DEP Habitat Ranking

***Objective**:*

The habitat ranking was developed to rank marine habitats with justification from high to low sensitivity to disturbance and development activity. These rankings should be used to discourage activity in habitats with a higher ranking and alternatively, redirect activity to habitats with a lower ranking. Activities taking place in habitats with a high and moderate ranking should receive a greater level of scrutiny in the permitting process. It may also be used to justify compensation for the loss of functions and values from permitted activity.

Background:

The following table ranks marine habitats according to ecological and commercial functions and values as well as the habitat's sensitivity to perturbations. The rankings were determined by marine biologists in the Division of Environmental Assessment. The ranking are based on scientific research and our knowledge of intertidal and shallow subtidal marine environments.

Habitats are ranked as having a low, moderate or high ranking based on the number of important ecological attributes (see listing below). In general, the more attributes or functions maintained by the habitat the greater the ranking. Moderate and high ranking habitats are habitats that we consider ecologically and economically valuable regions that are more likely to be negatively impacted by development than other resilient marine habitats. Some attributes, like nutrient recycling, could be applied to all habitats in some degree. However, only habitats that have a significant role in nutrient recycling are listed. In addition, these rankings are based on the general understanding of functions and values of marine habitats. Upon field examination of specific sites, researchers may find that some habitats have fewer or greater number of attributes.

Some habitats have different rankings based on their exposure to air, freshwater and wave energy. <u>As a general rule, low intertidal zones, regions that receive less tidal exposure, have a greater number of attributes and, therefore, are more sensitive to disturbance</u>. Dry high intertidal areas are inhospitable regions that are exposed to temperature fluctuations, desiccation, solar radiation, weathering and freshwater. Therefore, they support species that are widely distributed, adaptive to environmental changes, and less sensitive to disturbance.

DEP habitat rankings are based on habitats with one or more of the following attributes:

A. Nursery ground for commercial species
B. Primary production / oxygen production
C. High diversity
D. High primary and secondary production
E. Shelter
F. Structure for attachment of settling larvae
G. Food resources for one or more functional groups
H. Variety of functional groups represented
I. Sediment and nutrient sink and/or source
J. Nutrient recycling
K. Production and export of detritus
L. Habitat dependent species
M. Rare or endangered animals
N. Rare or endangered plants
O. Foraging areas for shorebirds and/or wading birds
P. Shorebird roosting and/or staging areas
Q. Supports terrestrial birds
R. Supports terrestrial mammals
S. Reduces coastal erosion
T. Supports commercial fisheries
U. Supports lobster fishery
V. Supports tourism industry
W. Geographically isolated and rare populations of species
X. Haul out and pupping sites for gray and harbor seals
Y. Foraging areas for waterfowl and/or seabirds
Z. Nesting habitat for endangered birds (e.g. piping plover, least tern)
AA. Supports anadromous fish

HABITAT	LOCATION	DEP HABITAT RANKING	JUSTIFICATION
Artificial Substrates:			
Artificial or engineered structures	High to Low intertidal	Low	f, g variable depending on structure/materials
Artificial man-made sediments (e.g. woodchips)	High to Low intertidal	Low	Low quality habitat Variable
Degraded areas / previously impacted	High to Low intertidal	Low	Variable
Boulder Beaches:			
Boulder beaches with algae	Low intertidal	High	a,b,c,d,e,f,g,h,j,k,l,o,s,t,u,y
Boulder beaches with algae	Mid intertidal	Moderate	b,e,f,g,h,j,k,s,y
Boulder beaches (no algae)	High intertidal	Low	g
Ledge:			
Ledge with attached algae (or potential for algae - i.e. site has been grazed bare by urchins)	Low intertidal	High	a,b,c,d,e,f,g,h,j,k,l,o,s,t,x,y
Ledge (with algae)	Mid intertidal	Moderate	b,c,d,e,f,g,h,k,o,s,v,x,y
Ledge (no brown or red algae)	Mid - High intertidal	Low	f,g,n,o,p,q,v,x
Mixed Coarse and Fines:			
Mixed coarse and fines with algae	Low intertidal	High to Moderate	a,b,d,e,f,g,h,i,j,k,o,s,t,u
Mixed coarse and fines (no brown or red algae)	Mid and High intertidal	Low	g,p,f
Cobble beaches (no brown or red algae)	High to Low intertidal	Low	g,p
Gravel beaches (no brown or red algae)	High to Low intertidal	Low	g,p
Mud Flats:			
Mud flats	High to Low intertidal	High	a,b,c,d,e,f,g,h,i,j,l,o,p,t,w
Organic Habitats:			
American oyster bars	All	High	c,d,e,f,g,h,t,w
Mussel bars	Low intertidal	Moderate	a,d,e,f,g,s,t
Salt Marshes:			
Salt marshes	All	High	a,b,c,d,e,f,g,h,i,j,k,l,m,n,p,q,r,s,t,v,y,z,aa
Sand Beaches:			
Sand beaches	Low intertidal	High	d,g,i,l,m,o,t,v,y
Sand beaches	Mid and High	High to Moderate	g,i,j,l,m,n,o,p,q,v z(above high tide line)
Sand Flats:			
Sand flats	High to Low intertidal	High	a,b,c,d,e,f,g,h,i,j,l,o,p,t,w

