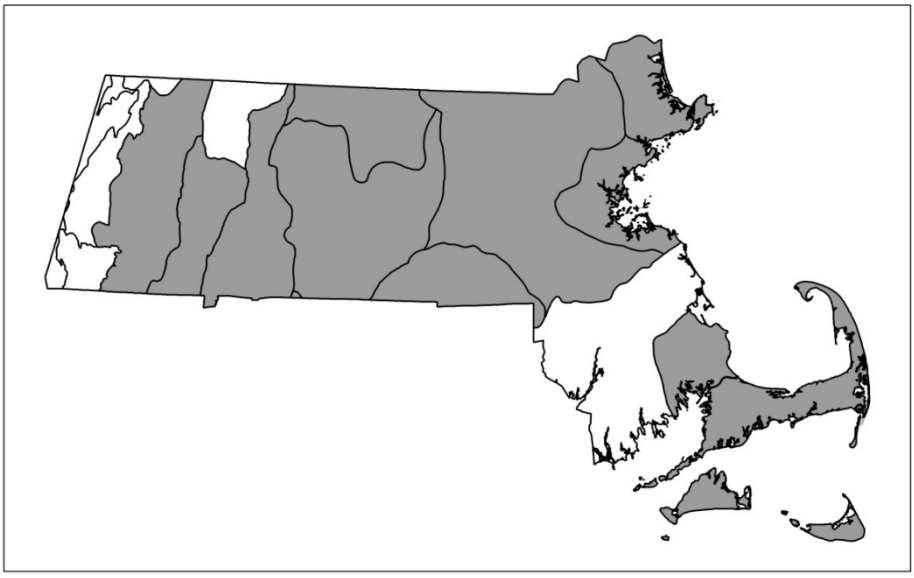
Level Bog

Community Code: CP2B0C1000

State Rank: S3



Concept: Acidic, dwarf ericaceous shrub peatlands, generally with pronounced hummock-hollow topography. Level Bogs are the most acidic and nutrient-poor of Massachusetts peatland communities.

Environmental Setting: Level Bogs are peatlands: wetlands with incompletely decomposed plant material (peat) that accumulates when saturated year-round by water that is cool, acidic, poorly oxygenated, and low in nutrients. They receive little or no stream flow and they are isolated from the water table, making them the most acidic (pH range 3 to 4), and nutrient-poor of peatland communities. Level Bogs develop along pond margins, at the headwaters of streams, and in pockets within large basins. Level Bogs that develop in isolated valley bottoms without inlet or outlet streams are classified as Kettlehole Level Bogs, a subset of Level Bog. The word "level" is used to differentiate Massachusetts bogs from the raised or domed bogs of more northern latitudes, where peat becomes so thick that the surface of the bog is actually domed, and the only way nutrients enter the system is through precipitation. Massachusetts' climate is not cold enough for raised bogs to develop; the state is at the southern limit of the geographic range of peatlands.

Vegetation Description: Sphagnum moss (*Sphagnum* spp.) is the most common plant in all acidic peatlands, forming a mat that the vascular plants grow on and producing most of the peat that underlies the community. Level Bogs are characterized by a mixture of tall and short shrubs that are predominantly in the heath family. Leatherleaf (*Chamaedaphne calyculata*) is dominant with other shrubs, typically including rhodora (*Rhododendron canadense*), sheep laurel (*Kalmia angustifolia*), bog laurel (*K. polifolia*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), Labrador tea

(*Rhododendron groenlandicum*), highbush blueberry (*Vaccinium corymbosum*), and low-growing large and small cranberry (*Vaccinium macrocarpon* and *V. oxycoccos*). Scattered, stunted trees (primarily tamarack (*Larix laricina*) and black spruce (*Picea mariana*), with red maple (*Acer rubrum*) saplings) occur throughout. A mixture of specialized bog plants grow on the hummocky sphagnum surface, including carnivorous pitcher plants (*Sarracenia purpurea*) and sundews (*Drosera rotundifolia* and *D. intermedia*).

