Guidance for Integrated Aquatic Vegetation

Management Plans

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Guidance for Integrated Aquatic Vegetation
(Nuisance Plants and Algae Control)

Management Plans

Prepared by:
Kathleen Emmett
Kelly McLain
Kathy Hamel
Washington State Department of Ecology
Water Quality Program

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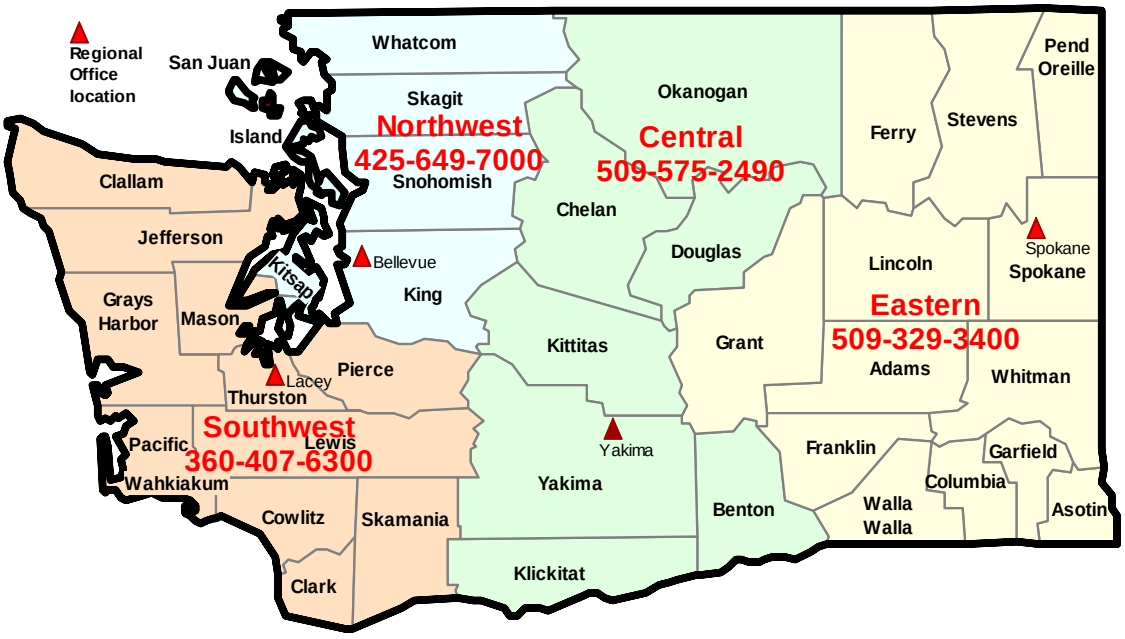

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Table of Contents

Guidance for Integrated Aquatic Vegetation Management Plans
(Nuisance Plants and Algae Control)

INTRODUCTION

Purpose: This guidance is designed to assist lake residents and lake managers with the development of integrated aquatic vegetation management plans (IAVMPs) that support a balance of beneficial uses and the public process in the management of the waters of the state. In addition to this guidance, Ecology also has numerous web-based resources to help with planning. *A Citizen's Guide for Developing Integrated Aquatic Vegetation Management Plans* is available at http://www.ecy.wa.gov/programs/wq/plants/management/manual/index.html or you can call or e-mail Ecology's Publication Officer at (360) 407-7000 or jewi461@ecy.wa.gov and request a paper copy of this manual.

The need for planning exists because lakes are highly interactive systems. It is impossible to alter one characteristic such as aquatic plant growth without affecting some other part of the system such as fish production. For example, a lake association may be concerned about a late summer algal bloom and treat the algae chemically, causing a massive alga die-off that can consume vital oxygen and disrupt food chains. However, many lakes experience a late summer increase in algae. On the other hand, the algae will die shortly as days grow shorter and water temperatures drop below the optima for algae, so the condition will clear up on its own. A chemical treatment in this case is not needed, would add unnecessary chemicals to the lake, and treats a symptom (algae growth) rather than the cause of the algae problem (nutrients) (North American Lake Management Society, 2001, p. 9). Chapter 1 of *A Citizens Manual for Developing Aquatic Vegetation Management Plans* states, "it is critical to distinguish between aquatic plant problems and water quality problems associated with excess algae production."

