that feed by wading and catching their prey in shallow water. Wading birds include herons, egrets, bitterns and ibises.

Waterfowl: birds that breed in fresh water, winter along the coast and forage by diving or dabbling in fresh , estuarine and marine waters. Waterfowl include geese, loons, grebes, bufflehead, goldeneyes and eider ducks.

Wintering habitat: resting, foraging, and roosting areas for birds in the wintertime.

Wrack: dead decaying plant, algal and animal matter deposited on high intertidal portions of the beach by wave and tidal action. Wrack deposits contain live populations of sand fleas and bacteria.

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APPENDICES

Appendix A

Sorting and Preservation Techniques

Soft Bottom Benthic Samples:

1. Remove core from sediment.
2. Place all sediment in a ziplock bag and store in a cool dark place until processing.
3. Process as soon as possible after collection.
4. Sieve all samples though a 1.0 mm mesh screen. In order not to lose or damage organisms, sieve samples in the lab under a low pressure water faucet.
5. Preserve all samples in 10 % formalin then transfer to 70 % ethanol after 24 hours.
6. Stain with a tiny amount of Rose Bengal.
7. Sort, identify and enumerate all animals to the lowest possible taxonomic level.

Appendix B

NOAA Benthic Lobster Pound Monitoring Survey

A draft protocol for monitoring invertebrate populations inside and outside the impoundment area is currently being established by the National Marine Fisheries Service. It should be completed by the fall of 1999.

The protocols used in the past by NMFS were designed on a case by case basis and usually consisted of the following requirements:

- 3- 4 parallel transects across the impoundment
- 0.25 m^2 quadrats placed every 100 ft along the transect line
- All sediment within the quadrat removed to a depth of 1 ft
- All sediment sieved through a 1.0 mm sieve
- All live fauna identified to species and enumerated
- All shellfish were measured and tallied by size category

Appendix C

Maine DEP Water Classification Program (July 1994, Title 38, Article 4-A):

Classifications for coastal waters in Maine can be found in the DEP GIS server:
e:\spatial\covs\current\lawb\seaclass

Class SA Waters: Class SA shall be the highest classification and shall be applied to waters which are outstanding natural resources and which should be preserved because of their ecological, social, scenic, economic or recreational importance.

A. Class SA waters shall be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish and navigation and as habitat for fish and other estuarine and marine life. The habitat shall be characterized as free-flowing and natural.

B. The estuarine and marine life, dissolved oxygen and bacteria content of Class SA waters shall be as naturally occurs.

C. There shall be no direct discharge of pollutants to Class SA waters.

Class SB Waters:

A. Class SB waters shall be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other estuarine and marine life. The habitat shall be characterized as unimpaired.

B. The dissolved oxygen content of the Class SB waters shall be not less than 85% of saturation. Between May 15th and September 30th, the numbers of Enterococcus bacteria of human origin in these waters may not exceed a geometric mean of 8 per 100 milliliters or an instantaneous level of 54 per 100 milliliters. The numbers of total coliform bacteria or other specified indicator organisms in samples representative of the waters in shellfish harvesting areas may not exceed the criteria recommended under the National Shellfish Sanitation Program Manual of Operations, Part I, Sanitation of Shellfish Growing Areas, United State Department of Food and Drug Administration.

C. Discharges to Class SB waters shall not cause adverse impact to estuarine and marine life in that the receiving waters shall be of sufficient quality to support all estuarine and marine species indigenous to the receiving water without detrimental changes in the resident biological community. There shall be no new discharge to Class SB waters which would cause closure of open shellfish areas by the Dept. of Marine Resources.

Class SC Waters: Class SC waters shall be the 3rd highest classification.

A. Class SC waters shall be of such quality that they are suitable for recreation in and on the water, fishing, aquaculture, propagation and restricted harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other estuarine and marine life.

B. The dissolved oxygen content of the Class SC waters shall be not less than 70 % of saturation. Between May 15th and September 30th, the numbers of Enterococcus bacteria of human origin in these waters may not exceed a geometric mean of 14 per 100 milliliters or an instantaneous level of 94 per 100 milliliters. The numbers of total coliform bacteria or other specified indicator organisms in samples representative of the waters in restricted shellfish harvesting areas may not exceed the criteria recommended under the National Shellfish Sanitation Program Manual of Operations, Part I, Sanitation of Shellfish Growing Areas, United State Department of Food and Drug Administration.

C. Discharges to Class SC waters may cause some changes to estuarine and marine life provided that the receiving waters are of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.