



DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AQUATIC NUISANCE CONTROL PROGRAM

GUIDANCE FOR LAKE MANAGEMENT PLANS

This document provides guidance to Aquatic Nuisance Control (ANC) permit applicants regarding the requirements of a Lake Management Plan (LMP). Under Part 33, Aquatic Nuisance Control, of the Natural Resources and Protection Act, 1994 PA 451, as amended, an LMP is required as part of an ANC permit application if a whole lake treatment is proposed. This document provides an explanation of the requirements and information to aid in collecting the required data. Please contact the ANC Program staff by telephone at 517-284-5593, or by email at EGLE-WRD-ANC@Michigan.gov for additional guidance. Contact the ANC Program for information about the availability of the LMP form.

I. Physical Characteristics of the Waterbody:

Location – include Township, Range, and Section numbers obtained from a county map, property documents, parcel maps, or online resources.

Lake size – provide the area of the waterbody in surface acres.

Maximum depth – provide the maximum depth measurement (in feet) for the waterbody.

Mean depth – determine the mean depth (in feet) of the waterbody using the following equation:

$$\bar{d} = \frac{V}{A_0}$$

where V = volume of the waterbody (acre feet)

A_0 = surface area at zero depth (acres)

Lake volume – provide the whole lake volume (acre feet), the volume based on 0 to 10 feet depth (acre feet), and the associated calculations. Procedures for these calculations are available at Michigan.gov/ANC. Provide these calculations with the LMP.

Size of littoral zone – determine surface acreage of the littoral zone.

R 323.3101(s) “Littoral zone” means the area of the waterbody from the water’s edge to the limit of the depth of light penetration where rooted aquatic vegetation typically grows.

Shoreline length – determine the length (in feet) of shoreline surrounding the waterbody.

Shoreline development factor (SDF) – the ratio of the length of shoreline to the circumference of a circle whose area is equal to that of the lake, indicating lake morphology. Use the following calculation:

$$SDF = \frac{SL}{2\sqrt{\pi A}}$$

where SL = shoreline length (feet)

A = surface area of the waterbody (ft²)

Retention time – the average length of time that water remains in a waterbody. Calculate the average retention time using the flow data for the months during which the treatment will occur. Provide retention time measurement in number of days.

Outlet flow rate – provide the outlet flow rate (cfs), the source of the data, and a copy of the data. Flow rates can be obtained from the Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division by submitting a discharge request at <https://www.michigan.gov/egle/about/organization/water-resources/hydrologic-data>. When requesting data from the Department of Environment, Great Lakes, and Energy (EGLE), select low flow discharge measurements for the monthly 95 percent, monthly 50 percent, and monthly mean, and include a contact person for the Aquatic Nuisance Control program. The normal turn-around time for these requests is two weeks.

Location map – provide a map showing the location of the waterbody within the county(ies).

Bathymetric map – provide a map that indicates the depth contours (at five-foot intervals) found within the waterbody. Select maps are available through the Department of Natural Resources (DNR) at <https://www.michigan.gov/dnr/things-to-do/fishing/where/inland-lake-maps-list>. Maps shall also identify the following attributes:

- **Tributaries**
- **Outlets and inlets**
- **Public and private access sites**
- **Public land**
- **Critical fish spawning areas** – indicate the location of any critical fish spawning areas identified by the reviews performed by DNR, Fisheries Division (see Part III).
- **Wetlands** – indicate areas of wetland vegetation as provided on the EGLE Wetlands Map Viewer at <https://www.mcgi.state.mi.us/wetlands/>. Click on the map layer titled “Part 303 Final Wetlands Inventory.”
- **Special habitats** – indicate the location of any special habitats associated with the waterbody that are identified by the reviews performed by Michigan Natural Features Inventory (MNFI); DNR, Fisheries Division; and/or DNR, Wildlife Division (see Part III).

- **Parks** – indicate the location of any local (public or private), state, or federal parks abutting the waterbody.
- **Water control structures** – indicate the location of any structure that is used or can be used to regulate the level of the lake. This includes any water level control structures that may be downstream from the lake.