The solution for many lake plant and algae problems is to prevent nutrients from entering the lake or altering the nutrient balance, although some lakes are also experiencing internal loading of nutrients from the sediments. Storm water run-off, for example, is a common source of nutrient loading that can often be prevented by channeling storm waters into retention ponds or creating natural vegetation buffers along the shoreline.

Ecology has also examined various options (mechanical, manual, biological, and chemical) for aquatic plant and algae control in an Environmental Impact Statement (Ecology 2001 - http://www.ecy.wa.gov/biblio/0010040.html) many of which would be useful tools for lake managers to consider. Chemical control methods are acceptable to maintain the beneficial uses if conducted occasionally or if conducted using an integrated aquatic plant

management plan. Management plans are used to examine available and economical options for long-term management of a lake. The purpose of a plan is to demonstrate to Ecology and the public a balancing of beneficial uses within the management options selected.

The decision to proceed with aquatic plant control in the water body is just the beginning. Follow-through is critical. Aquatic plant control is an ongoing process that requires long-term commitment; achieving management goals that can be maintained often takes many years. The IAVMP should be flexible and evolving. It should set action thresholds to determine when an action should be taken. It should provide for regular checking of how well the actions are working and allow for modification of actions as conditions change.

I. Develop a Problem Statement

If you are applying for a permit to treat nuisance plants in your lake with chemicals, you have most likely determined that certain plants in your lake "exist at a density and location so as to substantially interfere with or eliminate activities such as boating, swimming, fishing and waterskiing, or other beneficial uses of the water."

However, not all the plants in the lake can be deemed "problem or nuisance" plants. Aquatic plants also serve useful functions such as stabilizing sediments and shorelines, providing food for waterfowl, habitat for fish and wildlife, and can help prevent algal blooms. The Washington State Department of Fish and Wildlife requires 25 percent or more of the vegetated portion of the lake be left to provide habitat for fish and other aquatic organisms. The vegetation left in the water body after management activities should include native vegetation along portions of the shoreline as well as some native floating and submerged plants (if they occur naturally in the water body).

Develop your problem statement, state the type and location of plants that you perceive as causing problems and list the beneficial uses they are disrupting in the lake. An example might say:

> In 1994, native water lilies were first discovered around the dock area in Lake Joy. The water lilies have spread and now cover 30% of the lake. The number of fishing days has declined from 100 days in 1995 to less than 25 days in 1998. In addition to losing the fishery, other recreational uses, such as swimming and water skiing have been severely impacted. Many local residents are now afraid to swim in Lake Joy and are concerned for the safety of their children.

For help identifying plants check Ecology's Aquatic Plants and Lakes webpage at http://www.ecy.wa.gov/programs/wq/plants/plantid2/index.html.
Your lake may also have been surveyed by Ecology's Lake's Water Quality and Aquatic Plant Monitoring Program. Plant species lists and lake maps for many of Washington's lakes are available for downloading at http://www.ecy.wa.gov/programs/eap/fw_lakes/lk_list.html. Alternatively, you can search Ecology's aquatic plant database for plant species information at http://www.ecy.wa.gov/programs/eap/lakes/aquaticplants/index.html

If your lake does not have a map available from that list, you can obtain a map from the Topozone website at http://www.topozone.com or you can check with your local government. Many cities and counties have extensive data on the lakes within their jurisdictions.

Plan Elements for Section I

(Use as a checklist)

☐ 1. Describe the types, locations, and extent (density) of the problem plants in your water body or management area.

☐ 2. Identify the beneficial uses the plants are disrupting and explain why there is a need to manage these plants and/or algae.

Beneficial uses include:

- Swimming
- Boating
- Fishing
- Aesthetics
- Wildlife viewing
- Etc.

☐ 3. Formulate a problem statement for the water body based on the information in 1. and 2. above.

II. Describe Past Management Efforts

Identify organization(s) that have initiated lake management and describe any chemical and non-chemical control efforts used in the past five years, *longer if known*.

A. Organizations may include:

- Lake/homeowner associations
- Lake management districts (Chapter 36.61 RCW)
- Sewer and water districts

State or local agencies 1. Fish and shellfish:
Salmonid migration, rearing, spawning, and harvesting. Other fish migration, rearing, spawning, and harvesting. Clam and mussel rearing, spawning, and harvesting. Crayfish rearing, spawning, and harvesting.

