

H4.2 FEN

A fen is defined as a type of peatland with nutrient-rich waters and is found primarily along the edges of lakes and rivers or the perimeters of bogs. Water, the level of which fluctuates seasonally, contains dissolved minerals from the surrounding soils. The

vegetation consists predominantly of sedges, grasses, rushes and mosses, with some shrubs and, at times, a sparse tree layer.¹ A fen is differentiated from a marsh by its peat layer, nutrient load and lower pH.



H4.2
Fen

Plate H4.2.1: Grass-dominated fen near Devon in Halifax County (sub-Unit 436b). Photo: D.S. Davis

FORMATION

Fens are generally formed in the same manner as bogs. The annual growth and accumulation of vegetation remains on poorly drained soils. However, in addition to precipitation, fens also receive other nutrients via seepage waters from the adjacent or surrounding upland soils. Since most fens are only a few centimeters higher than the associated lake or river, they are quite often flooded during periods of high water. The small amounts of sediment that are deposited by these waters on the fen surface have a direct effect on the composition of the vegetation.

PHYSICAL ASPECTS

1. *Bedrock*: variable.
2. *Soils*: generally organics overlying coarse, textured sands and gravels.
3. *Relief*: in flat to depressional areas, particularly around lakeshores and river and stream courses.
4. *Drainage*: well to poorly drained.

ECOSYSTEM

Primary production in fens is carried out mainly by sedges and grasses, with much of the organic material accumulating on the site in the form of peat. The mineral soil on which the fen develops and the periodic inundation by nutrient-rich river water result in moderate productivity. Silts associated with the flooding inhibit the growth of some plant species and limit the diversity of consumer organisms.

Although not abundant in Nova Scotia, fens are still an important feature of the landscape. Anderson and Broughm found that fens were common in the early development of peatlands; they discovered thick layers of sedge-dominated peat at the bottom of many deposits.² In the Kejimikujik area, fens were found to be nutrient-poor and with a low pH, indicating that they are probably in transition to bogs.³

TYPES OF FENS

Fens found throughout the province are generally flat but can sometimes be sloped.

Flat Fen

A flat fen has a very gently sloping, featureless surface. This type of fen occupies broad, often ill-defined depressions and may be interconnected with other fens. Peat accumulation is generally uniform.¹

Sloped Fen

A sloped fen occurs on slowly draining, nutrient-enriched seepage slopes. Pools are usually absent, although wet seepage tracks may occur. Peat thickness is less than two meters.

Atlantic Ribbed Fen

Atlantic ribbed fens have parallel peat ridges and pools that are orientated to the direction and slope and drainage. The peaty strings that develop are often narrow, with pools comprising a large portion of the fen surface area. In Nova Scotia, this type of fen exists only in the Cape Breton Highlands (Region 200).

SUCCESSIONAL SEQUENCE

The fen is highly dependent on the hydrology of the site, especially flooding and sediment deposition. Successional changes within this habitat can occur only when the flood frequency changes. This may take place as the stream channel itself becomes modified, through an elevation in the peat surface, or as additional sediment is deposited from the stream. If flooding should cease, a forest habitat would eventually become established.

If the water level remains steady over an extended period, a net production of organic material accumulates. This raises the system above the flood level of the stream, and a new water table is created. The site then favours bog development, and a *Scirpus caespitosus*-*Sphagnum* subassociation would be established.

PLANTS

The vegetation of a fen is characterised by the Bluejoint Grass-Sweet Gale association. Four sub-associations occupy various surfaces on this floodplain habitat.

1. The *Carex oligosperma* subassociation occurs in the deeper depressions of old stream channels that are frequently flooded with standing water during most of the growing season. Sedge (*Carex oligosperma*) and *Myrica gale* dominate the herbaceous layer. Bluejoint Grass (*Calamagrostis pickerlingii*) is also present. *Drepanocladus exannulatus* and *Sphagnum* spp. dominate the moss layer and are indicative of the very wet habitat.
2. The first Bluejoint Grass (*Calamagrostis pickerlingii*) subassociation occurs in old stream channels and shallow depressions resulting from the infilling of old ponds. This occurs at a higher

relief than that of the sedge subassociation and the surface is submerged only during floods. Grass dominates the vegetation, with characteristic species such as *Myrica gale*, Bog Goldenrod (*Solidago uliginosa*), Bog Laurel (*Rhododendron canadense*) and the sedge *Carex oligosperma*. *Sphagnum* spp. dominate the moss layer.