Subtidal Habitats			
Ledge with attached algae (or potential for algae - i.e. site has been grazed bare by urchins)	Subtidal	High	a,b,c,d,e,f,g,h,j,k,l,s,t,u,y,aa
Mixed coarse	Subtidal	High	a,b,c,d,e,f,g,h,j,k,l,t,u,y,aa
Sublittoral zone	Shallow subtidal	High	a,b,c,d,e,f,g,h,i,j,l,r,t,u,w,y,aa
Unconsolidated sediments	Subtidal	High	a,b,c,d,e,f,g,h,i,j,l,r,t,u,y,aa
Vegetated Habitats:			
Eelgrass beds	All	High	a,b,c,d,e,f,g,h,i,j,k,l,o,s,t,w,y
Irish moss (Chrondrus sp)	All	High	a,b,c,d,e,f,g,h,j,k,l,o,s,t,u,y
Kelp beds	All	High	a,b,c,d,e,f,g,h,j,k,l,s,t,u,y,aa
Rockweed - on all habitats	Mid-low intertidal	Moderate	a,b,d,e,f,g,h,i,j,k,o,s,t

ANNUAL AND SEASONAL VARIABILITY

August 1999

March 1999

Photo #1. These two photos were taken at the same coastal location in the summer and the winter. The photo on the left shows a close up of the tall grasses of the fringing salt marsh in August. The photo on the right shows the fringing salt marsh after it has died back and been scoured by rafting ice. A majority of the functions and values of salt marsh are not apparent in the wintertime.

The marine environment, like terrestrial habitats, fluctuates annually and seasonally. Intertidal and shallow subtidal habitats are influenced by the atmosphere and the oceans. Variations in the physical properties of marine waters drive changes in the plant and animal community. For example, temperature and rainfall greatly influence interannual and seasonal variability. Warmer summer temperatures in the oceans favor species, like the green crab, that can tolerate warm temperatures, reproduce successfully and flourish. Conversely, warm temperatures kill boreal cold water species or cause them to move offshore seeking cooler waters in the summer. Heavy rainfall or flooding events can also destroy many intertidal invertebrates while favoring the growth of some forms of macroalgae and phytoplankton.

In the winter, freezing temperatures, lack of light, ice scour, lack of food and other physical and biological factors affect the intertidal environment. These factors cause a die off of plants and animals, a migration by mobile species to sheltered sites or other biological interactions. In low energy environments, ice buildup in the winter scours plants and removes epifauna and infauna on tidal flats (Whitlatch 1982). Depending on the severity of the winter, shallow surface sediments can freeze 5 cm to 10 cm below the surface (Whitlach 1982). The freezing of sediments can kill benthic species or force them to burrow below surface layers. Frozen sediments reduce access and foraging by birds (Whitlach 1982). Dense algal mats on tidal flats can form in the winter due to the reduced grazing pressures from herbivores (Whitlatch 1982). Many species, like the mudsnails, *Nassarius obsoletus*, over-winter subtidally to avoid low temperatures on intertidal flats (Whitlatch 1982). Adult lobsters also move offshore in the winter (Diane Cowan, personal communication). Some fish swim south to warmer waters. Abundance and diversity of marine life in the subtidal may be greater in the winter than the summer

due to offshore migrations of intertidal species and southward migrations of northern species seeking warmer waters off the coast of Maine (Les Watling, personal communication).

