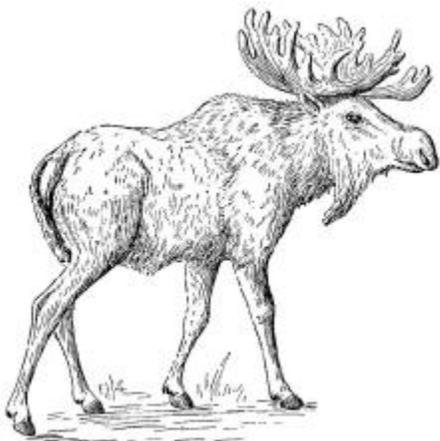


BOGS AND FENS



Bogs and their close cousins--fens--are biologically fascinating wetlands. Their deep peat layers offer a glimpse into the geologic past--seeds, plant parts, and even animals may remain intact in the acidic peat for thousands of years. If a bog or fen exists on your property, consider yourself lucky as they are very rare.

In Michigan, bogs and fens occurred historically as a result of glaciation, dating from about 8,000 to 12,000 years ago when the last ice sheets retreated north, although some bogs and fens are only 3,000 to 5,000 years old. The retreat of these glaciers created tundra climates, and over time, forests of spruce and fir, which still dominate in the north. However, bogs and fens began to form in areas that were too wet for most trees to grow, and that had poorly drained dark soils and cold water. Although both bogs and fens are similar types of wetlands as they

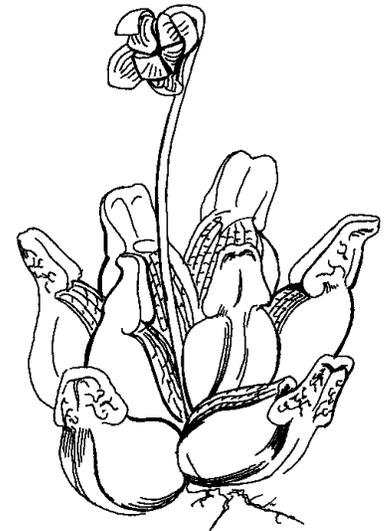


are both considered peatlands, what sets them apart from each other is the source of their water supply. Fens typically are fed by a steady source of ground water whereas bogs are usually enclosed depressions filled by rain water.

These unusual wetlands are home to a variety of plants and animals including unique bog lemmings, pitcher plants, and sundews. The familiar song sparrow and red-winged blackbird live there along with yellow-bellied flycatchers, and Nashville warblers, which nest only in northern Michigan. American goldfinch, American woodcock, alder and willow flycatchers, and golden-winged and chestnut-sided warblers are other birds that use them. Ruffed grouse eat the catkins of bog birches, which often grow around the edges of bogs and fens, and migrating ducks use their open pools. Because bogs attract insects, shrews, mice, frogs, and toads, they also attract mink, raccoons, herons, and other predators. Moose also use these areas in the Upper Peninsula. In winter, the white cedar forests that often surround many bogs yield important browse and cover for deer.

Bogs

Bogs are unique wetlands because their nutrient-poor systems support a specific group of plant species. Such plants include carnivorous species such as pitcher plants, sundews, and bladderworts, which eat insects and are able to



pitcher plant

retain water from precipitation, and sphagnum moss, which grows abundantly over the layers of peat found here. Common shrubs include leatherleaf, bog laurel, bog rosemary and Labrador tea. Blueberries and cranberries are also common.

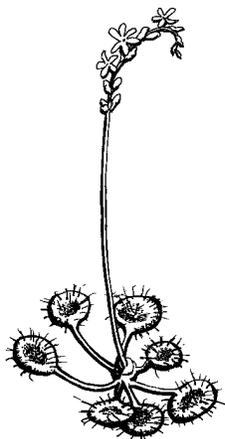
Although they occur throughout Michigan, bogs are more numerous in the Upper Peninsula where they are found along the margins of lakes and ponds and in depressions created by glacial activity. Many southern Michigan bogs, however, were converted to muck farms, and in many other cases landowners felled the trees, drained the bogs, and plowed the soil for agriculture.

