

H3.5 WATER'S EDGE LOTIC (RIVERS AND STREAMS)

The water's edge habitat, or hydrosere, of lotic environments is the extension of the streambed habitat onto the shore and is also referred to as the water's edge component of riparian zones, characterized by

hydrophytic vegetation. The edge habitat in rivers and streams is most obvious where deposition or streambed gradient allows for zonation to occur.



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Plate H3.5.1: Slow-moving section of MacLellan's Brook, Inverness County (sub-Unit 551b). The stream margins are defined by energy changes. The left bank is permanently steep, undercut and has overhanging vegetation; the inward curve of the right bank fluctuates with seasonal water flow and depositional activity, creating an ephemeral environment. Herbaceous plants colonize the cobble bar briefly during the height of summer. The elms in the background are the remnants of a floodplain forest (H6.1.3). Photo: R. Merrick

FORMATION

The formation is influenced by water flow and deposition. During periods of high discharge, the edge habitat will increase shorewards, possibly extending to the edge of the floodplain. During periods of low water or intermittent streams, the edge habitat decreases, allowing dry-land vegetation to grow right up to the water's edge. The aquatic extension of this habitat is also influenced by water levels, stream gradient and water clarity. This habitat supports a variety of plant species and provides food and cover for animals that occupy the area and for those found in adjacent aquatic or upland habitats. The habitat also aids in reducing pollution from surrounding land areas by slowing runoff and decreasing erosion. In addition, the hydrosere provides shade that helps maintain suitable water temperatures for aquatic life.

PHYSICAL ASPECTS

1. *Bedrock*: any bedrock and glacial till (fast-moving stream-exposed bedrock; particularly resistant metamorphic or igneous rocks, and boulder or coarse gravel bottoms).
2. *Soil*: fluvial sediments, silt, mud, sand and gravel, with varying amounts of organic material; often mobile in fast-moving streams.
3. *Relief*: in depressions, gently undulating and sloping towards the coast.
4. *Drainage*: wet shoreline; seasonal fluctuation of water levels.
5. *Water conditions*: turbidity, deposition.

ECOSYSTEM

In slow-moving streams, the lotic hydrosere contains a diversity of plant communities, many of which are located in the numerous shallow channels and backwaters of the floodplain margins. Some of the organic material produced is exported downstream; some, which may develop into peat, remains on site; some is consumed by herbivores, such as aquatic insects.

In fast-moving streams, primary production is low because adverse conditions, such as coarse, mobile substrate, restrict plant growth. Production from plants near the stream bank and marginal terrestrial vegetation is soon exported by the current. Few consumer organisms (mainly aquatic insects) can be found. The quality of the ecosystem is directly affected by an increase in water temperature caused by the removal of shade trees from the stream banks.

SUCCESSIONAL SEQUENCE

In slow-moving streams, the development of habitat depends upon the depositional and erosional characteristics of the river. There is a progressive downstream movement of meanders, leaving shallow or deep pools, backwaters, braided channels and oxbow ponds. Sediment is deposited on the floodplain during periods of high water, slowly filling up old erosional features. The plants and animals of the river ecosystem are constantly adjusting to these changing conditions (see Figure T8.2.3).

The fast-flowing young stages of streams will always be present as the river erodes the landscape. Over time, the young stage will mature into a slow-moving stream, but can be rejuvenated when a geological obstacle (e.g., a waterfall) is encountered.

Plants

In slow-moving streams, the variable condition of the habitat results in a diversity of plant communities along the stream bank. A distinct zonation in the type of vegetation usually occurs. This is directly related to substrate stability and drainage for plants located on the bank and to the current for those found in the water. The type of vegetation found along the bank is characteristic of other freshwater habitats, including the hydrosere of ponds (H3.6), bogs (H4.1), fens (H4.2), swamps (H4.3) and floodplain forest (H6.1). Aquatic plants adjacent to the stream bank include rushes and sedges found mainly in stony shallows. Water mosses (*Fontinalis* spp.) are often abundant. In calcareous water the alga *Chara* may also be present.