As the days lengthen and the temperatures warm in the spring and summer, species return to the intertidal environment to develop, breed and forage. Planktonic larvae, like barnacles, crabs and snails, settle out of the water column and colonize intertidal habitats between April and July. Mudsnails and other marine invertebrates that survived the winter return to the flats in the spring, feed and reproduce in the summer releasing their young into the height of the plankton bloom (Whitlatch 1982). Sand worms burrow out of the mud and spawn between March and June (Whitlatch 1982). Adult and larval fish are seasonal intertidal visitors, foraging during summer months on organisms living in intertidal flats and salt marsh (Whitlatch 1982). Adult lobsters return to low intertidal habitats in late spring and summer. The highest population density of juvenile and adult lobsters in low intertidal mixed coarse habitats is between May and November (Diane Cowan, personal communication).

Birds also have seasonal migrations and foraging and breeding behaviors. Shorebirds have a spring migration to the Canadian arctic breeding grounds and a fall migration to South American wintering grounds (MIF&W 1994). The fall migration is between July and November and the spring migration is between mid-April and early June (USF&W 1980). As many as 150,000 shorebirds, passing through Cobscook Bay in Downeast Maine, forage and roost on intertidal flats during the fall migration (MIF&W 1994). The spring shorebird migration brings fewer numbers of birds to Maine (MIF&W 1994). In Casco Bay and other places in Maine, large numbers of waterfowl such as eiders, old squaws and gulls, over-winter and feed on offshore islands in the winter. In the summer great black-backed gulls, terns, double-crested cormorants, herring gulls, and eiders nest and raise chicks on offshore islands and exposed ledges of Maine (USF&W 1980).

Management Considerations

Seasonal and interannual variability need to be considered while reviewing marine wetland assessments. Winter sampling will miss many species that live and breed on intertidal habitats in the summer thus underestimating the use of the habitat by flora and fauna. If ice scour doesn't affect the habitat, rockweed and other macroalgae may survive throughout the winter months but the fauna associated with the macroalgae will be minimal. Only species tolerant of freezing temperatures will be present in the intertidal in the wintertime.

- Field studies should be conducted between April and November before cool temperatures limit the availability of species.

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.

Boulders: stable rocks greater than 256 mm (10 ") but less than 3 m (~10 ft) in diameter that cannot be rolled by wave action.

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.

Cobble: unstable rocks less than 256 mm (10 ") but greater than 64 mm (2.5") that can be over turned by wave action.

Deposit feeders: animals that feed on the detritus that collects on the substrate at the bottom of the water column (e.g. bloodworms, sea cucumbers).

Desiccation: the drying out of intertidal plants and animals exposed to air, wind, and sun.

Detritus: dead organic plant, algae and animal matter mixed with live bacteria.

Diatoms: microscopic benthic or pelagic single celled algae from the class Bacillariophyceae.

Direct disturbance: the area of habitat that is directly impacted by development (e.g the footprint of the activity, area filled or dredge, area under pier).

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 bottom.

Epiphyte: plant or algae living on another plant, algae, animal or substrate.

Epifauna: animal living on a plant, algae, animal or substrate.

Epiflora: plants or algae 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.

Forage fish: small fish that are prey for fish, birds, and mammals (e.g. sand lance).

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).

Gravel: small pebbles between 2 mm (.04") and 64 mm (2.5") in diameter.

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.

Haul out: resting sites and pupping sites for marine mammals. Haulouts in Maine are typically ledge habitats on isolated portions of the mainland and offshore islands.

Holdfast: the "roots" of algae used to attach to hard substrates.

Indirect disturbance area: area of habitat that may be indirectly impacted by the proposed activity (e.g. area of potential impacts from docking and departing, shaded habitats, regions impacted by changes in sediment flow or currents).

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.

Inorganic nutrients: dissolved nutrients that do not contain carbon as a principle element (e.g. nitrate and phosphate) that are absorbed by algae and required for primary production.

Ledge: stable bedrock > 3 m (~10 ft) in diameter.

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.

Metamorphic rock: rock composed of altered layers of sand and mud.

Mixed coarse and fines: flats consisting of a mixture of rocks, boulders, gravel, sand, cobbles, and mud.

Mud: very fine particles of silt and clay less than .06 mm in diameter that are usually mixed with organic matter.

Non-point source pollution: pollution originating and discharging into the ocean from an indirect source such as stormwater run-off from parking lots.

Nudibranchs: mobile shell-less gastropods also known as sea slugs. Nudibranchs are predatory animals consuming sponges, tunicates, bryozoans or other small invertebrates.