Bogs often lie in frost hollows or other cold, wet environments where cold air and water are trapped. On clear nights, heavier

cold air settles to the ground and flows down slopes and valleys often ending in bog lakes or ponds. Although daytime surface temperatures may reach 90 to 100 degrees Fahrenheit, the root level of plants growing within a bog are typically 45 to 55 degrees Fahrenheit. Because of the great insulating quality of sphagnum moss, these areas rarely exceed 60 degrees Fahrenheit.

As bogs age, they tend to become more acidic. As peat accumulates in bogs, it becomes tightly compressed by the weight of material lying over it, and the oldest part turns into fine-textured black muck. This compressed peat becomes impermeable, cutting off the bog from the water table making it acidic, or mineral poor. Over time, the older peat is colonized by shrubs and then trees such as white pine, tamarack, and black spruce.

There are two ways that bogs are formed in Michigan: kettle-lake bogs, and paludification bogs. These processes may take thousands of years. In the Great Lakes region various estimates for forming a single foot of peat range from 100 to 800 years.



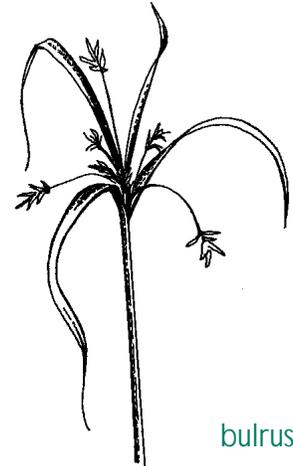
sundew

Kettle-lake bogs begin as reeds, sedges, and mosses around the edges of lakes formed by glaciation. This vegetation slowly expands across the entire lake surface, forming a floating mat of peat. This mat slowly consolidates and is then dominated by sphagnum moss and other bog plants. Over time, the peat forms an impermeable layer and isolates the bog from the water table. Shrubs and trees then begin to move in. Thus, this process of natural succession turns an open-water lake into a forested wetland. This process may also reverse itself during cooler and wetter periods and become more open.

Paludification bogs are formed by the blanketing of previously dry land by overgrowth of bog vegetation as it exceeds its basin boundaries. These bogs can be brought about by climatic change, hydrological change caused by beaver dams or logging, or the natural advancement of a peatland. Once this blanket advances and begins to accumulate, the formerly mineral-rich soil is cut off from the water table creating acidic conditions. This kills many existing trees and allows bog vegetation to dominate.

Fens

Fens are somewhat rare in Michigan. They are peat-covered grassy wetlands that are springy when walked upon. Fens are fed by mineral-rich artesian groundwater in the form of springs, rivulets, marl flats, or saturated peat. The constant supply of groundwater being forced up through accumulating peat causes some fens to appear higher than the surrounding terrain. Because the groundwater is rich in calcium and magnesium car-



bulrush

bonates, the water is usually neutral or alkaline. Fens are often found on hillsides along lakes, streams, and rivers, which occur in glacial outwash on sandy glacial lakebeds. Others are located in broad outwash channels. Researchers distinguish among several different kinds of fens: prairie fens, northern fens, patterned fens, and poor fens.

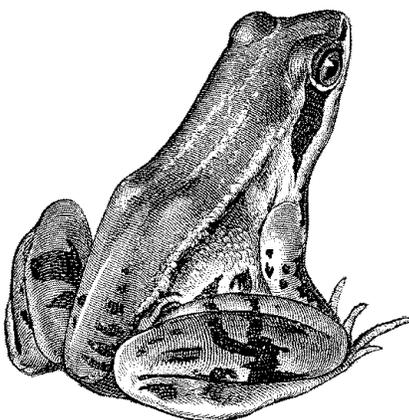
Prairie fens are found in the former oak-savanna prairie region of southern Lower Michigan. They are very rich in calcium and magnesium. Typical plants found in prairie fens are switchgrass, Indiangrass, big bluestem, sedges, rushes, Indian plantain, and prairie dropseed. The wettest part of a prairie fen, which is usually found near the water source, is called a "sedge flat" because members of the sedge family dominate the vegetation. The "fen meadow" is the largest part and is more diverse with many lowland prairie grasses and wildflowers. Slightly elevated areas, especially around the upland edge, also support tamarack, dogwood, bog birch, and poison sumac.

