Habitat Characterization description for Middle Bay, Merepoint Bay, Maquoit Bay, Moore Point to Flying Point, and the Harraseeket River.

The intertidal zone of Middle Bay, Maquoit Bay and the Harraseeket River were surveyed for species' occurence. From the field data, classifications were constructed following Dethier's system for Washington State which is based on substrate and energy characteristics. Exceptions in this report to those defining features are the marsh localities which were determined by indicative species rather than substrate. The complete Washington system is not applied here since Middle, Maquoit and Harraseeket Bays contain a more limited variety of habitat types than does the Washington coast, and the current survey focused on sheltered areas to the exclusion of more open localities. More open habitats are represented here, although with more thorough coverage in protected areas.

Species' citing relied on direct observation along transects perpendicular to the shoreline with the

exception of clammers' or wormers' spotty indications from digging of the following species:

Cerebratulus lacteus Mercenaria mercenaria

Arenicola marina

Area covered includes that coastline extending North and West of Curtis Cove to East of and including the Harraseeket River. This area was divided for convenience into three sections in this report, the field notes and map: Harraseeket and the bay Northeast of Moore Point to Flying Point; Maquoit Bay from Flying Point to Merepoint; and Middle Bay including Merepoint Bay from Merepoint to the West edge of Curtis Cove on Harpswell Neck. Characteristic intertidal habitat types found in the entire area are designated as estuarine and include:

High marsh, partly enclosed
Low marsh, partly enclosed
Low marsh, open
Bedrock, open
Bedrock, partly enclosed
Cobbles, open
Mixed-coarse, open
Sand, partly enclosed
Mixed-fine, partly enclosed
Shell hash
Silt, partly enclosed: mid+upper intertidal
lower intertidal

Mud, partly enclosed: mid+upper intertidal

lower intertidal

Muddy-gravel organic (cel grass beds)

Mussel bcds

Mixed-fine includes mud-silt-sand and shell hash.

Areas with mixes of substrate representing two or more habitat types mentioned above (i.e. mud pockets interspersed amidst bedrock outcrops) are considered two habitats with many species of each habitat occurring in their respective location rather than as an additional habitat type. Although an impractical approach for surveying in some areas due to their intermittant nature, this is more manageable in the three bays of Casco because of the expanse of individual habitat types.

Estuarinenergy levels are described by Dethier as:

The term diagnostic species is taken from Dethier and is used to mean:

- 1. The species (plant or animal) most abundant at the end of the growing season.
- 2. A combination of numerical and biomass measures.
- 3. The functionally-important species, either habitat-forming or strongly-interacting. Predictably present through time, whenever possible.
- 4. The species with high "fidelity" to one habitat type preferably restricted to one habitat type, even if not necessarily abundant.

Energy parameters are:

Open: Shorelines exposed to moderate to long fetch and receiving some wind waves and/or currents, but stell diluted by freshwater.

Partly Enclosed: Bays or river mouths partially enclosed by headlands, bars, spits, or artificial obstructions reducing circulation. Minimal wave action or currents. Drift algae and seagrass often concentrated here.

Where there is a dominant habitat such as bedrock with common scattered smaller communities such as tide pools, species will be grouped in subcategories according to their field associations. Only those species identified in the field are recorded in this survey. Similar habitats in other areas may have slightly differing species.

High marsh, partly enclosed

diagnostic species:

-Spartina patens

-Juncus Gerardi

associated species:

-Solidago sempervirens

-Triglochin maritima

-Atriplex patula

-Salicornia sp.

-Sucda maritima

-Distichlis spicata

Such habitat is a common occurrence in the upper reaches of low energy coves, sometimes having a width of tens of meters. S. patens and J. Gerardi are the most abundant taxa, but many flora can be found scattered or in muddy pans (i.e. Salicornia sp.) within the grassy mats. Marsh area is often supported by an organic substrate and littered with rack washed in at high tide. As the elevation drops seaward, the high marsh abuts the low marsh.

Exemplary habitat localities:

Wharton Point; essentially every cove and inlet in the upper half of Middle, Maquoit, and Merepoint Bays, and fringing most of the Harraseeket River.