-
- Private and/or homeowner
- Individual residents
- Other

B. Non-chemical control efforts may include:

- the elimination of direct or indirect stormwater drainages into the lake,
- increased buffers of natural vegetation to further reduce stormwater run-off,
- reduced fertilizer use in yards or using non-phosphorous fertilizers,

- septic system repairs or removal,
- excessive geese population controls,
- sediment or diver dredging,
- hand pulling by divers or others,
- raking,
- mechanical cutting,
- mechanical harvesting,
- rotovation
- bottom barriers,
- sediment agitation devices (weed rollers)
- water level drawdown,
- biological controls such as grass carp, and
- Others.

C. Chemical control methods may include:

- glyphosate (Rodeo™, Aqua Master™)
- diquat dibromide (Reward™)
- copper compounds (including Komeen™, Copper Sulfate, and AV-70™)
- fluridone (Sonar™, Avast!™)
- endothall (Aquathol K™, Aquathol Super K™)
- endothall (Hydrothal 191™)
- 2, 4-D ester (Aqua-Kleen™, Navigate™)
- 2, 4-D amine (DMA*4IVM™)
- triclopyr (Renovate3™)
- GreenClean™
- Imazapyr (Habitat™)
- Aluminum sulfate and sodium aluminate
- Others

Explain the results of the past control methods. Provide the year or years that specific control methods were used. For all control methods, list the plants that were targeted and the length of time the plants were controlled. If chemicals were used, also describe what percent of the lake was treated, the target plants, and list the names of the chemicals used.

Plan Elements for Section II

(Use as a checklist)

☐ Identify and name the organization(s) that have coordinated lake management efforts in the last 5 to 10 years.

☐ Describe the *manual* control methods used.

- Was diver or shoreline hand pulling, or raking tried? ☐ Yes ☐ No
  If no, explain why these methods were not used.
  If yes, explain when and where these methods were used, what plants were targeted, and the length of time that the plants were controlled.

- Were bottom barriers tried? ☐ Yes ☐ No
  If no, explain why this option was not used.

- If yes, explain when and where this method was used, what plants were targeted, and the length of time that the plants were controlled.

- Was diver dredging tried? ☐ Yes ☐ No
  If no, explain why this method was not used.
  If yes, explain when and where this method was used, what plants were targeted, and the length of time that the plants were controlled.
  Describe other manual methods

☐ Describe the *environmental manipulation* methods used.

- Was water level drawdown tried at this site? ☐ Yes ☐ No
  If no, explain why this option was not used?
  If yes, explain when and where this method was used and provide the length of time that the plants were controlled.

☐ Describe the *mechanical* methods used.

- Were mechanical cutting and/or harvesting and/or rotovation tried at this site? ☐ Yes ☐ No
  If no, explain why these methods were not used.
  If yes, explain when and where these methods were used, what plants were targeted, and the length of time that the plants were controlled.

- Were *sediment agitation devices* such as weed rollers used at this site?
  ☐ Yes ☐ No
  If no, explain why these devices were not used.
  If yes, explain when and where these devices were used, what plants were targeted, and the length of time that the plants were controlled.

☐ Describe the *biological* control methods used.

- Were biological control methods, such as triploid grass carp, used at this site?
  ☐ Yes ☐ No
  If no, explain why grass carp were not used.
  If yes, explain when and where these methods were used (or when grass carp were stocked, what plants were targeted, and the length of time that the plants were controlled.

☐ Describe the *chemical* control methods used.

- Were chemical control methods used at this site? ☐ Yes ☐ No
  If yes, identify any herbicides or algaecides that have been used in the last ten years.
  Explain where they were used and what plants were controlled.
  How long were the plants controlled after each application?

III. Define Management Goals

Once a problem statement has been drafted and all interested and affected parties have been invited to participate in the planning effort, the next step is to come up with specific management goals. Management goals define what is to be achieved in response to the aquatic plant problems. Defining goals helps in selecting the best methods of control.

Management efforts should cover *at least five years*. Goals set year-to-year tend to be inconsistent or even counterproductive. They are often less protective of beneficial uses of the lake and they usually result in an inefficient use of resources. Examples of long-term goals are:

1. To restore or create long-term recreational opportunities such as boat races, fishing access, or a safe swimming beach.
2. To enhance the long-term aesthetic enjoyment of the lake.
3. To reduce aquatic plant vegetation and phosphorous loading over time.