Nursery ground: a region where larvae or juveniles settle, seek shelter, feed and mature.

Nutrient recycling: the bacterial driven conversion of detritus back into inorganic nutrients.

Organic sediments: intertidal or subtidal sediments containing large percentages of peat, sawdust, wood chips, leaf litter or other organic matter.

Opportunistic species: animals that can adapt to environmental changes and stresses and flourish.

Point source pollution: pollution discharging from a known source such as a pipe.

Plankton: microscopic algae, eggs, larvae, small fish and invertebrates that are free-floating and a drift in the water column.

Primary production: the production of plant or algal matter by means of photosynthesis.

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: small sediment granules between .06 mm and 2 mm in diameter.

Sand fleas: small amphipods that live in high intertidal wrack on sand beaches and flats.

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.

Secondary production: the production of animals that graze on plants or algae (e.g. clams, mussels, shrimp, periwinkles, sea urchins).

Sediment sink: a region that stores sediments.

Sensitivity: animal and plant communities that are susceptible to small changes within their environments.

Settlement: the act of settling on the benthos or other habitats by early developmental stages of animals. Many marine organisms live and drift in the plankton as larve and settle out to complete their life cycle.

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.

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.

Top consumers: animals like large fish, birds and mammals that are at or near the top of the food chain.

Tunicates: marine and estuarine invertebrates also known as sea squirts. They are colonial or solitary animals that filter feed on plankton, detritus, and microscopic algae.

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

Maine Dept. of Environmental Protection
Permit-by-Rule Standards
June 1996

Activity	**Planning the Project to Comply with the DEP's Permit-by-Rule Standards**
1. soil disturbance	Regulated only if the possibility exists that soil or fill materials may wash into a regulated water body (i.e., not regulated if existing barriers such as ice berms and retaining wall or a negative slope will prevent runoff): permit-by-rule applicable only if the work involves soil disturbance and/or fill placement ***adjacent to (i.e., within 100 feet, measured horizontally, from the normal high water line) but not in*** a coastal wetland, freshwater wetland, great pond, river stream or brook; [**Note**: soil disturbance in areas adjacent to freshwater wetlands is exempt from this standard except for those wetlands listed under 480-C.1.B.]
2. water intake and monitoring devices	Pipes must not significantly affect water levels or flows in the water body: applies also to drilled wells in or adjacent to freshwater wetlands or adjacent to coastal wetlands, great ponds, rivers, streams or brooks [**Note**: Water line placement to a single family house adjacent to a great pond is exempt from NRPA regulation provided excavated trenches are backfilled, riprapped and seeded to prevent erosion.]
3. replacement of structures	A replaced structure may not exceed the dimensions of the previously existing structure, nor may it extend any further into the water body or wetland, except applicants may replace retaining walls with properly installed riprap (see riprap installation, below)
4. movement of rocks or vegetation	The standards allow for only minimal movement (no more than ten feet) of rocks or removal of vegetation from below the normal high water line of a great pond, river, stream or brook to provide access for swimming or navigation
6. outfall pipes (including ditches and drain tiles)	PBR applies to the installation and maintenance of permanent outfall pipes, ditch outlets and drain tiles for discharges of storm water, ground water and other discharges approved by the DEP (**Note:** Except for uncontaminated groundwater and storm water from residential and small commercial/industrial facilities, applicants must receive a wastewater discharge license from the DEP)
7. riprap	PBR applies to the placement of riprap along the shoreline of coastal wetlands (only to protect a structure within 100 feet of the eroding bank and never in any portion of a coastal sand dune system or in areas containing soft-bottom/mudflat sediments or salt marsh vegetation), great ponds, rivers, streams and brooks ***only where erosion already***