Low marsh, partly enclosed

diagnostic species:

-Spartina alternoflora

associated species:

-Modiolus demissus

-green algae mat

-Chaetomorpha sp.

-Enteromorpha sp.

-Salicornia sp.

On the seaward edge of the high marsh, the low marsh can withstand more lengthy salt water submergence. *S. alternoflora* is by far the predominant inhabitant. However, other species also exist here, commonly on slumping scarped edges of the marsh along mud flat boundaries. *Salicornia* intrudes on the upper boundaries, again commonly found dominating small muddy patches. As with the high marsh, low marsh species extend into partially exposed areas where they thrive in increasingly narrowing bands. Low marsh areas, though commonly wide in inner coves, do not extend as far into mud flats in proximity of inlets as they do otherwise. In such localities, mud flats rise to a higher elevation in the intertidal zone. Where the marsh has not been scarped or the scarp is old, the low marsh can commonly be found encroaching upon mud flats via the rhizomes of *S. alternoflora* which extend into the mud flat and push up new shoots beyond boundaries of accumulated organic substrate.

Exemplary habitat localities:

Same as above

Low marsh, partly enclosed

diagnostic species:

-Spartina alternoflora

associated species:

-Salicornia sp.

Similar to the open low marsh, partially enclosed marsh is easily identified by the presence of *S. alternoflora*. It forms in narrower bands, however, commonly fringing coarser substrate, having less accumulated organic substrate, and lacking scarped banks. The bands of *S. alternoflora* are limited to a meter or two, and often are only a few stocks deep. Patches are also found in small patches intermittent with consolidated rock or other very coarse substrate upon which it has been able to take hold and develop enough soil to perpetuate.

Exemplary habitat localities:

Coves along the south shore of Middle Bay; much of the shore along the East side of Flying Point Neck; much of the more exposed points and islands facing southwest.

Bedrock, partly enclosed

diagnostic species:

-Ascophyllum nodosum

-Balanus balanoides

-Calothrix sp.

-Littorina obtusata

associated species:

-Mytilus edulis

-Enteromorpha sp.

-Littorina littorea

-Nucella lapillus

seaweed patches:

-Ascophyllum nodosum

-Cancer irroratus (young)

-Carcinus maenas

-Fucus sp. (sparse)

-Gammarus sp.

-Littorina obtusata

-Campanularia sp.

tide pool species:

-Spongomorpha sp.

-Chondrus crispus

-Codium fragile

-Desmarestia sp.

Partly enclosed bedrock is often interspersed with small patches of marsh communities and tide pools where many of the listed algae thrive. Where seaweed occurs it is predominantly *Ascophyllum*, while *Fucus* dominates more exposed ledges. Partly enclosed bedrock in the surveyed area rarely extends below the mid intertidal where it is overlain by mud or mixed substrate. Therefore many species associated with the lower bedrock zones were not observed other than in tidal pools in this habitat.

Exemplary habitat localities:

Simpson's Point; inner side of Birch Island

Bedrock, open

diagnostic species:

-Fucus sp.

-Calothrix ap.

-Codium fragile

-Balanus balanoides

-Littorina obtusata

associated species:

same as partly enclosed, in addition to: lower intertidal:

- -Tectura testudinalis
- -Asterias sp.
- -Spirorbis sp.
- -Chondrus crispus
- -Brown algae
- -Ulva lactuca
- -Spongomorpha sp.

Partly enclosed bedrock is similar to open bedrock. However, in areas where finer substratum can less easily settle out, bedrock more often extends to the low intertidal where an abundance of species exist.

Exemplary habitat localities:

South edge of Wolf Neck; southwest end of Merepoint Neck; Lookout Poing

Cobbles, partly enclosed

associated species:

- -Gammarus sp.
- -Balanus balanoides
- -Calothrix (upper intertidal)

seaweed patches:

- -Spirorbis sp.
- -Littorina obtusata (upper intertidal)

Due to their lack of stability, cobble pockets or beaches do not accumulate an abundance of musseles or seaweed or their associated species. Neither species diversity nor abundance is high. Most occurrences of cobbles, however, are in areas of mixed-coarse substrate rather than well sorted cobble where the variety attracts more inhabitants. The exclusively cobble habitat is not widely represented in the bays.

