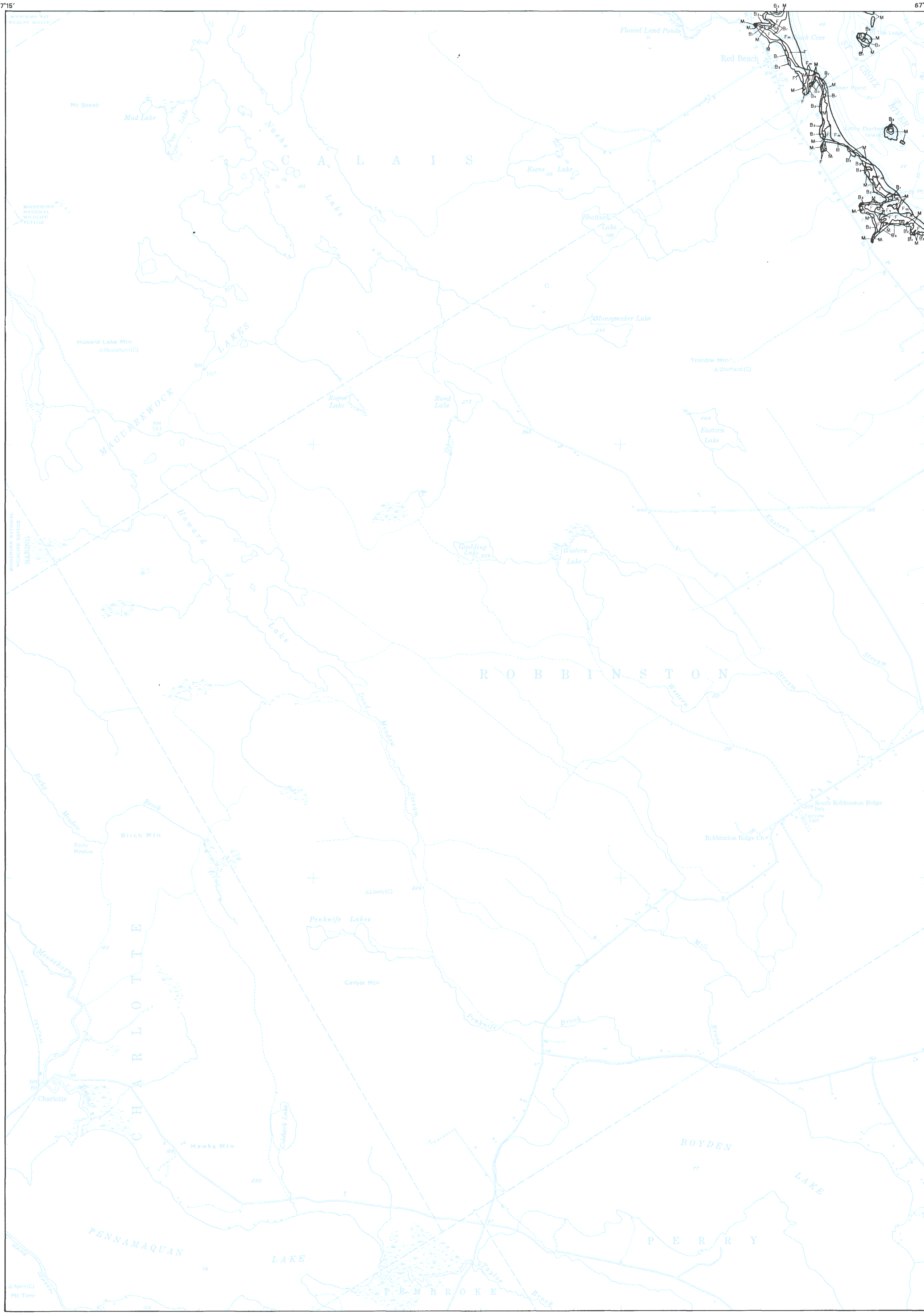


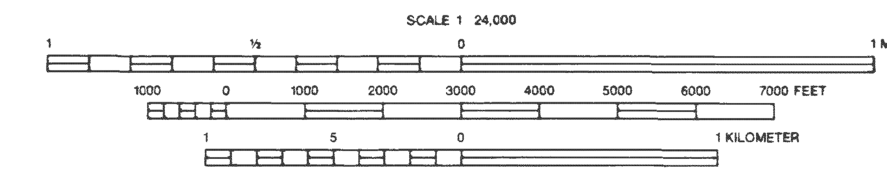


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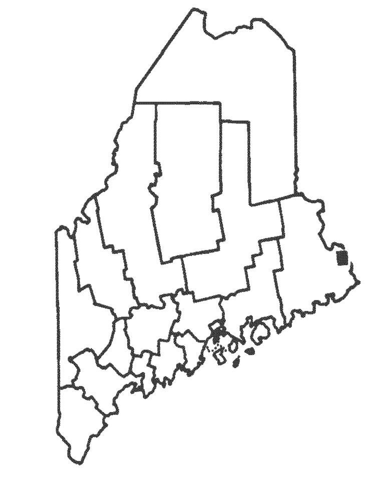

Quadrangle Location

# COASTAL MARINE GEOLOGIC ENVIRONMENTS

OF THE

# RED BEACH QUADRANGLE, MAINE

By

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1976

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## SUPRATIDAL ENVIRONMENTS

Environments just above the highest high water datum, but under the partial influence of marine processes and forces.

**Sd** — Dunes and Vegetated Beach Ridges — Unconsolidated sand or gravel deposits capping beach environments. Dunes are subject to storm waves and winds, while gravel beach ridges are subject only to storm wash. Each may be vegetated with salt-tolerant vegetation.

**Sw** — Fresh-Brackish Water — Ponded water behind beach ridges, man-made constrictions on former tidal embayments, or on marsh surfaces transitional between upland and salt marsh environments Salinity of the water is less than 5 parts per thousand (ppt).

**Sm** — Fresh-Brackish Marsh — Water-saturated, organic-rich sediments characterized by broad-leafed vegetation tolerant of constant submergence in fresh water. Salinity of interstitial water is less than 5 ppt.

**Sz** — Man-Made Land — Structures or fill emplaced by man in the nearshore environment.

**Sx** — Landslide Excavation and Deposits — Natural excavation into shoreline upland slopes created by large-scale slumping or sliding of bank material and the resulting deposits at the base of the slopes.

**Se** — Eolian Flat — Partially vegetated sand flats adjacent to dune fields. Subject to generally northwest winds and occasional storm flooding.