	exists and cannot be controlled by planting vegetation. Riprap must not extend higher on the bank than the level at which vegetation can be established to control erosion (1-3 feet above normal high water). Applicants must plant trees and shrubs above the riprap to replace any material removed. Vegetation planted must be similar in type and placement to that removed. Riprap slope must not exceed one horizontal to one vertical, nor be shallower than three horizontal to one vertical. Applicants must:
	• anchor riprap at the base of the existing bank by placing the bottom row of rock in a trench excavated at least to a depth equal to the height of the largest rock; • place a layer of filter fabric or crushed rock or washed gravel under the riprap to prevent the washing of soil particles into the water; • not install any fill material below the normal high water line and must cutback eroding banks to required slopes to allow for riprap installation; • not put riprap in front of a retaining wall in a manner that it extends further into the water; and • combine riprap with tree and shrub planting to provide bank stabilization, shading of the water and cover for wildlife along any river, stream or brook.
8. utility line crossings	PBR applies to the installation, maintenance and replacement of utility lines over, submerged under or adjacent to: coastal wetlands, freshwater wetlands, great ponds, rivers, streams or brooks, excluding "outstanding river segments" identified in Title 38, Section 480-P. (**Note**: The installation of utility cables to a single family house adjacent to a great pond are exempt from NRPA regulation provided excavated trenches are backfilled, riprapped and seeded to prevent erosion. Overhead service drops less than 1,000 feet long for telephone or electrical service in freshwater wetlands.)
9. bridges, culverts and fords	PBR applies to the construction of a permanent road crossing of a river, stream or brook using either a bridge or culvert ***except for***: • "outstanding river segments" identified in Title 38, Section 480-P; • any river subject to state mandated Shoreland Zoning; and • coastal wetlands, freshwater wetlands, floodplain wetlands greater than 10 acres and great ponds. (**Note**: maintenance and repair of public and private crossings are exempt from the NRPA provided that erosion control measures prevent sedimentation, the activity does not block fish passage; and there is no additional intrusion into the river, stream or brook)
10. State transportation facilities	PBR is applicable only to projects conducted by the Maine Department of Transportation or the Maine Turnpike Authority
11. restoration of natural areas	PBR applies to the restoration of altered portions of coastal wetlands, freshwater wetlands, great ponds, rivers, streams, brooks (or areas adjacent to these protected natural resources) to their natural conditions through the removal of fill, structures or deposited debris. PBR also

	applies to the restoration of adjacent areas through recontouring or grading to pre-existing elevations, replanting to pre-existing or similar vegetation and correcting for inundation from previous flooding. Does ***not*** apply to: • restoration or replacement of structures or to draining of freshwater wetlands to convert an area to upland; • conversions of existing natural wetlands to a different type of wetland through flooding, inundation or other means; • dredging silt, sand or soil materials naturally deposited into a coastal wetland, freshwater wetland, great pond, river, stream or brook; • mining of gravel or other minerals from rivers, streams or brooks; • replacement of eroded soil material in areas above, below and adjacent to the normal high water mark of coastal wetlands, freshwater wetlands, great ponds, rivers, streams or brooks; and • removal of dam structures.
12. fisheries and wildlife habitat creation and water quality improvement projects	PBR applies to alterations in and adjacent to coastal wetlands, freshwater wetlands, great ponds, rivers, streams and brooks, provided the alterations are exclusively to create or enhance habitat for fisheries or wildlife or projects to improve water quality. Activities must be conducted by public utilities and municipalities under the supervision of public natural resource agencies. Activities allowed include, but are not limited to: • fishway installation; • the construction of artificial reefs, nesting platforms and boxes; • maintenance, installation or modification of dam structures; and • the construction and maintenance of nutrient retention structures
13. piers, wharves and pilings	PBR applies to the construction or expansion of pile-supported piers and wharves and the installation of pilings in coastal wetlands. PBR also applies to the construction of structures for water dependent uses (e.g., bait sheds) on pile-supported piers and wharves.
14. public boat ramps	PBR applies to the construction of new or the replacement of existing public boat ramps (no more than two new lanes or a total of two upon completion) and carry-in launch areas, including associated parking and accessways (walk-ways or stairs, portage trails, etc.) in or adjacent to a protected natural area. Such activities include projects by public natural resource agencies, municipalities and owners of federally-licensed hydropower projects. Larger projects or projects where any portion of the ramp or related facilities is located in, on or over emergent marsh vegetation or intertidal mudflat are not eligible for permit-by-rule.
15. general permit for selected activities in coastal sand dune systems	PBR applies to the following specific activities, provided the activity is undertaken in conformance with the DEP's Coastal Sand Dune Rules (Chapter 355): • replacement of existing seawalls; • dune restoration or construction; • beach nourishment;