Exemplary habitat localities:

Just south of Googin's Island; southwest end of White Island; upper intertidal of transect 49

Mixed-coarse, partly enclosed

Associated species:

- -Gammarus sp.
- -Littorina littorea
- -Calothrix sp. (associated with larger particles of the mix, upper intertidal)
- -Balanus balanoides
- -Nucella lapillus
- -Carcinus maenas (young)
- -Modiolus demissus (upper fringe, low abundance)
- -Mya arenaria (finer pockets of mixed-coarse only)
- -Chondrus crispus (lower intertidal)
- -Crassostrea virginica

seaweed patches:

- -Ascophyllum nodosum
- -Fucus sp.
- -Littorina obtusata
- -Campanularia sp.
- -Spirorbis sp.
- -Gammarus sp.
- -Sertularia

mussel patches:

- -Mytilus edulis
- -Balanus balonoides

Few large areas of well sorted very coarse substrate exist in the bays. Rather, boulders, cobble and gravel occur in mixed bands in transition between bedrock and mud flats or marsh and are here considered one characteristic habitat type, not inclusive of well sorted zones of either. Few species are evident on the smaller coarse sediment in contrast to pockets of life attached to frequent overlying mussel clusters and larger cobbles and boulders.

Exemplary habitat localities:

Curtis cove, extending north; Wilson Cove; Lookout Point; Southwest end of Merepoint Neck;

Sand, partly enclosed

diagnostic species:

-Mya arenaria

associated species:

- -Capitellid (lower abundance than in finer sediment)
- -Clymenella sp. (low intertidal)
- -Gammarus sp.
- -Shrimp
- -Nucella lapillus (high intertidal)
- -Littorina littorea
- -Macoma sp.
- -Ensis directus (sparse, low intertidal)
- -Spongomorpha sp.

mussel patches:

- -Mytilus edulis
- -Ascophyllum nodosum
- -Fucus sp.
- -Littorina obtusata
- -Sertularia sp.
- -Balanus balanoides

mobile species following the water in:

- -Cancer irroratus
- -Limulus polyphemus
- -Pagurus sp.

Coarse sandy substrate supports minimal infauna, though does provide habitat for scattered musscles and associated species, and cobbles and boulders usually inseparable from coarse sand in the bays support small A. nodosum and Fucus sp.habitats mentioned in the mixed-coarse habitat section. Areas of just coarse sand are rare in the bays, exception being those listed below. Marsh and mixed substrate usually transform abrupty into sandy silt or clay flats rather than boardering sandy stretches. Areas of finer sand tending toward sandy silt harbor more abundant fauna shown above. Infaunal abundance is higher in areas bordering silty

Exemplary habitat localities:

Curtis Cove; North of Little Flying Point; East point at Cushing Briggs, Harraseeket

Mixed-fine, partly enclosed

diagnostic species:

-Glycera sp.

Associated species:

- -Mya arenaria
- -Macoma sp.
- -Ensis directus
- -Capitellid
- -Neries sp.
- -Saccoglossos dibromophenolicum
- -Shrimp
- -Pagurus sp.

- -Corophium sp.
- -Gammarus sp.
- -Nassarius obsoletus
- -Littorina littorea
- -Cancer irroratus (sparse)
- -Carcinus maenas
- -Clymenella sp. (sparse)
- -Modiolus demissus (sparse)
- -Crassostrea virginica (sparse)
- -Enteromorpha sp.
- -Ulva lactuca
- -light green algal mat

scattered mussel patches:

- -Mytilus edulis
- -Balanus balanoide
- -Tectura testudinalis
- -Crepidula plana

scattered seaweed patches:

- -Ascopyullum nodosum
- -Fucus sp.
- -Sertularia
- -Spirobus sp.
- -Chaetomorpha sp.
- -Brown algae
- -Spongomorpha sp.
- -Campanularia sp.
- -Littorina obtusata

following water in:

-Limulus polyphemus

Lower intertidal:

- -Amphitrite sp.
- -Spionid sp.