**Sf** — Washover Flat — Sand deposits covering salt marshes behind inlet mouths which originate from storm washover or inlet delta deposits on salt marshes. Subject to storm washover and spring tide flooding.

**Sr** — Fluvial Marsh — Vegetated river floodplain and bank environments. Characterized by freshwater pond vegetation such as pond lilies, reeds, and wild rice. Subject to daily tidal flooding as well as inundation during high river discharge periods.

## INTERTIDAL ENVIRONMENTS

Environments between the highest high water datum and the lowest low water datum subject to twice daily tidal flooding and all other marine forces.

### Marsh Environments

Vegetated environments or isolated depressions within vegetated environments located above mean tide level in protected coastal areas.

**M1** — High Salt Marsh — Organic-rich sediments densely vegetated primarily with the salt marsh grass <u>Spartina patens</u> (salt-meadow grass). High salt marshes are at the same level as mean high water.

**M2** — Low Salt Marsh — Mud or muddy sand embankments sparsely to densely vegetated by the salt marsh grass <u>Spartina alterniflora</u> (salt cord-grass). Low salt marsh exists between mean tide level and mean high water.

**M3** — Marsh Levee — Channel-margin sediments vegetated with salt-meadow grass which exist up to several tens of centimeters above the salt marsh surface. The marsh levee consists of sandy silt or silt-size sediment deposited from flood waters rising above channel margins, either from high river discharge into estuarine embayments or from storm-surge influenced flood tides from the ocean.

