

H3.6 WATER'S EDGE LENTIC (LAKES AND PONDS)

The water's edge, or hydrosere, habitat of lentic ecosystems is the marginal edge of lakes and ponds, where rooted plants can grow. The habitat includes shallow water, where sunlight can penetrate to the bottom.

commonly known as the littoral zone (see Figure T8.2.2). The littoral zone often applies to the entire area of ponds, which are generally shallow enough to support submerged vegetation throughout.

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Plate H3.6.1: A sheltered lake shore at Lake Egmont, Halifax County (sub-Unit 511a), showing floating leaves of pond-lilies and emergent Pickerel-weed and rushes. Photo: D.S. Davis.

FORMATION

The water's edge habitat forms at the edge of a lake or pond and is always wet, though the water level may vary seasonally and is invariably frozen for some period during the winter. It is best developed in open, shallow conditions on glacial till in areas of low relief.

PHYSICAL ASPECTS

1. *Bedrock*: any bedrock and glacial till (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.
3. *Relief*: in depressions, gently undulating sandscape.
4. *Drainage*: wet shoreline; seasonal fluctuation of water levels; variations in water levels can vary in relation to hydrodams – lake levels fluctuate artificially.
5. *Water conditions*: turbidity, deposition

ECOSYSTEM

Aquatic life is most abundant in the shallow water around the edges of lentic environments. Plants and animals generally establish a distinct zonation which varies mainly according to water depth (Figure H3.6.1). Rooted macrophytes, such as sedges, lilies and rushes, which grow in shallow, sheltered areas, are the primary producers. They contribute substantially to the productivity of lentic environments and provide a large input of organic material to the ecosystem.

Plant growth relies primarily on the availability of nutrients from sediments found in the benthic habitat (see H3.4). Macrophytes enhance the recycling of nutrients such as phosphorus by putting them back into circulation from the sediments. This process can produce a buildup of nutrients, resulting in increased productivity and the eutrophication of lakes and ponds. The hydrosere also provides favourable habitat for numerous animal species, including invertebrates, amphibians, fish, waterfowl, and small mammals.

SUCCESSIONAL SEQUENCE

The process of succession slowly converts the hydrosere into a terrestrial habitat. The sedimentation and subsequent infilling of a shallow water zone

occurs from several sources. These include organic material produced by plants, silt imported from surface runoff, and the input of suspended sediment from streams. In the early stages of succession, there is a relatively large area of water with distinct zones of plants around the margins. As the pond silts up, these zones progress toward the middle, reducing the amount of water, giving rise to bog, fen, swamp or marsh habitats. The pace at which this takes place depends upon the rates of siltation, the rate of organic production and the rate of decomposition.

PLANTS

The plants occupying the lentic hydrosere can be classified according to four main zones, as shown in Figure H3.6.1.

1. The terrestrial zone of vegetation is characterized by members of the sedge family and sphagnum mosses, and is associated with various fen or swamp plants. In lakeshore areas with a mineral substrate, an association between two plants, Water Lobelia (*Lobelia dortmanna*) and Loosestrife (*Lysimachia* spp.), often develops. This relationship remains dormant until late summer, when water levels are lowest. At this time, these two species become the dominant vegetation in this zone. Other types of plants include Twig-Rush (*Cladium*), Pipewort (*Eriocaulon*) and Broad-leaf (*Spartina pectinata*).
2. The zone of emergent vegetation is characterized by rooted plants with most of their surface above the water. Some of the more common emergent plants found in Nova Scotia include Pickerel-weed (*Pontedaria*), Spike Rush (*Eleocharis*), Bog Buckbean (*Menyanthes*), Pipewort (*Eriocaulon*), Arrowhead (*Sagittaria*), cattail (*Typha*) and bulrush (*Scirpus*). Plant growth relates to the pH of the water, the degree of exposure and geographic location. The emergent plants, together with those on the shoreline, form an important link between water and land environments. They are used for food and shelter by amphibians and aquatic mammals, and provide a convenient means for aquatic insects to enter and exit the water.¹
3. The zone of floating plants is characterized by plants with leaves on or just below the water surface, and emergent flowers. These may be either rooted or not rooted. Common species include Water-lily (*Nymphaea*), pond lily (*Nuphar*), and pondweed (*Potamogeton*). In small ponds with little surface movement, duckweed (*Lemna*) is usually found covering the surface. The

undersurfaces of lily pads provide suitable resting and oviposit sites for various animals.