As managers of waters of the state, your goals must be protective of all of the *characteristic uses* of the lake. "Characteristic uses" of waters of the state are defined in the Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC. The characteristic uses protected for lakes include:

1. Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting. Other fish migration, rearing, spawning, and harvesting. Clam and mussel rearing, spawning, and harvesting. Crayfish rearing, spawning, and harvesting.
2. Primary contact recreation, *i.e.*, activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing;
3. Domestic, industrial, and agricultural water supply;
4. Stock watering;
5. Wildlife habitat;
6. Harvesting (such as crayfish, plants, etc.);
7. Commerce and navigation;
8. Boating; and
9. Aesthetic values.

Invite others in the area of your control via flyers, letters, or newsletters to comment on your goals.

- For small treatments along private shorelines, or ponds less than five acres without public access, notify neighbors within 400 feet of the proposed treatment area that may have beaches affected by the proposed treatment.
- For lake areas greater than five acres, notify all property owners around the lake and send invitations to Washington Department of Fish and Wildlife and other appropriate state, federal, and local agencies and tribes to comment on your

planning goals. Interested agencies could include Parks and Recreation Commission (should they own land on the lake), Department of Natural Resources, and Department of Ecology. The public must be invited if there is public access.

Once an aquatic-plant growth or algae problem has been recognized, it is crucial to invite all affected parties to comment on or participate in planning. If the goals being developed only pertain to part of the lake, it is important that they are consistent with the goals of other plans that have been developed for that lake. Identifying people who have an interest in the proposed treatment may be as simple as speaking to the neighbors on either side of your property who may have the plants on their shoreline affected by the treatment. For whole lake treatments, state, county or local governments and agencies may be involved. Private businesses or other interest groups may have concerns about the water body as well. For privately owned lakes, include all parties who have access to the lake. If the lake has an inlet and outlet stream, "interested parties" may include the public at large.

Some groups that may have an interest in management of an aquatic system are:

- Residents or property owners around the water body,
- Special user groups (*e.g.*, bass anglers, Ducks Unlimited),
- Local government,
- State and federal agencies (*e.g.*, State Department of Ecology),
- Native American tribes,
- Water-related businesses (*e.g.*, resorts, tackle and bait shops, dive shops),
- Elected officials, and
- Environmental groups (*e.g.*, Audubon).

Plan Elements for Section III

List your management goals in this section of the plan. You have stated management goals that are:
(Use as a checklist)

☐ Long-term
☐ Protective of beneficial uses
☐ Tailored to the size of your management area, and
☐ Interested/affected parties have been notified of your plans, invited to comment on the plans, and this action has been documented.

IV. List Water Body and Watershed Characteristics

A lake or river is a dynamic, living system, teeming with physical, chemical and biological activity. The system extends beyond its shores to include surrounding lands whose waters drain into the water body (the watershed). A water body and its watershed are inseparable. In fact, water body conditions are very much influenced by what occurs in

the watershed. For instance, a watershed contributes nutrients and sediments to a water body that are necessary for aquatic plant growth and algae growth. Nutrients—especially phosphorus and nitrogen—flow to the lake from all parts of the watershed by way of streams, ground water, and stormwater runoff. In addition, activities in the watershed, such as agriculture and forestry, road maintenance and construction can all contribute silt, debris, chemicals, and other pollutants to the water body.

Consider possible sources of nutrients and sediments and identify long-term measures to reduce them. Controlling watershed inputs from these sources can potentially enhance the effectiveness of your in-lake control measures.

The Department of Ecology and other state resource agencies frequently use a system of "Watershed Resource Inventory Areas" or "WRIAs" to refer to the state's major watershed basins. Your water body will be included in a WRIA, but will likely encompass a much smaller area. Your plan should provide data for your water body watershed.

WRIA and some on-line environmental information are available at:
http://www.ecy.wa.gov/programs/eap/env-info.html or
http://www.ecy.wa.gov/watershed/index.html or
http://www.ecy.wa.gov/apps/watersheds/aquaticplants/listbywria.asp. On this last website, click the arrow-down button on the top of the page to find your particular water body.