	• walkways and driveways, open fences and decks in back dune areas classified as "A," "B" or "C" flood hazard areas; • movement of sand and cobble from the front of buried seawalls using machinery; and • new development or additions to existing development in back dune, non-flood ("C" zone) areas of coastal sand dune systems ***that are not expected to be damaged due to shoreline change within the next 100 years based on historic and projected trends***. [**Note**: The DEP will review such permit-by-rule applications on a case-by-case basis. If the DEP determines that the potential exists for damage from shoreline change, the DEP will require a complete NRPA permit application. This PBR section ***does not apply*** to the construction of or additions to existing single family dwellings in "A" or "B" flood hazard zones or to any structures in "V" hazard zones.]
16. transfers and permit extensions	To transfer an NRPA permit from the original permit holder to a new owner, an applicant must submit: • an affidavit attesting to the fact that the new owner has received, read, understands the terms and conditions and will fully comply with the original terms and conditions of the permit; and • copies of the permit to be transferred along with documents establishing proof of ownership of the property on which the project is located or sufficient title, right or interest to complete the project in accordance with the requirements of the permit and the NRPA. To extend a permit, an applicant must submit a copy of the permit along with a written reason/explanation for the extension request.
17. general permit for maintenance dredging previously approved by DEP	PBR applies to the renewal of DEP permits for dredging in coastal wetlands, freshwater wetlands, great ponds, rivers, streams and brooks provided that the dredged material: • will be disposed of in conformance with Maine Solid Waste Law on land and not in any protected resource area; • is located in an area that was dredged within the last 10 years; and • is not located within 250 feet of an area identified as significant wildlife habitat by the Maine Department of Inland Fisheries and Wildlife (DIF&W). [Note: Applicants can determine whether or not the project is located in or near a significant wildlife habitat area by contacting the local regional DIF&W office]

Appendix B

Analysis of Intertidal Habitat Distribution and Abundance Data

The data on the distribution and abundance of seven intertidal environments in Maine were created from the Coastal Marine Geological Environments (CMGES) on GIS at DEP. The CMGES were created by digitizing and enlarging the original Coastal Marine Geologic Maps (1:40,000) created by Barry Timson in 1976. The digitized maps (7.5 minute quadrangles) for GIS were enlarged to 1:24,000. The Timson maps, delineating 50 different coastal environments greater than 150 m^2 in the supratidal, intertidal and subtidal, were drawn from aerial photographs taken during low tide in 1960 for the entire Maine coast.

For the purposes of this study only information on the intertidal environments was selected, sorted and combined from 102 quadrangles.

Intertidal environments were combined into seven habitats (Appendix B Table 1). The seven intertidal habitats are salt marsh, sand beach, rock, boulder, mixed coarse and fines, sand flat, and mud flat. All habitat types for this study were based on the Brown (1993) and Cowardin et al. (1979) classification of marine environments (Appendix B Table 2). The reductions were based first on the geology of an environment and secondarily on the biological characteristics of the environments. Washover fans (Bw) and vegetated point of lateral bars (Mp), two habitats not characteristic of intertidal environments were excluded from the analysis.

Data tables of the area (m^2) of environments from 102 CMGES quadrangles were download, sorted and reduced into habitat coverage. Quads were divided into island and mainland coverage. Data for each intertidal habitat were summed and converted into acreage for each quad.

For the purposes of comparison, data from the entire coast of Maine was consolidated into four regions. These regions were based on district geological features along the Maine shoreline (Kelley 1987). Appendix B Table 3 lists, for both the mainland and islands, each region, from west to east, and the CMGES quadrangle within that region.

Appendix B Table 3 also lists the total amounts of each intertidal habitat by quadrangle. It is important to note that the names of the CMGES quadrangles do not necessarily represent the town boundaries with the same name. For example, it is possible to have a portion of ledge from the town of Bailey Island summed within the Orrs Island quadrangle. Therefore, without additional reference to the original maps or GIS quad, the data from the individual quadrangles should be used only loosely to refer to the geological settings of townships.

Appendix B. Table 1. A list of the seven intertidal habitats and their corresponding environments and GIS map symbols (Un id) from the Timson maps.