Differentiating Occurrences: Natural communities on acidic peatlands all occur on sphagnum peat. The depth, density, and strength of the underlying peat control the structure and composition of each type of peatland community because plants growing on it are isolated from nutrients carried by groundwater. Level Bog communities receive little or no stream flow and they are isolated from the water table, making them the most acidic (pH ~ 3 to 4) and nutrient-poor of peatland communities. The sphagnum peat tends to be deep and well-developed, graminoids may be present but not dominant, and shrubs are dominated by leatherleaf. Kettlehole Level Bogs are a subset of Level Bogs that occur in iceblock depressions (commonly called kettleholes) in sandy glacial outwash. They are typically small (<3 acres) and round, and they lack inlets and outlets. Atlantic White Cedar Bogs have a sparse canopy (averaging <25%, but there may be local clumps of trees) cover of Atlantic white cedar over sphagnum on peat. Atlantic White Cedar Bogs share many species and characteristics with other acidic peatlands, including Level Bogs. Acidic Graminoid Fens are differentiated by the dominance of graminoid and herbaceous species and lack of extensive shrubs. Threeway sedge (*Dulichium arundinaceum*) and buckbean (*Menyanthes trifoliata*) are characteristic of the wet, nutrient-enriched edges of Acidic Graminoid Fens. Sea-level Fens occupy the interface between estuarine marshes and upland seepage slopes, and therefore have a distinct species assemblage including both estuarine and palustrine species. Regionally, three species have been identified as diagnostic: saltmarsh straw-sedge (*Carex hormathodes*), saltmarsh spike-sedge (*Eleocharis rostellata*), and saltmarsh threesquare (*Schoenoplectus americanus*). Twig-sedge (*Cladium mariscoides*) at the edges of salt marshes is also used as an indicator of Sea-level Fens. Interdunal Marshes/Swales occur as part of a coastal dune system. They are graminoid- or shrub-dominated communities occurring in shallow basins (swales) between dunes. Some are fen-like with cranberries and sedges growing on shallow peat, but occurrence in dune systems is the defining characteristic. Acidic Shrub Fens are composed primarily of low-growing, interwoven shrubs. Dense water-willow and sweet gale are indicative and characteristic. Acidic Shrub Fens are wetter with a less well-developed sphagnum mat than other acidic peatlands. Spruce - Tamarack Bogs are acidic forested peatlands, with an overstory of black spruce and tamarack and an understory of heath shrubs on sphagnum moss.

Associated Fauna: Due to the extended periods of saturation, the lack of nutrients, and the high acidity and low oxygen content of the water, acidic peatlands are inhospitable to many animal species. Winged animals and large terrestrial animals can use peatlands as part of their habitat and then move on when conditions are

unfavorable. Moose and white-tailed deer use acidic peatlands for browsing and grazing, and their trails are often evident across the peat mat. Bears are attracted to the cranberries and blueberries in season. Many bird species use peatlands for part of the year as nesting or foraging habitat. Massachusetts birds that can be found in acidic peatlands include Swamp and White-tailed Sparrows, Common Yellowthroat, Olive-sided and Alder Flycatchers, Red-winged Blackbirds, and Gray Catbirds. The acidity and low oxygen content of Level Bogs make them poor habitat for most amphibians and reptiles, although some species can breed in the shallow pools that form among the sphagnum hummocks. Many species of dragonflies and damselflies inhabit acidic peatlands, especially where there is adjacent open water.

Public Access: Bog surfaces are damaged by trampling; sites with boardwalks are best suited to visitation, such as Ponkapoag Bog (DCR), Canton; Poutwater Pond (DCR), Sterling; Black Pond Nature Preserve (TNC), Norwell; Hawley Bog, Hawley.

Threats: Hydrologic alteration and nutrient enrichment from road and lawn runoff. Trampling from humans affects peat mat integrity.

Management Needs: The public should be encouraged to visit only those sites with established boardwalks. Signs need to be posted along boardwalks encouraging visitors to stay off the peat mat. Monitor the impact of salt and other nutrient runoff into bogs, and work to minimize runoff. Remove phragmites where it has become established.

USNVC/NatureServe: A3451 *Sphagnum rubellum - Rhynchospora alba* Sub-boreal Peat Lawn Alliance - *Sphagnum rubellum - Vaccinium oxycoccos* Nonvascular Vegetation [CEGL006135]; and in part A3450 *Chamaedaphne calyculata* Sub-boreal Dwarf-shrub Acidic Peatland Alliance - *Chamaedaphne calyculata* - (*Gaylussacia bigeloviana*) - *Decodon verticillatus*/*Woodwardia virginica* Dwarf-shrubland [CEGL006008]. Probably A3481 *Chamaedaphne calyculata - Kalmia polifolia*/*Carex oligosperma* Acidic Shrub Bog and Fen Alliance - *Chamaedaphne calyculata*/*Eriophorum virginicum*/*Sphagnum rubellum* Dwarf-shrubland [CEGL006513] and *Rhododendron canadense - Chamaedaphne calyculata* Dwarf-shrubland [CEGL006514].