**M4** — Salt Pannes and Salt Ponds — Salt-water filled, non-vegetated depressions on the high salt marsh surface (salt pannes) or salt-water filled depressions anywhere in the intertidal zone (ie. tidal pools). Salt pannes may be dry and covered with algae during late summer months.

### Beach Environments

Deposits of unconsolidated sediment which extend shoreward from the lowest tide line to the upland or vegetated dune field or beach ridge. Dominated by wave processes.

**B1** — Sand Beach — Beaches consisting of sand-size sediment which are subject to high or moderate wave energy (waves generated in the Gulf of Maine).

**B2** — Mixed Sand and Gravel Beach — Beaches consisting of sand and gravel-size sediment which are subject to high or moderate wave energy.

**B3** — Gravel Beach — Beaches consisting of gravel-size sediment which are subject to high or moderate wave energy.

**B4** — Boulder Beach — Beaches consisting of boulder-size sediment which are subject to high or moderate wave energy.

**B5** — Low-Energy Beach — Beaches consisting of a wide variety of sediment sizes which are protected from high wave energy. Sediment characteristics are dependent upon sediment source, which is usually from upland scarps immediately shoreward of the beach. Low-energy beaches may exhibit growth of salt marsh grass when there is little sediment movement.

**Br** — Boulder Ramp — Sloping surfaces in the lower intertidal zone veneered by large boulders. This environment is seaward of gravel or boulder beaches on high wave energy shorelines. Boulders are remnant lag deposits of eroded glacial tills. Boulder movement is limited to periods of intense storm wave activity.

**Bw** — Washover Fan — Fan-shaped deposits of gravel located behind gravel beach ridges and covering portions of marshes. Few washovers have been recognized as mappable units on sand beaches. Washover fans are deposited by storm waves. Fan sediment is derived from the beach itself.

**Bs** — Spits — Partially-submerged beach ridges which extend offshore into open water. This category includes tombolos (spits joining an island with the mainland).

### Flat Environments

Gently sloping or level environments composed primarily of fine sand, silt, and clay accumulated in relatively quiet water. Flats are depositional areas controlled primarily by tidal currents and sediment settling from the water column. Flat environments may be eroded temporarily by storm waves.

**F** — Mud Flats — Flats comprised of sediment finer than sand.

**F1** — Coarse-Grained Flat — Intertidal flats where sand or larger-size material comprises most of the sediments. Coarse-grained flats are subject to higher tidal-current velocities than mud flats.

**F2** — Seaweed-Covered Coarse Flat — Coarse-grained, shallow subtidal and low intertidal flats which act as a stable substrate for seaweed such as <u>Ulva</u>, <u>Enteromorpha</u>, <u>Ascophyllum</u>, and <u>Laminaria</u>.

**F3** — Mussel Bar — Low mounds of living mussels, <u>Mytilus edulis</u>, and/or disarticulated and broken mussel shells accumulated by wave shoaling. Mussel bars generally occur at the mouths of estuaries or embayments at tidal channel margins where nutrient-laden oceanic waters first flood flat environments. Mussel bars accumulate on intertidal flats.

**F4** — Channel Levee — Linear accumulations of sediment along margins of tidal channels built several tens of centimeters above the surrounding intertidal flats. Channel levees are constructed from sediment deposited on the flat as the tide rises above the channel margins.

**F5** — Algal Flats — High, coarse and fine-grained intertidal flats covered with the green algae, <u>Enteromorpha erecta</u>.

**F6** — Veneered Ramp — Former boulder ramps presently covered by fine-grained sediment settling out of the water column.

### Miscellaneous Environment

**M** — Ledge — Subaerially or subaqueously exposed bedrock.

**Mc** — Fluvial-Estuarine Channel — Transitional channel between river and estuarine channels. The fluvial, tidal fluvial, or estuarine state depends upon the volume of river discharge entering the estuarine basin.

**Mp** — Point or Lateral Bars — Accumulations of sediment adjacent to intertidal channel margins at channel bends (point bars) or along straight segments (lateral bars).