HABITAT	TIMSON ENVIRONMENT	MAP SYMBOL (Un Id)
Salt marsh	High salt marsh	M1
	Low salt marsh	M2
	Marsh levees	M3
	Salt pannes and ponds	M4
	Abandoned tidal channels	Cb
	Fluvial-estuarine channel	Mc
Sand beach	Sand beaches	B1
	Spit	Bs
	Swash bars	Ms
Ledge	Ledge	M
Boulder beach	Boulder beach	B4
	Boulder ramp	Br
Mixed coarse and fines	Gravel beach	B3
	Seaweed&coarse-grained flat	F2
	Sand and gravel beach	B2
	Low energy beach	B5
	Mussel bar	F3
Sand flat	Coarse-grained flat	F1
	Fan deltas	Mb
	Spillover lobes	Md
	Ebb-tidal delta	Me
	Flood-tidal deltas	Mf
	Unidentified	Mx
Mud flat	Mud flat	F
	Channel levee	F4
	Algal flat	F5
	Veneerer ramp	F6

Appendix B. Table 2. A comparison of the classification of intertidal marine environments between the current report and Brown (1993), Cowardin et al. (1979) and the Marine Geological Environments (Maine State Planning Office 1983).

Ward 1999	Brown 1993	Cowardin et al. 1979	SPO Geology Report 1983
Salt marsh			marsh levees salt pannes and ponds channels
Sand beaches	sand beaches	sand beaches	sand beach spit swash bars
Ledge	rock	rubble ledge	ledge
Boulder beaches	boulder	rubble	boulder beach boulder ramp
Mixed coarse and fines	mixed coarse and fines	gravel cobble	gravel beach seaweed and coarse-grained flat sand and gravel beach low energy beach mussel bar
Sand flat	sand flat	gravel cobble	coarse-grained flat fan deltas spillover lobes ebb-tidal delta flood-tidal deltas
Mud flat	mud flat	mud flat	mud flat channel levee algal flat veneerer ramp

Appendix B. Table 3. Total area of intertidal habitat (acres) listed by CMGE quadrangle and region from west to east.

Region	Quadrangle	Sand Beach	Mixed Flat	Boulder	Mud Flat	Sand Flat	Salt Marsh	Ledge	Total
SW	Portsmouth	0	19	0	92	110	5	13	240
SW	Isles of Shoals	0	1	2	1	1	0	86	91
SW	Kittery	13	138	34	713	48	360	150	1455
SW	Dover East	0	17	0	387	0	112	13	528
SW	York Harbor	14	19	1	278	51	433	20	817
SW	York Beach	94	30	26	10	94	11	222	488
SW	Wells	266	81	24	142	104	1697	56	2370
SW	Kennebunkport	43	58	8	230	19	180	319	857
SW	Kennebunk	0	0	0	0	0	51	2	53
SW	Biddeford	288	21	4	97	247	1097	180	1934
SW	Biddeford Pool	112	88	22	269	49	64	186	790
SW	Old Orchard Bch	46	0	0	0	0	236	0	281
SW	Prouts Neck	329	41	31	92	389	2380	172	3435
SC	Cape Elizabeth	46	34	18	0	9	5	267	380
SC	Portland West	0	27	0	1289	0	227	4	1546
SC	Portland East	97	215	47	1251	231	170	549	2560
SC	Yarmouth	19	200	0	1096	73	363	117	1868
SC	Freeport	9	232	28	2581	147	304	585	3885
SC	South Harpswell	19	120	57	92	87	16	895	1285
SC	Bailey Island	2	18	14	3	11	3	249	301
SC	Orrs Island	24	176	5	2995	20	435	1042	4696
SC	Phippsburg	29	14	5	1976	326	1682	447	4478
SC	Small Point	338	6	0	300	250	594	376	1865
SC	Brunswick	5	13	0	414	309	129	39	910
SC	Bath	0	9	0	1011	402	204	140	1766
SC	Wiscasset	0	0	0	298	0	25	12	334
SC	Westport	0	10	0	2613	0	397	404	3423
SC	Boothbay Harbor	22	59	26	460	64	690	768	2089
SC	Damariscotta	0	13	0	1087	0	703	87	1889
SC	Bristol	3	31	3	1052	8	60	247	1405
SC	Pemaquid Point	11	77	45	42	17	13	614	820
SC	New Harbor	0	1	2	9	0	0	53	66
SC	Louds Island	7	161	47	369	13	18	723	1337
SC	Monhegan	3	13	15	0	0	0	164	194
SC	Waldoboro West	1	16	0	861	1	211	150	1241
SC	Waldoboro East	1	36	0	427	3	32	182	681
SC	Friendship	28	136	2	960	103	53	1271	2552
SC	Thomaston	0	121	0	1840	10	480	223	2674
SC	Tenants Harbor	52	127	5	612	7	51	891	1745
NC	Hewett Island	51	4	0	34	0	0	311	400
NC	Rockland	154	270	221	566	87	55	446	1800

