
ENVIRONMENTAL Fact Sheet



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Atlantic White Cedar Swamp Communities

General Description

Atlantic white cedar (*chamaecyparis thyoides*) is geographically restricted to freshwater wetlands in a narrow band along the eastern coastal US ranging from Mississippi to Maine. This rare tree species generally decreases in abundance with increasing distance from the coast. Throughout the northeast, only a fraction of earlier stands remain.

In New Hampshire, Atlantic white cedar swamps (also referred to as cedar bogs) are uncommon. Changes in hydrology -- in particular the raising of water levels -- have resulted in the historical elimination of cedars from a number of wetlands; but some excellent swamps still remain. The distribution of Atlantic white cedars in the state (there are 30 documented swamps in 20 towns) is basically concentrated in three major areas: the Rye-Portsmouth area; the Newton-Kingston area; and in several inland areas running from Sutton to Antrim. A few swamps also exist outside of these three locations.

Atlantic white cedars grow at elevations ranging from sea level to 1,500 feet, and can occur shoreward of lakes, river or stream channels, or estuaries; on river flood plains; in isolated basins; or on slopes. They grow primarily on organic soils (commonly termed "peat" or "muck") which are usually saturated by water for long periods of the growing season; the ground water in these swamps can also be highly acidic. Cedar forests may be composed exclusively of an even-aged cedar stand of close-ranked trees, or of uneven-aged mixed stands. In mixed stands, the most frequently encountered trees are red maple and black gum. Cedar-dominated swamps generally have higher water levels than nearby red maple swamps and are flooded for longer periods.

Ecology & Environment

Atlantic white cedars grow extremely slowly. Investigations have discovered 200 year old trees no more than eight inches in height. They usually grow on hummocks slightly elevated above and surrounded by hollows where the water level may be up to four feet deep, or as low as a foot below the surface. Depending on the swamp's location, the hollows can be seasonally flooded, saturated, or hold standing water for extended periods during or throughout the growing season.

In New Hampshire, cedar swamp water levels are normally the highest in late winter and early spring, and the lowest during late summer and early fall. Mature white cedars are adapted to a wide range of water depths. However, rapid, prolonged change in water depth stresses or kills mature trees, and kills seedlings outright.

Because it is shade-intolerant, white cedar does not reproduce beneath its own living canopy or that of deciduous swamp forest. It requires relatively open conditions for healthy seedlings to grow. Under natural conditions, most white cedar seeds do not germinate until the start of the second or third growing season after seed fall. The overwinter storage of seeds in a cool, moist environment, such as in the moss and peat of a swamp floor, appears to promote germination. Some studies indicate that proper germination may only be successfully reached in an environment that has supported Atlantic white cedar populations in the past.

Another key requirement for Atlantic white cedar reproduction is the random occurrence of wildfires. Although viewed as destructive and harmful in most cases, a light fire at high water levels eliminates shrubs and brush, and favors germination and seedling survival.

Plant and Animal Species

Plant species growing in cedar swamps have unique physical and physiological adaptations which enable them to thrive in a waterlogged environment having acidic, nutrient -poor and often anaerobic soil and water conditions. These environmentally limiting characteristics support a variety of vegetative covers.

The canopy layer may be composed of only white cedars or, in mixed stands, most often includes red maple and black gum trees. The shrub layer, which is most developed in relatively open-canopy cedar stands, can include red chokeberry, and sweet pepperbush. The most common herbs that can make up the herbaceous layer include sedges, round-leaved sundew, cinnamon fern, and royal fern; a continuous carpet of sphagnum mosses is often present where there is adequate light. The acid, nutrient-poor waters of cedar bogs also contain a high diversity of algae.

An Atlantic white cedar community that contains a diverse mixture of old, mature, and intermediate growth, along with regeneration areas provides the most ideal wildlife habitat. Such habitats are well suited for such bird species as hermit thrushes and gray catbirds. White cedar provides excellent cover for deer and rabbits -- its foliage and twigs being the preferred winter browse for white-tailed deer. Cottontail rabbits and meadow jumping mice feed on cedar seedlings.

Unique to Atlantic white cedar swamps is the larvae of one butterfly, Hessel's Hairstreak (*Mitoura hesseli*), which feeds exclusively on Atlantic white cedar. This rare, emerald-green butterfly (only documented in one N.H. swamp to date) often feeds high in the cedar canopy and is difficult to detect. In addition, the few currently existing populations of the state endangered Banded Bog Skimmer dragonfly are sometimes found in cedar swamp habitats.

Functions and Values

Due to their uncommonness and complexity, cedar swamps are excellent sites for research. Very little is known about the biological and chemical processes that occur in these special environments.

Trees, shrubs, and herbaceous plants growing in swamps impede the flow of floodwaters, and the reduction in the velocity of floodwaters enables sediments to settle out. They also remove organic and inorganic nutrients and toxic materials from water that flows through them. The accumulation of organic peat, which is a common component of cedar swamps, results in the permanent burial of chemicals. Peat prevents such chemicals as DDT from moving into more critical areas such as surface and groundwater.

Human Impacts

Atlantic white cedar wetlands are extremely sensitive to development, since the cedar community at each site is adapted to a particular range of water, light, weather, and other conditions. An abrupt change in any of these regimes (e.g., flooding a dry site or drying a flooded site) is, by itself, a stress factor which may negatively impact the community.

Changes in water chemistry and the enrichment of surface waters due to stormwater runoff and wastewater discharges lead to the loss of characteristic swamp plant species and permit the influx of non-native species. Sphagnum mosses are the most common substrate on which cedar reproduction generally occurs and hold a large reservoir of buried viable seed. Unfortunately, they are especially sensitive to chloride, elevated nitrogen concentrations, hydrological changes, trampling, and other consequences of suburban development.

Slash left after logging severely reduces cedar seedling establishment. Hardwood and shrub leaf litter, and pine needles can inhibit cedar germination to less than 1 percent.

Human activities in upland areas immediately adjacent to cedar bogs also adversely affect white cedars. Such areas act as buffer zones, protecting the structure and function of the entire cedar community. Land-use changes in upland areas can impact water table height, water flow rates, and stream flooding characteristics -- factors that are critical to the structure and function of cedar swamps.

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