Northern fens are dominated by sedges and rushes and are found in areas of northern Michigan where limestone bedrock is cov-

ered with a thin mantle of glacial drift. Marl flats are very common in these places. Orchids, gentians, and other plants may be present. Bulrush, spike rush, cinquefoil, sawgrass, and white cedar usually surround northern fens.

Patterned fens have a gentle slope of less than one percent per mile, tend to have both acidic and alkaline areas, and feature strips of sedge-peat ridges only a few inches high alternating with depressions. The depressions are wettest with sedge and rush dominating. Besides sedges, the ridges may contain sphagnum, bog rosemary, bog birch, shrubby cinquefoil, leatherleaf, and stunted white spruce and larch. Patterned fens tend to occur on larger flat outwash or lake plain areas in the Upper Peninsula.

Poor fens are those peatlands with reduced water flow and lower mineral content. Consequently, the saturated peat is somewhat acidic. These fens occur throughout the northern Lower Peninsula and Upper Peninsula. Dominated by sedges and grasses, poor fens lack the plant diversity of northern and patterned fens.



Management Considerations

Bogs and fens are extremely sensitive to disturbance. Land-owners cannot create bogs or fens on their property. Bog management amounts to not disturbing the natural succession process and hydrology. Modifying the bog to convert it to a cranberry marsh will destroy the original plant community. Harvesting the top layers of sphagnum for commercial market will damage the fragile ecosystem. Researchers have little information about the recovery rate of harvested bogs but assume recovery is probably very slow or may never occur.

The following are options to consider when managing bogs and fens:

- Protect the mineral-rich groundwater source of fens from pollution or drainage or other alterations in hydrology.
- Avoid diverting or damming water flowing out of fens. Mowing for hay and allowing livestock to graze can also destroy these unique wetlands.
- Periodic burning in winter or early spring may help to retard the invasion of woody species, but because fire can be damaging as well as beneficial, be sure to consult with local fire authorities and a resource professional. Historically, many fens burned along with the surrounding prairie and forest, which were set by Native Americans or lightning. Fire burned the mulch and top growth of the fen--the specialty plants--with little danger to the peat below because of the steady water supply.
- Cottontail rabbits and snow-

shoe hares may help decrease the invasion of surrounding dogwood, willow, and other woody plants because these are their preferred food in winter.

- Avoid using fertilizers near any wetland. However, be especially careful near fens as polluted runoff can alter fen vegetation, gradually increase invasive species over natives. Remove invasive species such as garlic mustard, glossy buckthorn, or purple loosestrife, whenever they appear in order to avoid future problems.

- Do not alter water courses. Hydrology or water availability is a very important concept in maintaining bogs and fens. For example, changing water courses typically causes the soil to dry out, which can lead to the invasion of lowland and upland tree and shrub species. Also, additional water or drought over several years can have a major impact on the health and condition of these wetlands. Draining adjacent uplands might lead to a higher water table, which can also affect the site. Also, do not dig a pond within the site. Because of their importance and uniqueness, bogs, fens, and their adjacent uplands should be left alone if



garlic mustard

BOGS AND FENS

you want to maintain the existing bog and fen.

- Create a buffer strip of at least 100 yards around the wetland. This can be done by planting shrubs or grasses, or by not disturbing the area. Do not develop roads or trails in the bog, fen, or buffer strip.

- If livestock have access to the site, be sure to fence around it because heavy use by cows, horses, or sheep can damage the vegetation, disturb the soil surface layer, and pollute the water with manure.

In summary, bogs and fens are highly unusual, important places. They are important to wildlife seeking secure cover where they can feed, nest, rear their young, and escape predators. They also provide areas for many types of unique, threatened, and endangered plant and animal species. If you have a bog or fen on your property, enjoy its uniqueness and diverse plant and animal life.

**FOR ADDITIONAL
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Private Land Partnerships: This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information, and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this guide provides you with the knowledge and the motivation to make positive changes for our environment.

FOR ADDITIONAL ASSISTANCE: CONTACT YOUR LOCAL CONSERVATION DISTRICT