The Washington Department of Fish and Wildlife (WDFW) maintains a number of GIS databases that contain information on important fish and wildlife species that should be considered in land use decisions and activities. Use of this information in the earliest planning stages can help minimize project conflicts and delays due to fish and wildlife issues. Informed land use activities can assist in preventing fish and wildlife species from becoming listed as endangered and threatened or can help recover those that are already listed. Maps are available from: http://wdfw.wa.gov/habitat.htm

Plan Elements for Section IV

A *watershed* is the surface drainage area that contributes water to a lake, river, or other body of water. Activities occurring in a lake watershed affect the health of the water body. Because of this, it is important for lake groups to be aware of activities occurring in the watershed that could potentially affect the water body.

List the water body *watershed* characteristics including:
(Use as a checklist)

☐ What is the size of the watershed and where is it located?
Attach a map to show the location of the watershed. ☐ (map attached)

☐ List the land use activities in the watershed.
Land use activities include the following:

- Residential
- Urban
- Forested
- Rural
- Agricultural
- Private recreation (resident access only)
- Public recreation (parks, boat ramps, walking trails, etc.)
- Industrial (shipping, ports, shoreline businesses, etc.)
- City or county (drinking water, stormwater runoff, etc.)

☐ List the major stream and wetlands in the watershed.
Attach a map to show these locations, if appropriate. ☐ (map attached)

☐ List any nonpoint nutrient source locations, actual or potential, in the watershed.
Sources may include dairies, hobby farms, residential runoff, and storm water.

Water body characteristics

Lake maps and lake information for many of Washington's lakes are available at http://www.ecy.wa.gov/programs/eap/fw_lakes/lk_list.html. Or you can search Ecology's aquatic plant database for plant species information at: http://www.ecy.wa.gov/programs/eap/lakes/aquaticplants/index.html

List *water body* characteristics including:
(Use as a checklist)

☐ Location of the water body.

☐ Total acreage of the water body.

☐ The mean depth and maximum depth of the water body.

☐ The water source(s) and flushing rate of the water body.

☐ Attach a map of the water body showing the depth contours. ☐ (map attached)

☐ Water quality – evaluate historical water quality data if available.
(Examples of water quality data include dissolved oxygen, pH, fecal coliforms, and nutrients such as nitrogen and phosphorus. Observations from long-time residents around the lake may be useful – be sure to note your source.)

☐ Provide a list of the aquatic plants found in the water body.

☐ Are there rare plants found in or nearby the water body? ☐ Yes ☐ No

☐ Contact DNR. Contact the Department of Natural Resource Heritage Program (DNR) to determine whether rare plants are present in the water body. See their website at: http://www.dnr.wa.gov/nhp/index.html).

☐ Is the water body experiencing algae problems? ☐ Yes ☐ No
What kind of algae is causing problems (filamentous, blue-greens, others)?

☐ What is the shoreline use of the water body (residential, rural, industrial, etc.)? (Contact your county for this information or look at your county website at: http://access.wa.gov/)

☐ What sediment types are found in the lake (organic, sand, silt, gravel, flucculant)? (Contact your county for this information or look at your county website at: http://access.wa.gov/)

☐ Are there any lake residents or others using the water body for potable water or irrigation? ☐ Yes ☐ No
Do these residents have legal water rights? ☐ Yes ☐ No
(Contact your Ecology regional office for a list of water right holders).
If yes, if chemical treatments are selected as a control method, describe how these water uses will be protected.

☐ What fish are present in or use the water body and associated streams? (Contact your local Fish and Wildlife office for a list of fish in the water body). Are there fish rearing and spawning areas that should remain undisturbed by aquatic plant control efforts?

☐ Are there wetland areas associated with the water body? ☐ Yes ☐ No
If yes, describe the type and quality of these wetlands and indicate their location on a map. (This information is often available from your local government http://access.wa.gov/)

☐ What kind of waterfowl (including geese) use the water body?
Are there significant nesting areas or areas that should remain undisturbed by aquatic plant control activities? ☐ Yes ☐ No
(Contact your local Fish and Wildlife office for information).

☐ What kind of wildlife (reptiles, mammals, amphibians, etc.) use the water body?

☐ Are there any inlets or outlets (including springs) to the water body? ☐ Yes ☐ No

If yes, describe these inlets and outlets, including flow rates, time of flow (may be seasonal), and indicate their location on the beneficial use map. (This information is often available from your local government http://access.wa.gov/).

☐ Do any endangered or listed species use the water body? ☐ Yes ☐ No
If yes, what species?
When does this species use the water body?
Where does this species use the water body?