- The zone of submerged vegetation is located between the open-water habitat (see H3.2) and the shore. The character of the zone varies with the region. The plants generally require oligotrophic water conditions, rather than the dystrophic situations which receive input from acidic environments, such as bogs. Some of the commonly found plants include pondweed (*Potamogeton* spp.), milfoil (*Myriophyllum* spp.), White Water-crowfoot (*Ranunculus trichophyllus*), Canadian Pondweed (*Elodea canadensis*), and the calcareous algae Stonewort (*Chara* spp.). Found mainly in gypsum or limestone bedrock areas (Region 500), Stonewort often indicates the inner boundary of the littoral zone, as it is able to grow in relatively deep water.

ANIMALS

The plant growth at the edges of lakes and ponds provides food for a wide variety of invertebrates, the most important of which are insects. Adult beetles and bugs are common and are mostly predatory, feeding mainly upon the aquatic larvae and nymphs of other insects, such as mosquitos, mayflies, caddisflies and dragonflies. Other species include planktonic and benthic species of crustaceans, as well as numerous ostracods, cladocerans and copepods. Other invertebrates include one widespread species of amphipod (*Hyalella azteca*) and one isopod (*Caecidotea com-*

munis) which is found only in southwestern Nova Scotia and Sydney River (Unit 531). Other invertebrates include species of oligochaete worms, leeches, gastropods (snails) and bivalve molluscs (clams). The diversity of species other than flying insects is generally limited. In small, isolated ponds, species require some form of introduction via a carrier (e.g., the pea clams may be introduced by birds, insects or amphibians). During the summer, small ponds generally experience long dry periods, which requires many invertebrates either to estivate or hibernate until water levels rise.

The number of vertebrate species will vary according to the degree of isolation from larger water systems and the geographic region. Most of the bigger lakes provide for several distinct types of fauna associated with different habitat conditions. The sheltered shores where there is sediment deposition in the hydrosere provide a habitat similar to that found in ponds, and hence the types of animals present are quite similar. However, the diversity of fish species is greater and the predation of invertebrates more significant in lakes than in ponds. Fish include Banded Killifish, Golden Shiner and young White Sucker. In small isolated ponds, fish may be totally absent, which is a distinct advantage for the larvae of salamanders and tadpoles of frogs that utilize the ponds during their early stages of development. Turtles are also mobile and may colonize the larger ponds. They use the sand and gravel banks to lay their eggs. Some amphibians, such as the Green Frog, stay in the edge habitat of ponds as adults; others may disperse to the woods.

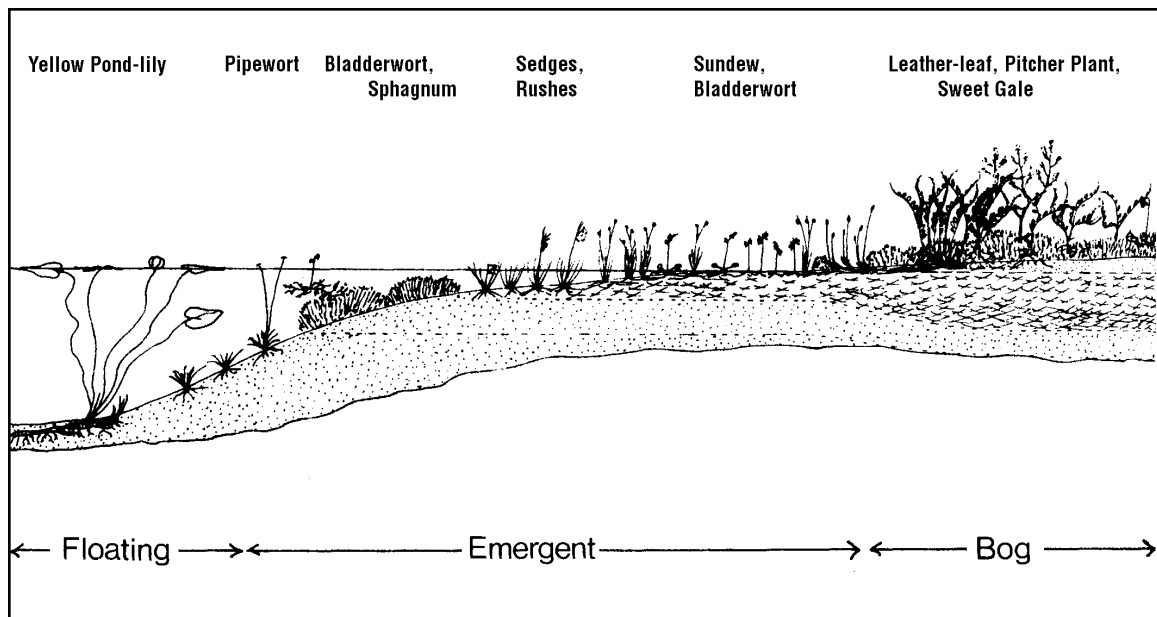


Figure H3.6.1a Zonation of aquatic vegetation at the edge of a dystrophic pond or lake in association with a bog.