Note: The administrative rules do not preclude an applicant from obtaining additional information beyond what is required. Other contact groups include The Nature Conservancy, lake consultants, fish biologists, or local residents.

Land use information – include a map of the waterbody with a legend and coding for the surrounding land use. The following categories shall be used to indicate the land use on a map:

- **High density residential** – single dwellings with less than or equal to 100 feet of shoreline frontage, apartment complexes, condominium complexes.
- **Low density residential** – single dwellings with more than 100 feet of shoreline frontage
- **Commercial/Industry**
- **Agricultural**
- **Parks**
- **Undeveloped areas**

II. Water Quality Information:

Water quality parameters should be collected in the year prior to the proposed treatment and may be measured by individual volunteers, lake consultants, laboratory personnel, etc. To locate a laboratory for sample analysis in your area, go to Michigan.gov/EGLELab. If the waterbody is involved in the Cooperative Lakes Monitoring Program (CLMP), some of the data may already exist. Contact Marcy Knoll Wilmes; Lakes, Erie, Huron, and Superior Unit; Surface Water Assessment Section; Water Resources Division, at 517-342-4348 or KnollM@Michigan.gov for information about the CLMP and existing water quality data. Existing water quality data may be found at U.S. Environmental Protection Agency's STORET database (<https://www.epa.gov/waterdata/water-quality-data>). The following water quality parameters and a map indicating the sample locations must be submitted as part of the LMP:

1. Temperature and Dissolved Oxygen (DO) – measured in mid- to late August as a surface to bottom profile over the deep basin of the waterbody. Temperature and DO must be measured from the surface to within three feet of the bottom at either of the following intervals:
 - Option A:
 - i. Five-foot intervals in the upper part of the water column (epilimnion)
 - ii. Two and a half-foot intervals through the mid-depth region (thermocline)

iii. Five-foot intervals below the thermocline (hypolimnion)

Option B:

i. Three-foot intervals from the surface to within three feet of the bottom.

2. Transparency – measured using a Secchi disk from mid-May through mid-September. Ideally, transparency should be measured on a weekly basis. At a minimum, EGLE will accept eight equally spaced measurements during this time period. Transparency must be measured over the deep basin of the waterbody.
3. Total Phosphorus – measured twice per year, a surface sample at spring turnover (approximately two weeks after ice out) and a deep water sample in mid- to late August.
4. Total Alkalinity – surface sample measured once per year at spring turnover (approximately two weeks after ice out).

III. Biological Characteristics of the Waterbody:

1. Total higher aquatic plant surface coverage – This is a measure of the percent plant coverage of the total surface area of the waterbody. To determine this measure, make note of the depths where the presence of aquatic plants begins and ends while performing an aquatic vegetation survey, then determine the total acreage of aquatic plant cover. Compare the acreage of aquatic plant cover to the surface acreage of the waterbody and calculate the percent plant coverage of the total surface area. When mapping the presence of aquatic plants, include macroalgae (*Chara* spp., *Nitella* spp.).
2. Aquatic vegetation map(s) and data analysis – An aquatic vegetation survey of the waterbody shall be performed in August or September of the year prior to the proposed whole-lake chemical treatment. The vegetation survey and data analysis shall be performed according to EGLE’s “Procedures for Aquatic Vegetation Surveys.” These procedures can be obtained from the Aquatic Nuisance Control Program web page at Michigan.gov/ANC. If you have questions about the procedures, please contact ANC staff at 517-284-5593, or EGLE-WRD-ANC@Michigan.gov.
3. A description of the fish, wildlife, and plant communities, including identification of any special concern, threatened, or endangered species. Provide original comments with the LMP. If a review request is submitted and no response is received, attach a copy of the original inquiry to the LMP form.
 - a. Fish communities – Contact the local DNR fish biologist, in writing via email or letter, to request information from fish surveys performed in the waterbody and any critical fish spawning habitat associated with the waterbody. Contact information for DNR fish biologists may be obtained at <https://www.Michigan.gov/dnr/about/contact/fisheries> by clicking on the appropriate management unit and

then clicking on “Staff Contacts.” Allow 4-6 weeks for these reviews. At a minimum:

