

Guidelines for large scale to whole lake scale herbicide treatments for AIS
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Background

These guidelines are intended to serve as a checklist for managing and providing technical assistance for large-scale herbicide treatment projects that are either funded through AIS Established Infestation Control grants, or are permitted through NR107. They are not requirements, rules, or manual code, but rather an attempt to pull together informal guidelines and “best management practices” related to large scale treatments. As we learn more through ongoing projects, these guidelines will evolve and hopefully lead to more standard procedures. Please provide comments and suggestions to Tim Asplund, WT/4, tim.asplund@wisconsin.gov.

Definitions

- Small scale = <10 acres or 10% of littoral zone
- Large scale = Between 10 and 160 acres and less than 50% of littoral zone
- Whole-lake scale = >160 acres or 50% of littoral zone

Applicability

- Treatments involving *established populations* of Eurasian water milfoil and/or curly-leaf pondweed (> 5 acres, present for more than 5 years)
- Grant funded projects
- “Large-scale” and whole lake scale NR107 permits (> 10 acres or >10% of lake area)
- Projects outside the intended scope of NR107:
 - e.g. the proposed chemical application is for waters beyond 150 feet from shore or along undeveloped shorelines (excluding parks) OR
 - involving an experimental use permit (field evaluation use permits); OR
 - not adequately addressed by label instructions and typical uses (e.g. use of granular 2,4-D at a “whole-lake” scale)

Pre-treatment requirements (minimum)

- Approved APM plan following APM Guide (<http://www.uwsp.edu/cnr/uwexplakes/ecology/APMguide.asp>)
- A recent baseline aquatic plant survey using the PI method (<= 5 years old)
- A map documenting the proposed treatment areas following *Pre and Post Treatment Evaluation of Aquatic Plant Community* protocol ([see APM Guide](#))
- A monitoring and evaluation plan
- Baseline year of water quality data (DO and temp profiles, Secchi, at minimum)

Additional requirements

- Technical review by statewide team (esp. for first-time, whole lake or experimental projects)
- Voigt Task Force consultation on “wild rice waters”
 - For projects in the ceded territory, applicant/consultant should notify the local tribe
 - If funded by a grant, plan review requirements for established infestation control projects ([See \[http://www.uwsp.edu/cnr/uwexplakes/grants/AIS_long.pdf\]\(http://www.uwsp.edu/cnr/uwexplakes/grants/AIS_long.pdf\)](#))

- Environmental Assessment if needed (see below)

Should an EA be completed? (See NR150: <http://www.legis.state.wi.us/rsb/code/nr/nr150.pdf>)

- For projects involving more than 160 acres or more than 50% of the lake area, or involving other Type II management actions, such as a drawdown or fish rehabilitation project, an Environmental Assessment following NR150 guidelines for *Type II* projects SHOULD be conducted by the applicant or DNR.
 - **Type II actions** require the issue identification, EA and decision procedures of the EIS process under ss. NR 150.21, 150.22 and 150.24.
- For projects involving less than 160 acres or less than 50% of the lake area, an Environmental Assessment following NR150 guidelines for *Type III* projects MAY be conducted by DNR.
 - **Type III actions** The department may require the issue identification, EA and decision stages on the EIS process under ss. NR 150.21, 150.22 and 150.24 or the full EIS process under ss. NR 150.21 to 150.24,

Conditions of the permit/treatment – considerations

- Timing – “early season” definition:
 - Target window is after ice out, but before temperatures have warmed up sufficiently for native plant growth
 - Optimally, when EWM/CLP just begins actively growing, but before reaching full growth stage; 6 inches or more – may require site visit
 - Generally mid-April to mid-May, depending on climate and latitude;
 - May have to treat different part of the lake at different times, depending on EWM growth patterns
 - Endothall has minimum temperature requirements (>50 °F)
 - Treatments should not occur after May 31, without consultation with the Department to confirm that optimal treatment conditions have not yet occurred.
- Products –
 - 2,4-D (Northern water milfoil and other dicots may be affected by treatments, esp at higher application rates)
 - fluridone (not appropriate for eutrophic lakes or flowing water; also impacts many pondweed species ([see Susceptibility Spreadsheet from ISS](#)))
 - endothall (useful for CLP treatments, or applications where selectivity is not as critical)
 - triclopyr (not much experience using it in WI, but may be useful for whole-lake scale treatments, similar to 2,4-D, expensive)
 - combinations (e.g. low-dose 2,4-D and endothall for combined CLP/EWM treatments)
- Liquid vs granular
 - Liquid for whole lake scale treatments or large areas with mixed plant community; granular for smaller scale areas or defined beds of EWM
 - Granular herbicide formulations are more expensive than liquid formulations (per active ingredient), however, granular formulations release active ingredient over a longer period of time. Granular formulations therefore may be more suited to situations where herbicide exposure time is a concern. Factors that affect exposure time are size of treatment area, configuration of treatment area, water flow, and wind.
 - For a given lake, liquid herbicides may be appropriate in some areas while granular herbicides may be more appropriate in other areas. In some cases a liquid herbicide formulation might be appropriate for an initial treatment, and granular formulations might be appropriate in following years depending on the milfoil infestation.
- Application rates
 - Application rates for liquid and granular formulations are not interchangeable.

