

## H4.4 FRESHWATER MARSH (INLAND)

*A freshwater marsh is a mineral wetland that is periodically submerged by standing or inflowing water from the surrounding area. Surface-water levels fluctuate seasonally. Flooding occurs in times of high rainfall, and drawdown occurs during dry periods, often exposing matted vegetation or mud. Freshwa-*

*ter marshes often exhibit mosaic surface patterns made up of pools or channels interspersed with clumps of emergent sedges, grasses, rushes and reeds, with bands of shrubs sometimes found along the edges.<sup>1</sup> Submerged and floating aquatic plants are abundant where pools occur.*



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Plate H4.4.1: Freshwater marsh at Lake Egmont, Halifax County (sub-Unit 511a). Photo: A. Wilson.

## FORMATION

Freshwater marshes are formed mainly by the infilling of ponds and shallow lakes. The gradual buildup of nutrient-rich sediments from surface runoff and groundwater seepage results in the formation of the marsh.

The beaver also plays an important role in the formation of some marshes. The flooding of backshore areas by beaver dams causes input of organic material and hence the enrichment of water. In addition, the damming of watercourses reduces drainage and thus increases the amount of sedimentation. This provides suitable conditions for the growth of aquatic vegetation.

## PHYSICAL ASPECTS

1. *Bedrock*: minimal outcropping; soft sedimentary rocks in the watershed contribute to soil development.
2. *Soils*: alluvium, fine material rich in organic material and nutrients.
3. *Relief*: low, generally flat, gently sloping to water.
4. *Drainage*: poor, wet site with standing water in depressions.

## ECOSYSTEM

Freshwater marshes are generally small, but highly productive ecosystems supporting an abundance of plants and animals. Primary production is carried out principally by cattails, sedges and bulrushes, and is strongly influenced by hydrological regimes, such as groundwater, surface runoff, precipitation, and drought cycles. It is also affected by the nature of the watershed in which the wetland lies, soils, nutrient availability, types of vegetation, and the life history of the plant species.<sup>2</sup>

## TYPES OF FRESHWATER MARSHES

Three major groups of marshes have been defined for Canada;<sup>2</sup> all are found in Nova Scotia.

### *Terminal Basin Marsh*

A terminal basin marsh has a well-defined basin filled with water and usually contains robust emergent vegetation. Water is supplied from rainfall, snowmelt or small streams, and sometimes from groundwater springs. The pools are generally shallow, with a mucky organic bottom that can support both submergent and floating plants.

### *Fluvial Marsh*

A fluvial marsh is generally associated with the floodplain of a river and is subject to seasonal flooding and deposition of silt. Portions of the marsh may dry out at certain times. The formation of oxbow lakes is a common occurrence during the frequent changes in the river course at these locations. The cycle of frequent flooding and siltation provides a nutrient-enriched habitat, which supports a variety of vegetation, including rushes, sedges and grasses. The dominant species is often Water Horsetail (*Equisetum fluviatile*), which has a high tolerance to fluctuating water levels.

### *Shore Marshes*

Shore marshes are formed where gravel, sand and soil is deposited along the shores of large lakes by wave, wind or ice action. A marginal basin is then created, which traps water moving from the surrounding watershed. Once sufficient sediments accumulate, marsh plants can become established. Input of nutrients from the lake occurs during periods of high water.

## SUCCESSIONAL SEQUENCE

In the early-successional stages of freshwater marshes, the waterbody gradually infills with sediment from the outer edge towards the centre of the basin. Submergent and floating plants become abundant. As decaying materials and minerals are added, the rate of sedimentation increases and the site becomes progressively more shallow. Emergent vegetation predominates. The major influencing factors are water depth and the effects of aquatic mammals, such as beavers and muskrats. The climax terrestrial vegetation stage is normally reached over a period of a few hundred years.

Under certain conditions, dynamic systems associated with fluvial marshes can display a number of marsh-development stages. The hydrological influences of major river systems can result in a reversal of the successional sequence. Under these conditions, high rates of vegetation decomposition can balance the rates of vegetation productivity; consequently, the sites remain as marsh indefinitely.