- If the waterbody is public, obtain a list of fish species present in the waterbody from the DNR.
 - If the waterbody is private, informally interview anglers to determine a list of fish species present.
 - Critical fish spawning habitat must be requested regardless of public or private ownership. The DNR may not be able to provide this information for private waterbodies. In this case, provide any correspondence received from the DNR.
- b. Wildlife communities – Contact the local DNR Wildlife Division District Supervisor and wildlife biologist to request information from wildlife surveys performed in the area of the waterbody. Contact information for DNR wildlife biologists may be obtained at <https://www.Michigan.gov/dnr/about/contact/wildlife> by clicking on the appropriate county. Allow 4-6 weeks for these reviews.
- c. Plant communities – Contact the DNR, Fisheries Division and DNR, Wildlife Division to determine if there are plant communities of local concern associated with the waterbody proposed for chemical treatment. Plant community information may also be gathered from a limnologist or botanist who is familiar with the waterbody. Reviews may be obtained from:
- DNR, Fisheries Division by letter or email request using the web site addresses above. Allow 4-6 weeks for these reviews.
 - DNR, Wildlife Division by letter or email request. Contact the District Supervisor and local wildlife biologist using the website address above). Allow 4-6 weeks for these reviews.
- d. Special Concern, Threatened, or Endangered Plant/Animal Species – Contact an ANC Program staff member at EGLE-WRD-ANC@Michigan.gov to request a list of special concern, threatened, or endangered species associated with the waterbody proposed for treatment.

IV. Nuisance Conditions

Provide a written description of the current aquatic nuisance problem occurring in the waterbody, including a description of the activities that are being impaired by the nuisance conditions, and a map that delineates the distribution of the targeted nuisance species.

V. Management Goals

Provide a written description of the desired outcome(s) of the management activities proposed for the waterbody, and management goal map(s) indicating goal locations of specific types of vegetation to be achieved through the proposed management activities.

VI. History of Waterbody Management

Provide a written description of the management activities performed on the waterbody within the past ten years. Include any mechanical, chemical, or biological control efforts, lake level manipulation, dredging, and fish stocking activities (including species stocked, stocking schedule). If there have been past whole lake treatments, include a description and discussion of the treatment results. If the treatment results were poor, describe changes that are proposed for the current application to improve the treatment success.

VII. Management Options

Provide a written description of all management options considered to achieve the goals established for this waterbody, including the reasons for choosing the option proposed in the LMP.

VIII. Vegetation Management Plan

The Vegetation Management Plan (Plan) is a plan indicating all activities proposed to manage the vegetation within the waterbody for a three-year period. The Plan shall include:

- proposed actions necessary to attain the management goals – a table summarizing all proposed management activities proposed to achieve the established goals.
- maps indicating proposed annual vegetation management, and the proposed product distribution path for whole lake treatment.
- calculations used to determine the amount of product proposed for whole lake treatment.

IX. Monitoring and Evaluation

Provide a written description of the monitoring activities to be performed on the waterbody (including a map indicating product concentration sampling sites) and an explanation of how the monitoring results will be evaluated to determine the level of success achieved for each management goal.

X. Lake Management Plan Development

Provide written documentation of LMP development participation of stakeholders and agencies responsible for managing public trust resources. This may include minutes from Lake Board and/or Lake Association meetings, minutes from public hearings, written correspondence from EGLE, the DNR, or other resource agencies, etc. The lake management plan must be signed and dated by the preparer and by a local representative of the aquatic vegetation management project.

For information or assistance on this publication, please contact the Aquatic Nuisance Control Program through EGLE Environmental Assistance Center at 800-662-9278. This publication is available in alternative formats upon request.

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