**Ms** — Swash Bars — Accumulations of sediment which occur where waves shoal onto intertidal flats.

**Mf** — Flood-Tidal Delta — Lobate bars of sediment which accumulate landward of an inlet separating a back-barrier estuary or lagoon from open-ocean water.

**Me** — Ebb-Tidal Delta — Lobate bars of sediment which accumulate seaward of an inlet separating a back-barrier estuary or lagoon from open-ocean water.

**Mb** — Fan Delta — Coarse-grained, fan-shaped deposits which accumulate on intertidal flats where upland streams drain onto high tidal-range shorelines.

**Md** — Spillover Lobes — Lobate bars of sediment which extend from flood-tidal deltas into estuarine or tidal channel areas.

## SUBTIDAL ENVIRONMENTS

Environments existing below lowest low water and subject to tidal current forces and wave-generated current forces.

### Flat Environments

Submerged, gently sloping, or level environments composed primarily of fine sand, silt, and clay. Includes subaqueous exposures of coarse-grained, Pleistocene glacial sediments.

**Fm** — Mud Flat — Fine-grained subtidal flats.

**Fc** — Coarse-Grained Flat — Coarse-grained subtidal flats.

**Fe** — Eelgrass Flat — Fine-grained and coarse-grained, shallow subtidal (low intertidal) flats which support dense stands of eelgrass (<u>Zostera marina</u>).

**Fs** — Seaweed Community — Coarse-grained subtidal flats and bedrock ledges which support seaweed growth.

**Fb** — Upper Shoreface — The inner subtidal slope which extends seaward from large exposed sand beaches where sediments are actively transported by bottom currents generated by storm waves. The upper shoreface is a sandy environment of constant wave shoaling under normal wave condrtions.

**Fp** — Lower Shoreface — The outer subtidal slope which extends seaward from the upper shoreface. The lower shoreface is affected only by currents generated by storm waves. Lower shoreface sediments grade from sand to mud in a seaward direction.

### Channel Environments

Linear, intertidal and subtidal depressions carrying tidal-current water.

**C1** — High-Velocity Tidal Channel — Tidal channels where maximum flow velocities probably exceed 2 meters per second (mps).

**C2** — Medium-Velocity Tidal Channel — Tidal channels where maximum flow velocities probably attain values between 1 and 2 mps.

**C3** — Low-Velocity Tidal Channel — Tidal channels where maximum flow velocities probably do not exceed 1 mps.

**C4** — Estuarine Channel — Tidal channels where ocean and river waters mix. Estuarine water salinities range between 0.5 ppt and 30 ppt.

**C5** — Estuarine Flood Channel — Estuarine tidal channels where flood-tide current velocities greatly exceed velocities attained during ebb tide.

**C6** — Estuarine Ebb Channel — Estuarine tidal channels where ebb-tide current velocities greatly exceed velocities attained during flood tide.

**C7** — Inlet Channel — High current-velocity channels cut through barrier beaches and connecting back barrier estuaries or lagoons with the open ocean.

**C8** — Dredged Channel — Man-made, artificially-deepened or widened tidal channel.

**Cs** — Channel Slope — Gently to moderately sloping wall margins of large tidal channels. Channel slopes are confined to channel wall margins composed of sediment.

**Cb** — Abandoned Tidal Channel — Former tidal channel no longer carrying flow sufficient to erode the channel floor or margin walls. Abandoned channels usually occur in salt marsh tracts where meandering of the central drainage channel cuts off former channel segments.

**Cf** — Tidal Fluvial Channel — Lower portions of river channels under tidal influence but not carrying estuarine waters.

Tidal Creeks — Small tidal channels draining salt marshes or intertidal mud flats.

Marsh Drainage Ditch — Man-made, rectilinear ditches dug into marshes to facilitate marsh surface drainage.

Approximate transition boundary between estuarine and marine (30 ppt salinity) waters and between estuarine and river (0.5 ppt) waters.

Unit boundary.

Approximate unit boundary.