

MOTHS FOR LINCOLN POND

As reported in the BRASS March '99 newsletter, Cornell Cooperative Extension requested funds to research weevils and moths for possible milfoil control, and to release one or the other to Lincoln Pond in the Year 2000. The application was successful and work is in progress. At a January 7 meeting of involved parties, it was determined *Acentria ephemeralla* (the moth) will be released to control the Eurasian Watermilfoil (*Myriophyllum spicatum* L).

Eurasian Watermilfoil (milfoil, for the rest of this article) is an exotic, aquatic nuisance plant. It is rapidly growing in Lincoln Pond. There was none reported in a 1978 survey of the lake. By 1990, there were some sightings. In 1995, BRASS measured milfoil beds by canoe in the 600 acre pond and determined about 60 acres were heavily infested with milfoil. An instrument survey conducted by John Deming in '97 resulted in a doubling in 2 years; 118 acres were impacted by milfoil.

Milfoil forms dense mats making boating, fishing and swimming difficult, and inhibiting the growth of native aquatic plants needed for fish and invertebrates. Control of milfoil is difficult. Some lake associations mow it, at a cost of over \$150,000 just for the machine. It has to be mown all summer long and this merely keeps the milfoil trimmed. Dredging is highly expensive and usually only used to clear access paths to marinas. You can draw down some lakes and freeze-kill the milfoil, or stake down matting that eliminates light needed for plant growth, but you kill other aquatic plants and damage fish populations by these methods. A chemical, Sonar, is sometimes used but costs over \$81,000 for 100 acres. You cannot spot treat a lake with Sonar; the whole lake must be treated, and additional applications may be required in a few years.

There are natural alternatives. You can hand-pull milfoil, and a lakeshore owner in the Adirondacks can get an APA permit to harvest up to 800 square feet. It is extremely tedious (as the whole plant, with no breakage of stems, must be taken), and would obviously be a time-consuming feat with as many acres as are in Lincoln Pond. Grass carp will eat milfoil if nothing else is available, but they eat other fish, cost \$10 each, and you need several thousand per acre. Then there are weevils and moths.

A native weevil called *Euhrychiopsis lecontei* is found in most lakes infested with milfoil. It is raised in Ohio by Middlebury College trained personnel, and large populations have been added to a number of Vermont and New York lakes. Weevils cost ~\$1 each. You need 3-5 weevils per milfoil tip, and there is likely 100 tips per square foot of a milfoil bed. Millions would be needed to start a strong population on a lake as large as Lincoln Pond. The weevil adults remove milfoil leaf tissue, and both adults and larvae weaken the stem, and the larvae removes stem vascular tissue. The stem burrowing often results in plant fragmentation. Although milfoil spreads through fragments that develop roots in soft lake bottoms, a Vermont pond enclosure study noted significantly reduced biomass of lateral stems and roots of regenerated fragments compared to stem fragments without weevil damage. Lakes with lots of weevils (whether

naturally occurring or augmented by releases) have experienced milfoil mid-summer "crashes," but unfortunately milfoil usually returns the following spring.

There is a problem with attributing milfoil decline in many of the lake studies to the weevil because these lakes contained both weevils and a moth called *Acentria ephemerella* that also seems to prefer Eurasian Watermilfoil. Originally from Eurasia, this moth was found in Montreal in 1927. The moth larvae feed on the growing tips of milfoil, and both larvae and moth will burrow into milfoil stems to avoid predators. It is thought that perhaps the role of moths in cases of milfoil decline has been overlooked since moths and their larvae are very small and can also wrap themselves in plant leaflets making their detection even more difficult. To start a strong population of moths, you would need 0.7 moths per milfoil tip.



moth, *Acentria ephemerella*

There is still another problem confounding studies. It is possible there is competition between these two insect species. They both go after the same part of the milfoil plant, the apical meristem. If milfoil starts to "crash" in mid-summer, that is exactly the time of moth pupation, egg-laying, and hatching of larvae. Also, newly hatched moth larvae need green metabolically active milfoil, and when milfoil is damaged by weevils it often develops a thick epiphyte growth probably making it unappetizing to the moth larvae.

Both weevils and moths are currently in Lincoln Pond, but in small numbers, according to Cornell researcher Bob Johnson who conducted a tip sampling last summer. Because there has been an emphasis on weevil studies and very little study of the moth, and because the divisions of Lincoln Pond provide settings for control studies, project staff seemed to feel Lincoln Pond an ideal location for an introduction (augmentation) of moths.

Therefore, Bob Johnson will raise 10,000 to 20,000 moth caterpillars in Cornell greenhouses and, if permits are obtained in time, release them in May or June of 2000. Of the four possible release sites, the moths will be released only in one. The heaviest population (10,000) of weevils resident in the lake occur in a rejected site; another rejected site will be a good control as it is farthest from all the other sites; and the last rejects site will be a short term control area.

No great effect should be expected the first year, Bob Johnson cautions. The moths do not move far or fast. Females are wingless and must walk or float to new plants. A survey of milfoil boundaries will be conducted with release in order to compare impact from year to year.