3. The second Bluejoint Grass (*Calamagrostis Pickeringii*) subassociation develops along the levees of both the present and older stream channels and on floodplain surfaces that are hummocky due to continuous peat deposition. It is submerged only during flooding and then only briefly. This subassociation has two layers: a poorly developed shrub layer consisting of Mountain Fly-honeysuckle (*Lonicera villosa*), Meadow Sweet (*Spiraea latifolia*) and *Myrica gale* and a well-developed herbaceous layer of Bluejoint Grass and *Aster radula* as the dominant species. In addition, Rough Goldenrod (*Solidago puberula*), the Meadow-rue (*Thalictrum polygamum*), Blue Flag (*Iris versicolor*), and Marsh Cinquefoil (*Potentilla palustris*) occur sporadically.
4. The Sweet Gale–Blue Flag subassociation is restricted to the banks of the stream and the edges of cutoff ponds. Moving or standing water is usually present for most of the year. The well-developed shrub layer is dominated by *Myrica gale*, Mountain Fly-honeysuckle (*Lonicera villosa*), Meadowsweet (*Spiraea latifolia*), and Bog Laurel (*Rhododendron canadense*). The herbaceous layer contains Blue Flag (*Iris versicolor*), Northern Manna Grass (*Glyceria borealis*), *Carex aquatilis*, *Carex oligosperma*, and *Carex paupercula*. *Sphagnum* dominates the moss layer. A conspicuous plant is Joe-Pye Weed (*Eupatorium maculatum*), which is often found in Cape Breton and northern Nova Scotia.

ANIMALS

In the wet mud and shallow water, there is an abundant insect population consisting mainly of deerflies, horseflies, and mosquitos. The animals located in the deeper channels are very similar to those found in small ponds (see H3.5). Butterflies and moths (Lepidoptera) associated generally with grasses and sedges are mostly *Crambidaespp.*, small white pyralid moths and *Leucania* spp. Terrestrial molluscs include Succineidae, *Zonitoides nitidus*, and the slug *Deroceras laeve*.

Amphibians that breed in local ponds can usually be found in fens. Frequent bird species consist

of the Virginia Rail, the Yellow Warbler and the Swamp Sparrow, as well as swallows and flycatchers. Common mammals include Cinerous Shrew, Water Shrew, Arctic Shrew, Star-nosed Mole and Muskrat. In addition, many other species may be encountered entering the fen from the adjacent habitats.

SPECIAL FEATURES

- Nutrient-enriched wetlands with an abundance of wildlife.
- Floodplain areas for numerous rivers.
- Contain several rare plant species of the coastal-plain flora (southwestern Nova Scotia).

DISTRIBUTION

Fens can be found scattered along the lower reaches of rivers and lakes throughout the province, especially in lowland areas of Regions 400, 500 and 600.



Associated Topics

T4.2 Post-glacial Colonization by Plants, T8.1 Freshwater Hydrology, T8.2 Freshwater Environments, T9.1–T9.3 Soils, T10.2 Successional Trends in Vegetation, T10.4 Plant Communities in Nova Scotia, T10.5 Seed-bearing Plants, T10.6 Trees, T10.8 Bryophytes Mosses, (Liverworts and Hornworts), T11.5 Freshwater Wetland Birds and Waterfowl, T11.15 Amphibians and Reptiles, T11.16 Land and Freshwater Invertebrates

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, H4.3 Swamp, H4.4 Freshwater Marsh (Inland)

References

- 1 National Wetlands Working Group (1987) *The Canadian Wetland Classification System*. Environment Canada. (*Ecological Land Classification Series*, No. 21).
- 2 Anderson, A.R. and W.A. Broughm (1988) Evaluation of Nova Scotia's Peatland Resources. N.S. Dept. of Mines and Energy, Halifax. (*Bulletin* 6).
- 3 Wood, J.A. and C.D.A. Rubec (1989) "Chemical characterization of several wetlands in Kejimikujik National Park, Nova Scotia." *Water Air Soil Pollut.* 46.