

TOPIC: Treatment Scale and Timing

White Paper Group 1

BACKGROUND

Aquatic plant management (APM) activities vary in effectiveness according to the time of year, stage of plant growth and rate of water movement. To achieve maximum effectiveness, the method of management, type of waterbody, and target species should be considered when determining the scale and timing of management activities.

Treatment Scale

Treatment scale is especially important in chemical or herbicide treatments for APM. The herbicide's effectiveness on the targeted species, as well as potential non-target impacts, is dependent on the product used, as well as the concentration (C) and exposure time (ET) at which it is in contact with the plants. Adequate herbicide CET must be met and maintained for herbicide treatment to be effective in controlling the targeted aquatic plants. The active ingredient in different chemical formulations have varying CET requirements for effective plant control. However, achieving adequate CET in aquatic scenarios can be challenging, as herbicides applied directly to waterbodies are susceptible to wind and water movements and CET can vary depending on the amount of area (scale) to which the herbicide is applied. Balancing herbicide selection and application method is important in achieving the desired effect on target plants while also minimizing impacts to non-target organisms – beneficial native plants, fish and aquatic life.

Small-scale treatments¹ aim to impact plants at a specific site. Herbicides applied at a small-scale in a large aquatic environment will dissipate or move offsite quickly, presenting challenges in meeting the CET required for effective control. Due to this rapid herbicide dissipation, the effectiveness of treatments to small areas are less predictable and may not achieve the desired level of control for the targeted species. Multiple small-scale treatments in a single waterbody by many individual shoreland property owners may combine and cause an unintended large-scale herbicide treatment, with potentially damaging non-target impacts lake wide. Scenarios in which small-scale herbicide treatment may be advisable include following large-scale management to maintain a low population density, or when temporarily controlling a specific colony that is causing material obstruction to navigation. Small-scale herbicide treatments are not advised in flowing waterbodies, as they are expected to have severely limited efficacy due to the likelihood of rapid dissipation rates.

Large-scale herbicide treatments² are generally more predictable in terms of anticipated CET and target species control but are also likely to have non-target impacts lake wide. Impacts on non-target plant species are likely unavoidable, so the presence of species of concern should be considered. Repeated herbicide treatments tend to shift plant communities toward dominance by a few highly tolerant plant species, so employing repeated large-scale treatments in lakes with high biodiversity may be inadvisable. However, there is no single, accepted threshold at which management of aquatic plants should move from a localized, small-scale approach to a large-scale approach. The level of acceptable impact may depend on the target species and the type and sensitivity of the plant community present.

¹ treatments less than 10 acres or less than 10% of the littoral zone (s. NR 107.04 (3))

² treatments covering more than 10 acres or 10% of a lake's littoral zone (s. NR 107.04 (3))

Selectivity: Some herbicides can be more effective controlling specific species; affecting some more than others allowing some ability to target problematic plant species. Other chemical formulations are “broad spectrum” or less selective and have negative effects or provide control on a wide range of species. When it comes to mechanical removal, aquatic plant harvesting is indiscriminate affecting all targeted plants. Therefore, selectivity comes into play when considering treatment scale. Careful consideration needs to be given to the amount of area that is harvested or treated with broad-spectrum herbicides since overall reduction in plant biomass will be greater. Large-scale loss of plant biomass in a water body can lead to decreased water quality, fish and wildlife habitat and health.

Treatment Timing

The effectiveness and application of herbicide treatments is also dependent on timing. Presence and timing of a lake’s seasonal temperature stratification is an important consideration when planning herbicide treatments. In stratified lakes, the warm upper layer (epilimnion) does not mix with the colder regions below the thermocline (hypolimnion). Most of the herbicide remains in the relatively warm, upper water layer and doesn’t mix to the lower layers. Thus, calculation of the volume of the epilimnion is necessary when planning large-scale treatments. If the lake is stratified but the volume of the whole lake is used to calculate the amount of herbicide to apply, the concentration will be higher than needed and could lead to large non-target impacts to the lake.

Understanding the ecology of aquatic plant communities and life history of target species can also help identify opportunities to increase efficacy and minimize non-target management impacts. Some invasive species, such as Eurasian watermilfoil and curly-leaf pondweed, can emerge and grow at lower water temperatures than many Wisconsin natives. Therefore, managing their populations in early spring may reduce some non-target impacts. Furthermore, treating while plant biomass is low minimizes decomposition, which prevents reductions in water quality. However, spring treatments may coincide with Tribal spearing and walleye spawning and hatching. In these instances, DNR staff wait to approve herbicide treatments until after spearing concludes, which prevents treatments from occurring in the early spring. Later treatments would reduce this timing conflict but may increase plant decomposition.

Timing of mechanical and manual control is also important. Harvesting or removing plants after they flower may ensure the population won’t rebound until the following spring. Drawdowns³ are ideally conducted to include at least one overwinter period to utilize freezing and desiccation to control aquatic plants. In manual or mechanical cutting, aquatic plants with propagules (seeds and turions) should be cut before propagules form but species with rhizomes should be cut later in the season to reduce spread after cutting. Some instances may require multiple control efforts in a single season.

GUIDANCE PROPOSAL

The department may create, in cooperation with external partners, best management practices (BMP’s) for treatment timing and scale of specific activities to target specific species if the department determines there is enough peer reviewed, lab or field research and/or field observation to suggest formalizing an ecologically sound and efficacious management approach. These BMP’s may be written as a statewide practice or have specific criteria such as lake type and/or trophic status if it makes sense ecologically to do so.

³lowering water levels to expose and dewater areas with aquatic plants

Permittees will not be required to follow BMP's, if a permit application meets the minimum standards set within repealed and replaced NR 107, the permit will be issued. However, permit applications that comply with BMP's set by the department may be issued with less review time. In addition, planning requirements will be simplified for permittees who adopt either one or a combination of department approved BMP's. Please refer to the Planning white paper for more information.

RULE PROPOSALS FOR REPEALED AND REPLACED NR 107 – SUBMERGED AQUATIC PLANTS

The department proposes two specific requirements regarding treatment timing and scale.

- Permit applicants, as part of their permit application, must calculate a whole lake herbicide concentration rate if they plan to treat over 5% of the waterbody. If the treatment will have large scale impacts, the appropriate monitoring, permitting and planning requirements will come into effect.
- Large scale herbicide treatments cannot occur in consecutive years.