Check with the local Department of Fish and Wildlife Office and the U.S. Fish and Wildlife Service for Endangered Species Act species of concern. Contact information:

Washington State Department of Fish and Wildlife:

Olympia Office (Main Office)
(360) 902-2200
FAX (360) 902-2230, TDD (360) 902-2207

Visitors:
Natural Resources Building
1111 Washington St. SE
Olympia, WA 98501
Building Office hours: 8 a.m. - 5 p.m.

Mailing Address:
600 Capitol Way N.
Olympia, WA USA 98501-1091

Link to Regional Offices:
http://wdfw.wa.gov/reg/regions.htm

U.S. Fish and Wildlife Service:

Jim Michaels, U.S. Fish and Wildlife Service
Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey WA 98503-1263
Phone (360) 753-7767

U.S. Fish and Wildlife Service:

Suzanne Audet, U.S. Fish and Wildlife Service
Upper Columbia Fish and Wildlife Office
11103 E. Montgomery Drive
Spokane, WA 99206
Phone: (509) 893-8002

Link to U.S. Fish and Wildlife Offices:
http://www.fws.gov/

☐ Describe any other unique characteristics of the water body that were not covered above, if any.

V. List the Beneficial Uses of the Water Body and Develop a Beneficial Use Map for the Water Body

For assistance with maps, refer to links in Section I.

Plan Elements for Section V

Developing a beneficial use map for the water body
(Use as a checklist)

☐ List all beneficial uses of the water body (see Section III for the list of beneficial uses).

☐ Attach a *waterbody use map* of the water body that has:

- Conservancy areas, including habitats that are integral to the lake ecosystem, such as nesting sites, fish rearing or spawning areas, or locations of rare plant communities or areas where plants will be left intact (i.e. to provide protection of shoreline, food and shelter for aquatic organisms, buffers, etc.)
- Boating and boat access areas (launches, ramps)
- Water skiing zones
- Beaches and swimming areas (public, private)
- Fishing areas
- Areas for special aquatic events (sailing, rowing, mini-hydroplane races)
- Parks, picnic areas, nature trails, scenic overlooks
- Inlet and outlets (including drinking water withdrawals)
- Other, please specify

☐ Beneficial-use map attached

☐ Check for threatened and endangered species

VI. Map Aquatic Plants

Survey methods for aquatic plant mapping can be seen at this web link:
http://www.ecy.wa.gov/programs/wq/plants/management/survey.html
This section should match Section I.

Are there any unique characteristics about these species that help determine the most appropriate methods and management timing?
(For example, if you are controlling curly leaf pondweed, it's best to control early in the season before the plant sets numerous turions (over wintering structures). Timing can be important to achieve the most effective management based on plant physiology.)

Plan Elements for Section VI.

Create an aquatic plant map for the water body
(Use as a checklist)

☐ Attach a map of the water body that includes:

- ☐ Approximate locations and species of aquatic plants.
- ☐ Locations of wetlands.
- ☐ Sediment types (organic, sand, silt, gravel), etc.
- ☐ Waterbody depth contour lines.
- ☐ Locations of threatened or endangered species of plants or animals

Describe unique characteristics about these species that help determine the most appropriate methods and management timing.

VII. Identify the Aquatic Plant Control Alternatives, Their Effectiveness, Environmental Impacts, Human Health Risks, and Costs

Management strategies will likely involve a mix of methods. A management program may include mechanical harvesting or cutting to reduce plant biomass, treatment with herbicides, and follow-up "spot" treatments that may include a combination of methods, including hand pulling, diver dredging, or spot application of aquatic herbicides. Ensure your strategy is specific to your lake. For example, if drawdown is not an option, explain that the lake does not have an outlet structure or dam, etc. The following website provides excellent information on aquatic plant management methods and considerations:
http://www.aquatics.org/pubs/madsen2.htm

A detailed description and discussion of each method can be found on Ecology's website. For information on:

Manual methods see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua022.html
Bottom barriers see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua023.html
Diver dredging, see:
http://www.ecy.wa.gov/programs/wq/plants/management/dredging.html
Sediment agitation methods see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua029.html
Mechanical cutting see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua025.html

