

**Brief summary of benthic mat pilot program
on Forge Pond/Lake Matawanakee
Westford and Littleton, MA
Summer 2023**

Prepared by Friends of Forge Pond

A benthic mat is a physical barrier, like a tarp, placed on the lake bottom to prevent plant growth in the covered area. It prevents plant growth by blocking the light required for growth. A mat also provides a physical barrier to growth, reduces the space available for expansion, and prevents plants from germinating.

The objectives of this pilot project are to learn how well benthic mats work in controlling nuisance plants in waterfront areas in front of homes on Lake Matawanakee/Forge Pond and to understand what the experience is for participants installing, maintaining, and removing the mats.

During the summer of 2023, benthic mats were used at six sites on the lake, four in Littleton and two in Westford. (In 2022, there were three sites in Westford, but in June 2023 one of the Westford participants moved from the lake, so their participation in the pilot program ended.) A spreadsheet provided with this summary contains the monthly reports of benthic mat performance at each site.

Two types of mats were used:

- 3 sites in Littleton used biodegradable burlap mats held down by burlap bags filled with pebbles
- 3 sites used commercially available polyethylene mats held down by steel reinforcing bars

Non-burlap mats

Non-burlap mats were put in place between late May and early July. At one site, the mat was in place for 2½ months, at another it was in place for 4½ months, and at the third site, the mat was moved every month. All the non-burlap mats had all their elements removed from the lake by early October. The mats at all sites were successful at eliminating plants from the area covered by the mat. When mats were removed from an area, the lakebed under them had no plants remaining and no plant debris. At the one site where the mat was moved during the season, after the mat was moved, plants slowly began to regrow in the previously covered area.

Burlap mats

The burlap mats were initially put in place in 2022 and are being left in place indefinitely, to eventually decompose and become part of the lake bottom. While the mats at all sites were all highly effective the first year, the effectiveness of the burlap mats varied among the sites in the second season. At one site, the mat was equally effective the second year, and at another site the effectiveness had become very limited by the end of the second season. Participants had intended to install thicker burlap mats this season, to see if that was more effective, but this didn't get done. There were no instances of burlap pieces breaking off and drifting away from the mats.

Common observations

Areas adjacent to the mats didn't seem to be affected by the mat. Plant growth around the mats seemed to be the same as it would have been without the mat.

Operations with the mats generally required planning, actions by several people, and, in some cases, a fair amount of effort and patience. Installation needed preparation of the mat system and one to three people working in the water. Installation of the polyethylene mats was generally easy. Burlap mats are more difficult to install, but that wasn't done this year. At the site where the mat was moved, it was relatively easy to drag it from one location to another, partly because the lake bottom was smooth. Removing mats was not difficult this year.

Overall, participants found that the non-burlap mats were easy to use and very effective. Participants with burlap mats needed to do no work this year, and the effectiveness of the mats varied a lot by the end of this second season for those mats.

Lessons learned over the first two seasons

- Benthic mats do a very good job of eradicating plants in the area they cover. After the mat is removed, plants begin to grow in this area, but growth is slower than usual over the remaining summer season.
- Ease of mat installation varied among the sites and with the type of mat. The commercially available polyethylene mats with metal re-bar anchors simplified placement because the mat didn't float around during placement and no separate anchors had to be placed. Narrow mats were easier to position than wide mats. Other factors making installation more difficult included deep water (more than 5 ft) and poor visibility, especially when silt is stirred up. It is easier to install the mats before significant plant growth has occurred in the installation area.
- Polyethylene mats purchased commercially were completely successful at preventing plant growth in the area that they cover. Leaving a benthic mat in place for about one month results in the area under it being generally clear of plants. Some of the polyethylene mats were permanently stained after use. Not sure if this will affect their length of service.
- Burlap mats maintained their integrity during the first year (summer of 2022). By the end of their second season in 2023, they had deteriorated to the point where a hole could be poked in them with a finger, but they did not have pieces break off. A thin layer of silt formed over the burlap mats, which helped maintain the mats' integrity but also allowed some amount of plant growth on the mats. The amount of plants growing on the burlap mats varied considerably: one site had virtually no plants all summer, a second site had some plants but very much less growth than the surrounding area, and the third site found the effectiveness declined over the summer with little benefit from the mat by the end of the season.
- Current burlap mats used burlap weighing 5 oz per square yard. Heavier burlap has a tighter weave and is hoped to last longer, so this will be tried next year.
- At some sites, placing the warning buoys at the edge of the mat interfered with waterfront activities so their placement was adjusted to avoid this while still alerting people to the presence and location of the mat.
- The allowed coverage at each site was increased from 600 sq ft to 2000 sq ft after the 2022 season because all but one participant had requested a larger area. When none of these requesting participants were making use of the larger area in 2023, the remaining participant moved their mat twice over the season, ultimately covering 1200 sq ft, to learn more about plant growth after the benthic mats are removed. Plants started to grow back after the mat was removed, but at a slower rate than the surrounding area.

Plans for 2024

- All participants are planning to use the benthic mats again in the summer of 2024.
- Sites that are using burlap mats will increase the weight from 5 oz to 10 oz. A limited area with a 17 oz mat will also be tested. These sites plan to cover about 1000 sq ft with the new mats.
- At least one of the sites with polyethylene mats will move the mat every month, covering 1200 to 1600 sq ft over the course of the summer, to learn more about the rate of plant growth after the mat is removed.