Region	Quadrangle	Sand Beach	Mixed Flat	Boulder	Mud Flat	Sand Flat	Salt Marsh	Ledge	Total
NC	Camden	20	47	77	69	4	0	132	350
NC	Matinicus	6	71	14	0	3	2	315	412
NC	Lincolnville	3	23	7	4	31	4	6	79
NC	Belfast	0	12	0	165	7	5	7	196
NC	Searsport	15	144	53	105	266	14	147	744
NC	Islesboro	6	184	80	319	83	53	551	1276
NC	Northhaven west	5	169	92	100	18	20	409	813
NC	Northhaven east	2	243	135	138	22	30	525	1095
NC	Leadbetter Isl.	11	31	20	184	1	25	641	912
NC	Vinalhaven	22	102	11	1057	1	70	1047	2310
NC	Bucksport	13	65	21	884	38	418	103	1543
NC	Castine	28	254	93	562	204	39	248	1428
NC	Penobscot	2	117	1	1155	170	61	106	1612
NC	Cape Rosier	5	147	59	422	51	78	366	1128
NC	Sargentville	16	185	173	233	141	25	368	1141
NC	Deer Isle	12	190	65	1096	142	141	621	2269
NC	Stinson Neck	3	193	90	583	2	7	915	1793
NC	Isle au Haut west	26	53	69	11	5	4	351	518
NC	Isle au Haut east	18	51	54	13	5	11	489	640
NC	Brooklin	3	216	232	680	94	56	431	1712
NC	Blue Hill	0	31	4	229	3	5	129	401
NC	Ellsworth	0	1	0	84	0	11	6	103
NC	Barlett Island	5	227	198	276	9	41	422	1179
NC	Swans Island	24	146	147	360	28	32	914	1652
NC	Johns Island	0	56	14	1	0	4	130	205
NC	Frenchboro	0	18	5	9	1	4	98	134
NC	Bass Harbor	7	179	59	324	16	73	413	1070
NC	Southwest Harbor	9	103	19	467	3	136	307	1045
NC	Seal Harbor	15	94	19	23	24	57	351	584
NC	Bar Harbor	9	297	133	429	82	15	552	1516
NC	Salsbury Cove	34	103	40	2121	3	130	439	2870
NC	Newbury Neck	0	169	54	710	15	9	396	1354
NC	Hancock	0	93	23	1226	0	111	317	1770
NC	Sullivan	0	51	7	805	28	129	115	1134
NC	Winter Harbor	22	209	27	1070	7	223	727	2285
NC	Schoodic Head	0	68	43	82	18	9	435	653
NC	Petit Manan	3	335	110	1681	69	205	902	3306
NC	Bois Bubert	21	204	90	150	39	88	660	1252
NC	Cherryfield	0	8	0	218	1	434	11	672
NC	Harrington	12	210	21	4789	49	1077	590	6748
NC	Columbia Falls	0	0	0	9	0	298	0	307
NC	Addison	1	143	22	2456	53	383	699	3755
NC	Drisko Island	2	81	27	2	36	2	373	524
NC	Great Wass Isl.	4	255	78	86	90	8	844	1365

Region	Quadrangle	Sand Beach	Mixed Flat	Boulder	Mud Flat	Sand Flat	Salt Marsh	Ledge	Total
NC	Jonesport	184	371	80	989	118	111	860	2713
NC	Whitneyville	0	28	1	806	0	127	85	1047
NC	Roque Bluffs	76	287	152	69	282	81	607	1555
NC	Machias	1	78	1	2130	29	511	197	2945
NC	Machias Bay	24	525	82	2145	328	37	559	3700
NC	Cross Island	31	58	17	24	5	16	350	502
NE	Cutler	6	79	39	132	30	30	263	579
NE	Moose River	1	28	31	57	17	7	149	291
NE	West Lubec	16	111	84	1453	123	216	649	2651
NE	Lubec	43	94	128	580	323	53	173	1394
NE	Whiting	4	29	16	769	1	106	321	1245
NE	Pembroke	0	73	41	1393	34	239	758	2538
NE	Eastport	12	442	263	1508	309	113	760	3406
NE	Robbinston	47	60	27	10	272	6	118	540
NE	Red Beach	0	14	5	42	1	2	32	95
NE	Devil's Head	5	20	2	167	68	20	81	364
NE	Calais	0	1	0	95	12	9	0	117