In fast-moving streams, emerging aquatic plants may be found along the stream banks where the current is reduced. Aquatic mosses are also common in this habitat.

Animals

Similar to plants of the hydrosere, the aquatic animals of the slow-moving stream include the rich diversity described for bog, fen, and the hydrosere of ponds. There is an abundance of aquatic invertebrates dominated by insects. Nymphs and larvae of insects such as blackfly, dragonfly, mayfly, stonefly and caddisfly, as well as adult and larval stages of waterbugs and water beetles, can be found. Leeches, oligochaete worms and molluscs are plentiful in oligotrophic waters. Freshwater mussels may be abundant in some areas and include some species with limited distribution. Various sponges and ectoprocts are also commonly found.

Amphibians such as Mink Frogs, are common and may breed and develop in the shallow backwaters and oxbow ponds. Wood Turtles often lay their eggs on sand stream banks. Most bird species are mainly associated with the adjacent forest habitats; exceptions to this are mergansers, Black Duck, Spotted Sandpiper, and Belted Kingfisher. A few mammals, such as the Water Shrew, Star-nosed Mole, Muskrat, otter, mink, and beaver, are characteristic of this environment.

In fast-moving streams, aquatic animals of the hydrosere are well adapted to withstand the seasonal variations in water level. The most important invertebrates are the aquatic larvae and nymphs of insects, especially stoneflies, mayflies and caddisflies. Blackfly larvae develop on rocks in the well-aerated water and form their pupae on the leaves of submerged plants. Other aquatic invertebrates include sponges (e.g., *Spongilla*), although fewer in number than lakes or slow moving streams, and freshwater mussels (e.g. *Margaritifera*), which are found in patches of gravel. The larvae of river mussels are parasitic on the gills of fish, an adaptation that counteracts the tendency for populations to be carried downstream by the current.

The insect larvae of fast- and slow-moving streams provides the primary food source for many fish species, including Lake Chub, White Sucker and Threespine Stickleback. During times of low water, fish tend to concentrate in the larger pools.

SPECIAL FEATURES

- Special adaptations of stream organisms.
- Breeding habitat for Wood Turtles.
- The heating effect of shade removal due to tree cutting.
- Modification of river courses by human activities, such as gravel extraction and dam construction.

DISTRIBUTION

Slow-moving streams are found in all regions of the province, except where high ground is located close to the sea. Some of the well-developed larger river systems include the Tusket, Medway, Mersey, LaHave, St. Marys (Region 400); the Shubenacadie and Stewiacke (Region 500); the Cornwallis and Annapolis (Region 600).

Fast-moving streams occur throughout the province in upland areas. These include the Cape Breton highlands (Regions 100 and 200), the Cobequid Hills (Region 300), North Mountain (District 710) and South Mountain (District 420). Slow-moving streams flowing to the Atlantic Ocean are often rejuvenated as they pass through the Meguma bedrock near the Atlantic Coast. Examples of this occurrence are the Musquodoboit River (Units 413a and 453) and the St. Marys River (Unit 842).



Associated Topics

T8.1 Freshwater Hydrology, T8.2 Freshwater Environments, T9.1 Soil-forming Factors, T10.5 Seed-bearing Plants, T10.7 Pteridophytes (Ferns and Their Allies), T10.8 Bryophytes Mosses, Liverworts and Hornworts, T10.9 Algae, T11.5 Freshwater Wetland Birds and Waterfowl, T11.11 Small Mammals, T11.13 Freshwater Fishes, T11.15 Amphibians and Reptiles, T11.16 Land and Freshwater Invertebrates

Associated Habitats

H3.1 Open-water Lotic (Rivers and Streams), H3.3 Bottom Lotic (Rivers and Streams), H3.6 Water's Edge Lentic (Lakes and Ponds), H4.1 Bog, H4.2 Fen, H4.3 Swamp, H6.1 Hardwood Forest.

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