

H2.4 MUD FLAT

Mud-flat habitats are areas of mud and sandy mud exposed between the extreme-high-tide and extreme low-tide marks.



H2.4
Mud Flat

Plate H2.4.1: Mud flat, with mussel shells and stones colonized by *Fucus* in the foreground. The forest is coastal spruce, fir–maple, birch association (H6.3). Sandy Cove, (St. Marys Bay), Digby County (District 810). Photo: R. Merrick.

FORMATION

Mud flats form from the deposition of mud in sheltered tidal water, particularly in estuaries where there is a large sediment supply.

PHYSICAL ASPECTS

1. *Substrate*: particles range from fine sand to silt, and are often compacted into clay. Drainage is poor, and anaerobic conditions exist just below the sediment surface.
2. *Wave action*: the surface sediment is mobile in moderate waves, due to exposure to wave action, related to wind and to a tidal and longshore currents.
3. *Tidal regime*: tidal range determines the area of shore that is exposed to the air.
4. *Water-land interaction*: water conditions include summer and winter temperature extremes, formation and movement of ice, turbidity and salinity.
5. *Climatic conditions*: air conditions include summer and winter temperature extremes, humidity, precipitation and wind.

ECOSYSTEM

Primary production is limited to diatoms and other microscopic and filamentous algae and to Cord Grass. Most energy enters the system from the plankton, or as organic detritus derived from the land or adjacent tidal marshes. The detritus and associated bacteria are consumed by large populations of bivalve molluscs, amphipods and polychaetes. These are, in turn, eaten by carnivores, and particularly by migratory shore birds. The crustacean *Corophium volutator* occurs in the Bay of Fundy intertidal mud flats (Units 912, 913) and is an important food source for the migratory Semipalmated Sandpiper (see T11.6).

PLANTS

Plants are limited to microscopic algae (diatoms) and filamentous algae on the sediment surface, and occasionally seaweeds, such as *Fucus* spp., attached to stones. Some Cord Grass is found at the first stage of tidal-marsh succession, and Eel Grass occurs on the lower shore.

SUCCESSIONAL SEQUENCE

1. In sheltered areas, the deposition of sediment on the shore will eventually raise the level so that seeded or ice-transported Cord Grass may become established.
2. The Cord Grass expands from the point of colonization by vegetative means and accelerates the rate of sediment deposition, developing into the low marsh (see H2.5).
3. When the substrate of the marsh rises to the mean-high-water mark through the accumulation of sediment, the Cord Grass gives way to Marsh Hay and associated plants, and the high marsh develops (see H2.5).
4. With further sediment deposition, the vegetation becomes mainly freshwater: cattail, rushes and reeds, possibly in association with spruce (swamp).

ANIMALS

Animals are predominantly detritus-feeding infauna that can tolerate exposure at low tide and the mechanical difficulties of living in mud. Polychaete worms (*Spiophanes wigleyi*, *Clymenella torquata*), amphipods (*Corophium volutator*) and bivalves (*Mya arenaria*, *Macoma balthica*) are particularly common. Scavengers and carnivores present are polychaetes (*Neanthes virens*), crustaceans (*Chiridotea caeca*, *Crangon septemspinus*) and molluscs (*Ilyanassa obsoletus*, *Lunatia heros*).

Sessile epifauna species, such as barnacles and Slipper Limpets, occur attached to small stones lying on the mud surface. Flounders and other fish species come on to the mud flats to feed at high tide. Mud flats are also important feeding areas for migratory shore birds, such as the Semipalmated Sandpiper, and land mammals (particularly Raccoons).

SPECIAL FEATURES

- Vast numbers of a few species of infauna depend on a diet of organic detritus. Examples of population densities are 15 000/m² for *Corophium volutator* and 3500/m² for *Macoma balthica*. These animal populations support large flocks of migrating shore birds during the late summer. This habitat is critical to the survival of the Semipalmated Sandpiper. Flocks totalling over 280,000 gather at the Head of the Bay of Fundy to feed before continuing their migration south. This is an important ecological

feature of Nova Scotia. Migratory fish also visit to feed on the benthic (e.g., *Corophium*) and epibenthic species (e.g., *Neomysis*, *Mysis*, *Crangon*).

DISTRIBUTION IN NOVA SCOTIA

Mud flats occur in all inlets and estuaries around the coast of Nova Scotia, but the best examples are in Minas Basin, Cobequid Bay (sub-Unit 913a) and Cumberland Basin (sub-Unit 913b).



Associated Topics

T6.1 Ocean Currents, T6.2 Oceanic Environments, T6.3 Coastal Aquatic Environments, T6.4 Estuaries, T7.2 Coastal Environments, T7.3 Coastal Landforms, T10.5 Seed-bearing Plants, T10.9 Algae, T11.6 Shorebirds and other Birds of Coastal Wetlands, T11.12 Marine Mammals, T11.14 Marine Fishes, T11.17 Marine Invertebrates, T12.7 The Coast and Resources

Associated Habitats

H1.1 Open Water, H1.2 Benthic, H2.1 Rocky Shore, H2.2 Boulder/Cobble Shore, H2.3 Sandy Shore, H2.5 Tidal Marsh

Additional Reading

- Risk, M.J., R.K. Yeo and H.D. Craig (1977) "Aspects of marine ecology of the Minas Basin relevant to tidal power development." In G.R. Daborn, ed., *Fundy Tidal Power and the Environment*. Acadia University Institute, Wolfville. (Publication No. 28). pp. 164–179.