

# Natural Heritage & Endangered Species Program

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## Hemlock-Hardwood Swamp (S4)

State Status: None  
Federal Status: None



Hemlock-Hardwood Swamp showing the fern understory and sun flecks coming through the dense canopy. Photo: Patricia Swain, NHESP.

**Description:** Hemlock-Hardwood Swamps (S4) are relatively common types of forested wetlands characterized by a dense tree canopy that is dominated by mature Eastern Hemlock (*Tsuga canadensis*). The dense canopy allows little light to reach the forest floor. Any of a number of hardwood tree species may be present and often occur in small gaps or patches within the tall canopy. Due to the nearly closed and mostly coniferous canopy, the understory tends to be open with patches of Cinnamon Fern (*Osmunda cinnamomea*) and extensive areas of Sphagnum mosses. Hemlock-Hardwood Swamps tend to occur in large or long depressions and often contain standing water and small intermittent streams. These wetland communities are usually low in overall plant species diversity but often have very large hemlocks, hummock-hollow topography, and large patches of mosses. Hemlock saplings may persist in the understory for many decades, to be released and grow into maturity when canopy gaps occur.

**Environment:** These swamps tend to occur in poorly drained basins or long linear depressions over glacial till, along stream or river riparian zones or the base of hills and ridges. The soils tend to be acidic, nutrient poor, high in organic matter and primarily saturated or flooded throughout most of the growing season. Some groundwater seepage appears to be typical and small intermittent streams are often visible flowing within these forested wetlands. Hummock-hollow microtopography and windthrows of large trees are common. Seasonally flooded depressions within Hemlock-Hardwood Swamps may function as vernal pools when they are isolated from perennial streams.

**Characteristic Species:** These forested wetlands are characterized by abundant Eastern Hemlock in a mature canopy, with Yellow Birch (*Betula allegheniensis*), Ashes (*Fraxinus spp.*), and Red Maple (*Acer rubrum*) as common hardwood associates. Large Eastern White Pines (*Pinus strobus*) sometimes grow on the higher hummocks. The sparse subcanopy tends to occur in gaps created by windthrows, usually comprised of the overstory species with Grey Birch (*B. populifolia*), Ironwood (*Carpinus caroliniana*), and Black Gum (*Nyssa sylvatica*) occasionally present as well. The poorly developed shrub

layer has sparse and patchy cover with Highbush Blueberry (*Vaccinium corymbosum*), currants (*Ribes spp.*), Mountain Holly (*Nemopanthus mucronatus*), and hemlock most characteristic; Mountain Laurel (*Kalmia latifolia*), Alders (*Alnus spp.*), Witch Hazel (*Hamamelis virginiana*), Winterberry (*Ilex verticillata*), and Maleberry (*Lyonia ligustrina*) are sometimes present. Ferns are the most prominent herbaceous component, especially Cinnamon Fern (*Osmunda cinnamomea*) and Royal Fern (*Osmunda regalis*), although there are many portions of the forest floor with little vegetation or extensively covered with mosses, due to low light penetration through the hemlock canopy. Goldthread (*Coptis trifolia* ssp. *groenlandica*) is characteristic in the herb layer with Skunk Cabbage (*Symplocarpus foetidus*), Canada Mayflower (*Maianthemum canadense*), Whorled Aster (*Oclemena acuminata*), Partridgeberry (*Mitchella repens*), Starflower (*Trientalis borealis*), and blackberries (*Rubus spp.*) often present. In areas with more hardwoods in the canopy, there is higher species diversity including Sensitive Fern (*Onoclea sensibilis*), Marsh Fern (*Thelypteris palustris*), and occasional woodferns (*Dryopteris carthusiana*, *D. intermedia* and *D. cristata*). Sedges are commonly present in low amounts, although more field studies are needed to characterize the diversity of graminoids in this community. Hemlock-Hardwood Swamps are characterized by extensive cover of Sphagnum mosses in the lowest areas or in saturated hollows. Orchids are found occasionally, although field work is needed to determine the particular species that are characteristic of this community type in Massachusetts.

Variants of Hemlock-Hardwood Swamps appear to be present in Massachusetts. In the western portion of the state over calcareous substrates or with calcium enriched seepage waters, these swamps are characterized by a much more diverse floral assemblage, including Elm (*Ulmus* sp.), Spicebush (*Lindera benzoin*), Poison Ivy and Poison Sumac (*Toxicodendron rydbergii* and *vernix*), Marsh Marigold (*Caltha palustris*), Spotted Touch-me-not (*Impatiens capensis*), Jack-in-the-pulpit (*Arisaema triphyllum*), Pennsylvania Bittercress (*Cardamine pennsylvanica*), Water Avens (*Geum rivale*), Wood-sorrel (*Oxalis montana*), Green Wood Orchid (*Platanthera clavellata*), Blue Marsh Violet (*Viola cucullata*), and Hemlock Parsley (*Conioselinum chinense*). These richer Hemlock-Hardwood Swamps lack the true calciphiles of calcareous seepage swamps, but do grade into that community type. In northern and western portions of the state at higher elevations, Hemlock-Hardwood Swamps often include a low percentage of Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*) scattered in the canopy and understory. This variant grades into Spruce-Fir Swamps, differentiated by the dominance of spruce or fir and the addition of species typical of colder or northern areas.

**Range:** Hemlock-Hardwood Swamps occur throughout most portions of Massachusetts, with the exception of our highest elevations (above about 1700 ft), Cape Cod and the islands. In the southeast part of the state, these swamps seem to have less moss and mix with Atlantic White Cedar (*Chamaecyparis calyculata*) and other species typical of the coastal plain or more southern areas, grading into Atlantic White Cedar Swamps.

**Related Communities:** Spruce-Fir Swamps are dominated by Spruce and Balsam Fir and tend to be at higher elevations in the Berkshires and northern portions of the state. Hemlock may be present in low percentages.

Black Gum Swamps tend to be in smaller confined depressions in the north central portion of the state and are characterized by abundant large Black Gums in the canopy.

Hemlock Ravine Communities are upland forests dominated by Eastern Hemlock on slopes..

**Management Considerations:** Changes in hydrology, water pollution, soil compaction, and the Hemlock Woolly Adelgid are the greatest threats. Nearby development or road building can result in hydrological and water contamination impacts. Improper delineation of wetlands can result in additional impacts from development and forestry operations including impacts from woods roads and trails (logging and ORV traffic). The Hemlock Woolly Adelgid is a non-native pest that is present throughout much of the state on some sites and is capable of causing complete mortality.

**Status in Massachusetts:** Hemlock Hardwood Swamps are ranked as S4, meaning that they are relatively common and presumed to be secure throughout most of the state at this time. NHESP does not survey for the community type and tracks only those occurrences considered to be of excellent quality.