Mechanical harvesting see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua026.html
Grass carp see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua024.html
Water-level drawdown see:
http://www.ecy.wa.gov/programs/wq/plants/management/drawdown.html
Rotovation see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua027.html
Herbicides see:
http://www.ecy.wa.gov/programs/wq/plants/management/aqua028.html and the Aquatic Nuisance Weed Control Fact Sheet, pp. 7-10 and supplemental information on Ecology's website:
http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/nuisance/nuisance_index.html

Plan Elements for Section VII

Describe which of the following aquatic plant or algae management methods are applicable for your water body and provide specific reasons why or why not they are applicable (sometimes individual homeowners may chose to do one or more of these methods around their own water front property, where other methods may be more suitable for higher use areas):

Follow the order and the format of Appendix A in the Aquatic Nuisance Plant and Algae Control Permit to make clear what is required.
(Use as a checklist)

☐ *No action* – Describe the specific short- and long-term impacts associated with not controlling aquatic plants in the water body.

☐ *Manual* control methods are described in the environmental manipulation section of Appendix A.

- Are hand-pulling or raking suitable aquatic plant control methods for the water body? ☐ Yes ☐ No
  If no, explain in detail why hand pulling or raking are not suitable control methods.
  If yes, provide approximate costs for performing this activity.

- Are bottom barriers a suitable aquatic plant control method for the water body?
  ☐ Yes ☐ No
  If no, explain in detail why bottom barriers are not suitable.
  If yes, provide approximate costs for performing this activity

- Is diver dredging a suitable aquatic plant control method for the water body?
  ☐ Yes ☐ No
  If no, explain in detail why diver dredging is not suitable.
  If yes, provide approximate costs for performing this activity.

☐ *Environmental manipulation* methods

- Is water level drawdown a suitable aquatic plant control method for this water body? ☐ Yes ☐ No
  If no, explain in detail why water level drawdown is not suitable.
  If yes, provide approximate costs for performing this activity

- Is nutrient reduction and/or sediment reduction suitable aquatic plant control or algae control methods for this water body? ☐ Yes ☐ No
  If no, explain in detail why these methods are not suitable.
  If yes, provide approximate costs for performing this activity

☐ *Mechanical* methods

- Are mechanical cutting and/or harvesting and/or rotovation suitable methods for aquatic plant control for this water body? ☐ Yes ☐ No
  If no, explain in detail why these methods are not suitable.
  If yes, provide approximate costs for performing this activity

- Are sediment agitation devices, such as weed rollers, suitable for aquatic plant control for this water body? ☐ Yes ☐ No
  If no, explain in detail why these devices are not suitable.
  If yes, provide approximate costs for performing this activity

☐ *Biological* control methods

- Are biological control methods, such as stocking triploid grass carp, suitable for aquatic plant control for this water body?
  ☐ Yes ☐ No
  If no, explain in detail why biological control methods are not suitable.
  If yes, provide approximate costs for performing this activity

☐ *Chemical* control methods

- Are chemical control methods suitable for aquatic plant control for this water body? ☐ Yes ☐ No
  If no, explain in detail why chemical methods are not suitable for this water body.

  If yes, identify any herbicides or algaecides that you think suitable for use in the water body.
  If yes, provide approximate costs for performing this activity.

☐ New technologies

- Are there any new technologies suitable for aquatic plant control or algae control for this water body? ☐ Yes ☐ No
  If yes, describe the new technologies and provide approximate costs for performing this activity

VIII. Develop a Control Intensity Map for the Water Body

Various levels of control within each beneficial use zone (including no control) need to be evaluated. This can be accomplished by overlaying the *beneficial use map* with the *aquatic plant map*.

Where should a **low level of control** be applied to preserve some intermediate level of plant growth? And under what circumstances would a **high level of control** be necessary, such as where a minimal amount of nuisance plants can be tolerated (*i.e.*, public swimming beaches). Dense growths of aquatic plants in high use contact recreation areas generally indicate a need for control. Some plant zones around the lake should be left unmanaged for fish and wildlife habitat (**no control**). Overlaying these maps should help you determine where the control zones are suitably placed.

Set action thresholds. Under integrated pest management programs, actions should be taken only when the pest exceeds a certain number or density.
How many plants and of what type are too many for a use zone?
How will you determine when a control action needs to be taken?

Plan Elements for Section VIII

Indicate the following areas on your map:
(Use as a checklist)

☐ No control – some conservancy areas may be best managed by being left in a natural state.

