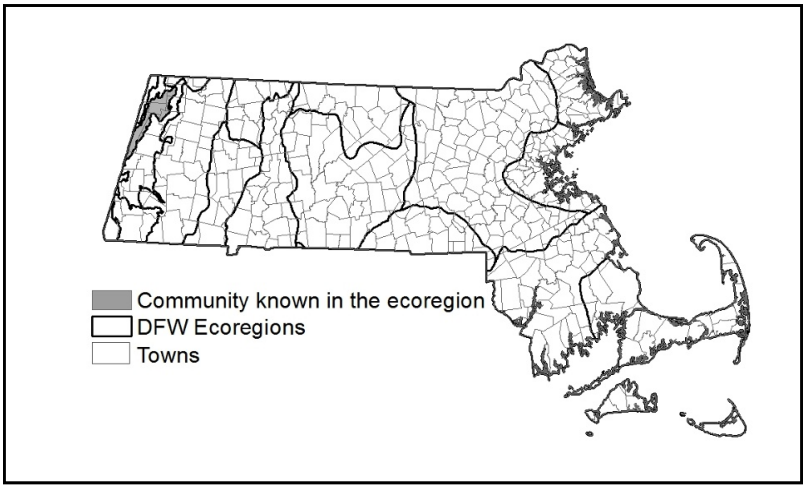
High Elevation Spruce - Fir Forest/Woodland

Community Code: CT1D300000

State Rank: S1



Concept: Forest/woodland with trees dwarfed from wind on the ridgeline of the tallest, most exposed mountain in Massachusetts. Conifers (balsam fir and red spruce) dominate and often form dense thickets.

Environmental Setting: High Elevation Spruce - Fir Forests/Woodlands are very uncommon in Massachusetts, occurring only above 915 m (3000 ft.) at the highest elevations in the state on the upper and often very steep northern slopes of the Mt. Greylock massif. Strong winds and heavy winter snow and ice sculpt and stunt plant growth producing a dense, short (approximately 5-10m (15-33 ft.)), and often patchy tree canopy. The soils are generally thin, acidic, and nutrient poor and often there are areas of exposed granite, schist, or gneiss bedrock. The evergreen canopy trees and their associates are adapted to severe weather conditions with a relatively short growing season and low average temperatures. Species diversity is naturally low, but includes plants and animals that, like the community, are very rare here but more common to the north. Due to the cold temperatures and acidity of the habitat and conifer needles, decomposition of the organic matter is slow, resulting in a thick humus layer.

Vegetation Description: High Elevation Spruce - Fir Forests/Woodlands are low diversity coniferous forest of high elevations, usually on steep stony, upper slopes or level ridgetops. Balsam fir (*Abies balsamea*) is dominant, associated with red spruce (*Picea rubens*). Paper birch, heart-leaf paper birch (*Betula papyrifera* and *B. cordifolia*), and yellow birch (*B. alleghaniensis*) occur in lower numbers. Where there is light shrubs such as mountain maple (*Acer spicatum*), mountain holly (*Ilex mucronata*), American mountain ash (*Sorbus americana*), and hobblebush (*Viburnum lantanoides*) may grow. A few sedges are present in low amounts, including northern stalked sedge (*Carex debilis* var. *rudgei*) and New England sedge (*C. novae-angliae*). Blue-bead lily (*Clintonia borealis*), mountain wood-sorrel (*Oxalis montana*), bunchberry (*Chamaepericlymenum canadense*), bristly clubmoss (*Spinulum annotinum*), and shining fir-moss (*Huperzia lucidula*) grow scattered on a thick layer of needles or on mosses that form thick mats on fallen logs and on the forest floor.

Differentiating Occurrences: In Massachusetts, High Elevation Spruce - Fir Forest/Woodland occurs only on the Greylock massif at the very highest elevations in the state, and has short, sculpted trees with >75% spruce and fir combined, with the rest of the canopy dominated by birches with other northern hardwoods. Downslope they grade into Spruce - Fir - Northern Hardwoods Forests (SFNHF) that occur at slightly lower elevations in the Berkshires and also in the higher elevation areas of the northern Worcester Plateau. SFNHF has taller, less windswept trees; red spruce is a dominant or at least present with other conifers including balsam fir and eastern hemlock, as well as northern hardwoods. If spruce or fir is present in Northern Hardwoods - Hemlock - White Pine Forests or Successional Northern Hardwood Forests, it is as scattered individuals, <25% cover.

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Habitat Values for Associated Fauna: The top of Massachusetts's highest, most exposed mountain provides habitat for some northern animals such as Swainson's Thrush (*Catharus ustulatus*) and Yellow-bellied flycatcher (*Empidonax flaviventris*), as well as several state-protected species. Also expected would be more widespread species that use conifer forests, such as snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*), northern flying squirrel (*Glaucomys sabrinus*), deer mouse (*Peromyscus maniculatus*), and birds such as Olive-sided Flycatcher (Contopus cooperi).

Threats: Development of the summit, clearing for paving, trails, ski lift facilities, or communications towers. In these areas, some non-native invasive grasses such as sweet vernalgrass (*Anthoxanthum odoratum*) and other graminoid species can be a problem. Climate change is expected to affect the community in Massachusetts, as they only occur at our coolest, highest elevations now. The forest pests and fungi that affect Red Spruce and Balsam Fir may be more vigorous in a warmer climate, further damaging trees that have other environmental stresses as well.

Management Needs: Due to the rarity of this forest type in the state, efforts to remove non-native invasive species should be pursued. It is very important to protect the remaining acreage of this community from avoidable disturbances such as increased clearing for parking and road work and ongoing problems of siltation and sedimentation from existing roadways and parking lots. Long term monitoring of the species composition of this community would be helpful in order to increase understanding and protection efforts.

USNVC/NatureServe: A0150 *Picea rubens* - *Abies balsamea* Forest Alliance -- *Abies balsamea*- (*Betula papyrifera* var. *cordifolia*) Forest [CEGL006112]; A3314 *Picea rubens* Woodland Alliance -- *Picea rubens*/ *Vaccinium angustifolium* - *Sibbaldiopsis tridentata* Woodland [CEGL006053].