- Application rates should be based on concentration-exposure time considerations.
 - Lower concentrations warranted for large scale treatments or when target plants are mixed in with natives;
 - Higher concentrations may be necessary where exposure times may be seriously reduced (isolated beds or spot treatments)
- Water depth should be factored in to achieve target concentration, rather than relying on pounds per acre rates from label
- Must follow label guidelines, but maximum rates may be too high if being used at whole lake scale
- Water residues resulting from granular treatments may never come near to the application rate, but the exposure time should be increased.
- Weather conditions
 - Calm weather, low winds, esp. for liquid applications and endothall products
 - Conditions of treatment should specify thresholds, or require supervision
- Flowing water considerations
 - Granular products may need to be applied at higher concentrations in order to maintain effectiveness in flowing water
 - Conditions of treatment should specify thresholds of flow, or supervision

Supervision and reporting

- All large scale to whole lake treatments should be supervised by DNR staff, especially if trying to determine optimal treatment timing or ensure that conditions of the permit are being followed
- Possible role for DATCP staff
- Treatment records need to be filled out and submitted within 30 days of application.
- Compliance: Start with letters, then enforcement.

Contingency plan – what happens if something goes wrong

- Dissolved oxygen sags
- Fish kills
- Spills, or problems with applications (injuries, accidents, etc)
- Weather conditions or growth of EWM prevent proper treatment

Post-treatment monitoring and evaluation (compliance)

- Aquatic plant surveys (treatment effectiveness and native impact/response)
 - Follow *Pre and Post Treatment Evaluation of Aquatic Plant Community* protocol (see APM Guide)
 - For whole lake scale projects, a whole lake PI survey should be conducted.
 - For large scale projects, use targeted monitoring in treatment areas
 - Appropriate targets for determining “success” should be specified in plan
 - Use standardized reporting spreadsheets and stats packages from ISS (see APM Guide or DNR APM webpage)
 - Ideally, plant surveys should be conducted by an independent party not directly affiliated with the herbicide applicator to prevent bias or appearance of bias.
- Dissolved oxygen (negative impacts on DO levels from decaying vegetation)
 - Warranted for whole lake scale projects and treatments in confined bays or channels
 - If possible, collect profiles the year before treatment and/or in reference (untreated) locations
 - Profiles in treatment areas and mid-lake as a reference point, along with temperature and % saturation
 - Start prior to treatment, 4-6 weeks following treatments and monthly thereafter

- Take profiles at roughly the same time each day
- 5 mg/L is a useful standard for determining impact, especially in shallow waters or epilimnion
- Water quality (clarity, chl a, TP, pH, etc: algal response to nutrients released from decaying vegetation or less competition from macrophytes)
 - Warranted for whole lake scale projects and treatments in confined bays or channels
 - Chlorophyll and TP most important for eutrophic systems where “switch” to algal dominance is a concern
 - If possible, collect samples the year before treatment and/or in reference (untreated) locations.
 - Samples from treatment areas and mid-lake as a reference point
 - Start prior to treatment, 4-6 weeks following treatments and monthly thereafter
 - Involve CLMN for long term monitoring, especially on whole lake scale projects
- Residuals (effectiveness of treatments as well as monitoring safety thresholds)
 - Advised for large scale and whole-lake scale projects
 - Collect samples from multiple sites within treatment areas and mid-lake as a reference point, at what depth?
 - Ideally pre-treatment (0) and 1, 4, 7, 14, 28 DAT
 - May need to be more frequent or longer duration, depending upon treatment scenario
 - Label use restrictions for irrigation or drinking water intakes are useful guidelines for evaluation (e.g. 100 ppb and 70 ppb for 2,4-D respectively)
 - Possible ecological thresholds (see EPA and USDA Forest Service websites:
 - <http://www.epa.gov/pesticides/ecosystem/ecorisk.htm>
 - <http://www.fs.fed.us/foresthealth/pesticide/risk.shtml>
- Sediments (repeated use of herbicides over time in a specific area)
 - Warranted for soft sediments in areas where treatments have occurred or are planned to occur for more than 3 years in a row
 - Following the last water column residual sampling event, sediments from treatment areas of interest and at least 2 control areas should be collected
 - Results can be compared to toxicity thresholds for benthic invertebrates (see EPA and USFS websites)