

## New England Botanical Club – Minutes of the 958<sup>th</sup> Meeting

5 May 2000 Prepared by Lisa Standley, Recording Secretary pro tempore

The 731st meeting of the New England Botanical Club, Inc. being the 958th since its original organization, met on Friday, May 5, 2000 in the main lecture hall at the Biological Laboratories of Harvard University in Cambridge, Massachusetts with 48 members and guests present.

President Lisa Standley announced that one new member, Dr. Jay Raveill of Central Missouri State University, has joined the Club. Norton Miller invited members to attend the Friends of the Farlow trip to the Blue Hills Reservation on Sunday. Don Lubin offered a spare Ostrich Fern from his garden. Les Mehrhoff distributed a new list of "Non-native Invasive and Potentially Invasive Vascular Plants in Connecticut." He also noted that the Connecticut plant workshops will be held again this summer, with the June 14th one focusing on the identification of invasive species. Barre Hellquist announced that the long-awaited "Book" is expected to be published in July.

Vice President Paul Somers introduced the evening's speaker, **Dr. Avril de la Cretaz**, of the Department of Natural Resources Conservation at UMass Amherst. She spoke on her doctoral thesis research topic, "**Understory Restoration in a Watershed Degraded by Deer Browsing and Fern Invasion**," and won the Club's award for "best performance under adverse circumstances" by giving an outstanding summary of her research despite a balky slide projector.

The Quabbin Reservoir is a 120,000-acre tract of land and water of which 64% is administered by the Metropolitan District Commission (MDC) to protect the Metropolitan Boston water supply. Many of the upland areas of the Quabbin, farmland before being incorporated in the watershed protection area, were planted in white or red pine plantations to protect water quality. Deer hunting was banned in the Quabbin from 1940 to 1991 (originally because of fear of sabotage during WWII), resulting in a deer population of 40-60 deer per square mile. This resulted in intensive browsing on understory vegetation, essentially eliminating tree seedling regeneration from large areas of the Quabbin watershed. The MDC is now interested in restoring a natural forested community to the Quabbin. However, many of the pine plantations have a dense monoculture of Hay-scented Fern [*Dennstaedtia punctilobula* (Michx.) Moore] with essentially no tree regeneration, even after the deer population was substantially reduced. Dr. de la Cretaz investigated the mechanism by which hay-scented fern influences tree regeneration and mechanical means of control that may allow forest managers to restore the forest. Hay-scented Fern, although a native, behaves like many exotic invasives in the landscape, by creating mono-dominant stands and altering the natural community diversity and dynamics. Although some studies alleged that Hay-scented fern dominance was because of allelopathy, more recent work has shown that these ferns are not necessarily allelopathic. The fern's effect on other species seems to be because of competition for resources, particularly space in the thick root mat and light that is blocked by the fern fronds.

Dr. de la Cretaz found that the highest level of fern cover (essentially 100% of the herbaceous layer) and the virtual absence of tree seedlings occurred in pine stands that were

thinned more than 15 years before deer hunting was allowed. Stands thinned less than 15 years before deer hunting or after reduction of the deer herd have good tree regeneration. *Rubus* appears to play a role in tree regeneration in that brambles can grow up through the dense fern canopy and then out-compete the ferns for light, thus allowing tree seedlings to easily germinate and grow through the *Rubus*. However, deer browse *Rubus* preferentially and apparently eliminate plants from the forest and, as she demonstrated in another experiment, *Rubus* seed in the seed bank was depleted in areas of repeated browsing.

Avril also compared the ability of different tree species to become established in Hay-scented Fern communities. She found that only White Pine and Black Birch were capable of developing into saplings in a dense fern stand, because the leaves of these species develop and expand before the fern fronds expand in the spring and are therefore able to compete for light. White Ash and oak seedling leaves expand after the fern and thus are not as competitive.

In the final stage of her research, compared three mechanical treatments to control fern growth and promote tree regeneration: root mat removal (scalping), mixing root mat and mineral soil ("scarification"), and clipping (mowing). Herbicide treatments are not allowed in the watershed forest. She found that scarification actually increased the growth and dominance of Hay-scented Fern. Root mat removal resulted in the greatest germination response of tree seedlings, but also graminoid dominance (sedges, especially *Carex debilis*, established in high densities from the soil seed bank in the first 2 treatments). Clipping, particularly if done repeatedly during the growing season, resulted in good tree seed germination and seedling growth and low fern recovery and graminoid dominance. She hypothesized that clipping is the most effective treatment for tree seedlings because there are fewer graminoid competitors and a higher nutrient availability. The root mat of the ferns may interfere with seed germination, but this effect is outweighed by the increased light available without the dense fern frond canopy.

In summary, Avril's studies showed that the lack of tree regeneration is a result of deer browsing following overstory thinning. Browsing eliminates tree seedlings and depletes the seed bank, while increased understory light accelerates the growth rates of existing fern colonies and increases spore production that create new fern colonies. This results in the dominance of Hay-scented Fern: the fern's root mat inhibits germination of any remaining seeds, and the fronds block the light and inhibit growth of any seeds that do germinate. In dense fern stands, trees will not regenerate without intervention, and mowing is a promising mechanical treatment that may be effective for understory restoration.

Following questions, the meeting adjourned at 8:30 PM for refreshments.