## PLANTS

Cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) are both conspicuous plants in most freshwater marshes throughout the province. Shallow water depressions are characterized by a wide variety of aquatic species which includes White Water Lily (*Nymphaea odorata*),

Yellow Water Lily (*Nuphar variegatum*), Floating Heart (*Nymphoides cordata*), pondweeds (*Potamogeton* spp.), bur-reeds (*Sparganium* spp.), Wild Calla (*Calla palustris*), arrowhead (*Sagittaria* spp.), duckweeds (*Lemna* spp.), water smartweeds (*Polygonum* spp.), bladderworts (*Utricularia* spp.), Coontail (*Ceratophyllum* spp.), Water-milfoils (*Myriophyllum* spp.), and Pickerel-weed (*Pontederia cordata*). In addition, Water-shield (*Brasenia schreberi*) and Sweet Flag (*Acornus calamus*) are particularly abundant in northern Nova Scotia.

Significant freshwater marshes can be found in rich floodplain areas of major rivers, such as the Musquodoboit, the Annapolis and the Margaree. Marsh vegetation develops mainly in slow-moving waters, depending on the degree of siltation and local topography. Shrubs, such as alder, *Myrica gale*, and *Spiraea latifolia*, may also be present.

## ANIMALS

Freshwater marshes provide a rich habitat for an abundant and diverse animal population. In the wet mud and shallow water, there are numerous insect species, including deerflies, horseflies and mosquitos. The animals located in the deeper pools are very similar to those found in small ponds (see H3.5). Many of the molluscs and amphibians that breed in local ponds can usually be found in freshwater marshes.

Waterfowl closely associated with freshwater marshes are represented mainly by four duck species: Black Duck, Green-winged Teal, Ring-necked Duck and Blue-winged Teal, as well as the Canada Goose. Marsh habitat provides waterfowl with excellent breeding sites, as well as protection from most predators.

The primary mammals found in marshes include Muskrat, otter and beaver; the latter often can alter the habitat considerably. In certain localities, Moose are also frequent visitors to freshwater marshes.

## SPECIAL FEATURES

- Nutrient-enriched wetlands with an abundance of wildlife.
- Important waterfowl breeding habitat.
- The creation of impoundments as habitats for wetland wildlife.
- Recreational importance—migratory-bird hunting.

## DISTRIBUTION

Although freshwater marshes are associated with numerous lakes and rivers throughout the province, the greatest concentration can be found near

Amherst (District 520). This area, known as the Tantramar Marshes or the Chignecto wetlands, is a intricate system containing thousands of hectares of wetlands, including marshes as well as peatlands. The region is unique in North America for its complex history and pattern of wetland uses.



## Associated Topics

T4.2 Post-glacial Colonization by Plants, T8.1 Freshwater Hydrology, T8.2 Freshwater Environments, T10.2 Successional Trends in Vegetation, T10.4 Plant Communities in Nova Scotia, T10.5 Seed-bearing Plants, T10.8 Bryophytes Mosses, (Liverworts and Hornworts), T11.5 Freshwater Wetland Birds and Waterfowl, T11.15 Amphibians and Reptiles, T11.16 Land and Fresh Water Invertebrates, T12.8 Freshwater and Resources

## Associated Habitats

H3.3 Bottom Lotic (Rivers and Streams), H3.4 Bottom Lentic (Lakes and Ponds), H3.5 Water's Edge Lotic (Rivers and Streams), H3.6 Water's Edge Lentic (Lakes and Ponds), H4.1 Bog, H4.2 Fen, H4.3 Swamp

## References

- 1 National Wetlands Working Group (1987) *The Canadian Wetland Classification System*. Environment Canada, Ottawa. (*Ecological Land Classification Series*, No. 21).
- 2 Smith, R.L. (1990) *Ecology and Field Biology*. Harper and Row, New York.

## Additional Reading

- Larson, G.S. (1976) *Models for Assessment of Freshwater Wetlands*. University of Massachusetts, Boston. (*Publication*, No. 32).
- Manuel, P.M. (1992) *A Landscape Approach to the Interpretation, Evaluation and Management of Wetlands*. Ph.D. thesis, Dalhousie University, Halifax, N.S.
- National Wetlands Working Group (1988) *Wetlands of Canada*. Environment Canada, Ottawa. (*Ecological Land Classification Series*, No 24).
- Tarnocai, C. (1980) "Canadian wetland registry." In *Proceedings, Workshop on Canadian Wetlands*. Environment Canada, Ottawa. (*Ecological Land Classification Series*, No. 12).
- Weller, M.W. (1981) *Freshwater Marshes: Ecology and Wildlife Management*. University of Minnesota Press, Minneapolis.

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