. Exemplary habitat localities:

Miller Point to White Island; Wilson Cove; Brickyard Cove; southeast side of Harraseeket

Shell hash

associated species;

-Littorina littorea

mussel clumps:

- -mytilus edulis and associated species
- -Ascophyllum nodosum
- -Fucus sp.

Areas of pure shell hash are not common, but are prominent when occuring. They support little life other than L. littorea. As they mix with mud on the boundaries, Corophium sp. are the first taking up residence.

Exemplary habitat localities:

North of S. Freeport marina; north end of Scragg Island; between White Island and Birch Island

Silt, partly enclosed, mid+upper intertidal diagnostic species:

- -Capitellid
- -Neries sp.
- -Corophium sp.
- -Nassarius obsoletus

associated species:

-Gammarus sp.

-Littorina littorea

-Mytilus edulis

-Mya arenaria

-Limulus polyphemus

-Ensis directus (mid intertidal)

small seaweed patches:

-Fucus sp.

-Campanularia sp.

-Littorina obtusata (upper intertidal)

following water in:

-Pagurus sp.

-Cancer irroratus

Exemplary habitat localities:

Transects 18, 46, 7,38, and 23

Silt, partly enclosed, lower intertidal

diagnostic species:

The above species (not obtusata) and:

-Corophium sp.

-Saccoglossos dibromophenolicum

-Ensis directus

-Amphitrite sp.

-Spionid sp.

Species found in silty habitats are similar to those on the mud flats. Such areas are frequently spotted with *M. edulis* clumps and in small pockets amid coarser substrate as well as forming expansive flats in partly enclosed coves. As is the case with mud flats, community composition varries within consistent zones of silt and energy levels. This varrience is a much more frequent occurrence in these two habitat types than those with coarser substrate.

Exemplary habitat localities:

Transects 58, 33, and 18

Mud, partly enclosed, mid+upper intertidal

diagnostic species:

-Capitellid

-Neries sp.

-Corophium sp.

-Hydrobia minuta

associated species:

-Nassarius obsoletus (phases out in higher upperintertidal)

-Arenicola marina

-Glycera sp.

-Cerebratulus lacteus

-Gammarus sp.

-Littorina littorea (fcw)

-Limulus polyphemus

-Macoma sp.

-Mya arenaria

-Mercenaria mercenaria

-Ensis directus (mid intertidal)

-Gemma gemma

-Enteromorpha sp.

-Chaetomorpha sp.

-Ulva lactuca

-light green algal mat

mussel clusters:

- -Mytilus edulis
- -Balanus balanoides
- -Ascopyllum nodosum
- -Sertularia sp.
- -Campanularia sp.
- -Crepidula plana
- -Littorina littorea
- -Nucella lapillus

mobile species following water's edge:

- -Pagurus sp.
- -Limulus polyphemus
- -Shrimp
- -Gammarus sp.
- -Hydractinia echinata
- -Cancer irroratus (more abundant with scattered larger substrate)
- -Cancer maenas

Exemplary habitat localities:

Harrasceket River; Bunganuc Landing; Head of Maquoit Bay; northeast of White Island; Middle **Bay Cove**

Muddy, lower intertidal, partly enclosed

diagnostic species:

- -Amphitrite sp.
- -Saccoglossos dibromophenolicum (also midintertidal, prefers sandier locations)
- -Clymenella sp.
- -Spionid sp.
- -Ampelisca sp.
- -Crassostrea virginica

associated species:

see those of upper intertidal clay flat

This habitat commonly alternates with mussel patches, as in the Harrasceket, or Z. marina beds as in . Middle and Maquoit Bays. Mud flats is the area surveyed are expansive and for the most part uninterrupted by different substrate types other than intermittant sparse scattering of small hard substrate to which some of the above species are attatched. Species composition varries considerably among mudflat locations with no apparent accompanying substrate or energy type alteration. It is nevertheless all characterized as mudflat, either upper intertidal or lower intertidal, with no established method to predict variations in species composition. Ampelisca sp. is a predominantly subtidal dweller, but can be seen in the lower intertidal in some areas of the Harraseeket.