Lakes with exposed rocky or cobble shorelines are subject to considerable wave action, which makes the habitat largely unsuitable for rooted vegetation, with the result that animals are correspondingly sparse. Some insect larvae, such as the caddisfly (*Helicopsyche* spp.), and snails (*Physa* spp., *Lymnaea* spp., and *Amnicola limosa*) are found attached to stones. This is generally an impoverished state of the sheltered shore fauna. Mussels such as *Elliptio complanata* burrow in patches of gravel. In addition, the Green Sponge and several species of ectoprocts can be found. Spotted Sandpipers are commonly seen along the shore. Migratory waterfowl, such as Black Ducks and Canada Geese, as well as species of loons, cormorants and gulls are also found in this habitat. Other birds common to the pond habitat include the Red-winged Blackbird, herons, bitterns, small passerines and aerial foragers, such as Tree Swallows. Mammals that may be present include mink, beaver, otter, and Muskrat.

DISTRIBUTION

Found throughout Nova Scotia

SPECIAL FEATURES

- The rare flora of the coastal-plain shoreline (southwestern Nova Scotia) includes Plymouth Gentian and Pink Coreopsis.
- The hydrosere habitat of lakes and ponds supports the developmental and adult stages of numerous invertebrates and vertebrates. Many of these would not exist without the presence of the hydrosere.

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Associated Topics

T8.1 Freshwater Hydrology, T8.2 Freshwater Environments, T9.1 Soil-forming Factors, T10.2 Successional Trends in Vegetation, T10.5 Seed-bearing Plants, 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

H3.2 Open-water Lentic (Lakes), H3.4 Bottom Lentic (Lakes and Ponds), H3.5 Water's Edge Lentic (Rivers and Streams)

References

- 1 Odum, E.P. (1971) *Fundamentals of Ecology*. W.B. Saunders, Philadelphia.

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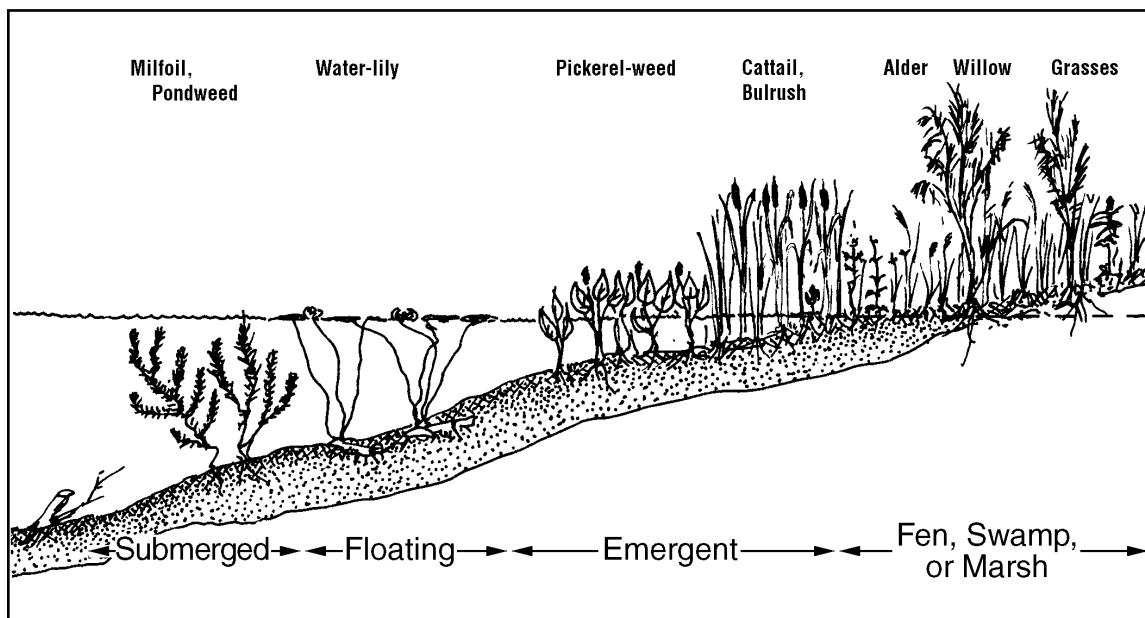


Figure H3.6.1b: Zonation of aquatic vegetation at the edge of an oligotrophic pond or lake in association with a fen.