Exemplary habitat localities:

Same as muddy upper intertidal

Muddy-sandy organic

diagnostic species:

- -Zostera marina
- -Idotea sp.
- -Nassarius obsoletus

associated species:

- -Capitellid
- -Neries sp.
- -Amphitrite sp.
- -Littorina littorea
- -Sertularia sp.
- -Campanularia sp.
- -Macoma sp.
- -Mya arenaria

- -Mercenaria mercenaria
- -Gemma gemma
- -Ensis directus
- -Pagurus sp.
- -Saccoglossis dibromophenoliculum
- -Shrimp
- -Gammarus sp.
- -Ulva lactuca
- -Hydractinia echinata
- -Chaetomorpha sp.
- -Enteromorpha sp.
- -Brown algae

intermittent patches void of Z. marina:

Mytilus edulis and mussel bed associates

mud pockets with lower intertidal species characteristic of the substrate type

Intertidal Z. marina beds are more dense in Maquoit Bay than Middle Bay, and nearly nonexistant in the Harraseeket. Where they do exist they harbor abundant life with high diversity, both infauna and epifauna. Commonly thought of as a subtidal species, it does extend into the upper low intertidal, particularly on expansive mud flats. It is often patchy, a possible result of the wasting disease, interspersed with irregulaly shaped patches of mud or other substrate upon which the Zostera has encroached. Mytilus edulis and associates are also found in small clumps in localities of less dense Zostera.

Exemplary habitat localities:

Head of Middle Bay, Maquoit Bay, Merepoint Bay and cove between Wolf Neck and Flying Point
Neck

Mussel beds

diagnostic species:

-Mytilus edulis

associated species:

- -Crepidula fornicata
- -Crepidula convexa
- -Crepidula plana (large low intertidal beds)
- -encrusting Bryozoan (on mussels)
- -Balanus sp.
- -Fucus sp.
- -Ulva lactuca
- -Tectura testudinalis

M. edulis is prolific in beds, patches and small scattered clusters on a variety of substrate. Infauna were not sampled. They are common throughout the bays and have a predictable devout following.

Exemplary habitat localities:

Googins Island Cove (northern side); northeast side and southwest end of Harrasceket; east and south of White Island

BROAD DESCRIPTION OF THE HARRASEEKET RIVER, MAQUOIT BAY, MIDDLE BAY, AND MEREPOINT BAY AREA:

The area surveyed is comprised of a series of estuarine bays oriented Northeast to Southwest, forming part of and opening into Casco Bay of Southern Maine. The extent of exposure ranges from open estuarine along the necks to partly enclosed estuarine in coves and inner bays. Exposure is intensified on the Eastern shores which are subject to prevailing Southwest winds approaching at an angle steeper than that of the Bays. Intertidal zones along the necks are predominantly bedrock, often grading to boulders and gravel toward the lower intertidal. Mud and silt pockets exist in coves and intermittent sheltered pockets amid the larger substrate. The Harraseeket River and the more protected inner bays shelter expansive mud flats and fringing salt water marshes. Exclusive of the Harraseeket, dense eel grass beds line the lower intertidal flats,

extending well into the subtidal. Subtidal substrate samples taken off a remote operated video near the center mouths of Middle, Merepoint, and Maquoit Bays reveal very fine mud and no cel grass beds.

Mudflat species' composition varies from Bay to Bay despite consistent exposure and substrate. The Harrasceket, in addition to minimal if no cell grass, supports comparatively few Nassarius obsoletus, and harbors extensive marshes; The coves North and East of Googin's Island are rich in mussel beds, supporting, among other creatures, Crepidula planna; Maquoit Bay is rich in Corophium sp., Gemma gemma, and Zostera marina; Merepoint and Middle Bays have thick Zostera marina beds, much evidence of subtidal Lunatioa Heros, and Mercenaria mercenaria in the center head of the Bay.

Field work and writeup with accompanying map completed by Laurie Stearns

Darling Marine Center, Walpole ME.

under the direction of Les Watling
September 1993

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