☐ Low level of control – this may include conservancy areas to protect and enhance habitat value. Examples include:

- Developing fishing lanes to create optimal warm-water fishing opportunities.
- Developing control strategies that protect shoreline-wetland vegetation.
- Considering depths and areas of control for activities such as water-skiing, boating, aesthetics, and swimming.
- Partial treatment of homeowner shoreline to provide access as well as habitat.

☐ High intensity of control – may include areas such as swimming beaches, docks, and boat ramps where any vegetation may be unacceptable.

IX. Choose the Best Combination of Options of Site-Specific Levels of Control Using These Criteria.

This step involves choosing the combination of control methods that best meets the needs of water body users with the least impacts to the environment and in accordance with the plan goals. In Section VII, each method was evaluated for suitability for this water body. Now the planning committee selects the aquatic plant management methods that will help them best meet the plan goals. An integrated vegetation management approach is used as a means of narrowing the options into an appropriate management package. However, no management program is without impacts and choosing a management program will require weighing all the factors. The challenge in deciding a course of action is to achieve a balance between expected management goals at a reasonable cost and acceptable environmental disruption.

Plan Elements for Section IX

The action plan must:
(Use as a checklist)

☐ Identify each proposed control method.
(The plan may identify control methods suitable for individual residents and identify control methods that will be used on a widespread basis.)

☐ Identify each area where the selected control methods will be used.

☐ Identify the timing of each of the selected control actions. (For a long-term plan, you may need to lay out options and areas for each year based on your action thresholds.)

☐ Identify the targeted degree (intensity) of control.

☐ Identify the permits needed to implement each method.

☐ Assess the duration of each control method and assess its compatibility with the site.

☐ Determine the capital costs and operation and maintenance costs of each control method.

☐ Determine the degree of control to the site, including evaluating whether the control strategy is appropriate to the site.

☐ Determine the action thresholds that will decide how often you need to apply each control method to each site.

☐ Determine if the strategy causes minimum health risks.

☐ Evaluate whether the strategy has a balanced approach between waterbody enhancement and environmental protection.

☐ Evaluate the compatibility of the weed control strategy with fisheries, waterfowl, wildlife, wetlands, rare plants, endangered species, water rights, and the ecology of the water body. (This is where the information in Sections IV and VII will be used.)

☐ If there are potential impacts, how will you mitigate for them?
(Mitigation could mean delaying implementation until a migratory species has left the system, providing drinking water to families, etc.)

☐ Preserve at least 25 percent of the vegetated area of the water body for habitat and other ecosystem uses. The vegetation left in the water body after management activities should include native vegetation along portions of the shoreline as well as some native floating and submerged plants (if they occur naturally in the water body).

X. Public Involvement

Obtain and document support or acceptance from interested parties, particularly large landholders and permitting agencies. Have a section in your plan or in the appendix to your plan that documents your public involvement including copies of notices and invitations that have gone out to interested parties and records of meetings that have been held such as attendance sheets or meeting minutes. (Please refer back to Section III. for additional guidance on this section.)

Each lake group needs to solicit input for plan development. At a minimum, one public meeting should be held to discuss the draft management plan and receive feedback. Some lake groups who have developed plans have sent out questionnaires or survey forms to lake residents and interested parties to receive feedback and gather ideas about levels of concerns with aquatic plants and potential control methods. This input can help with the development of a lake plan. Other lake groups provide plan and implementation updates to the lake residents via community newsletters or websites. Plans should be revised according to this feedback.

If more than one public meeting is held, here are times during plan development when holding public meetings are helpful:

- At the formative stages.
- When plant control alternatives have been developed, but before a recommended

plant control alternative has been selected.

- After selecting an alternative, but before implementation.
- During implementation, as necessary.
- During evaluation and surveillance phases, as necessary.

Plan Elements for Section X

A. Have you identified interested parties such as:
(Use as a checklist)

☐ Lake residents ☐ Yes ☐ No

☐ User groups (bass fishers, Ducks Unlimited, water ski clubs, etc.) ☐ Yes ☐ No

☐ Local government ☐ Yes ☐ No

☐ State and federal agencies ☐ Yes ☐ No

☐ Environmental groups ☐ Yes ☐ No

☐ Tribes ☐ Yes ☐ No

☐ Public (local community, nearby communities, etc.) ☐ Yes ☐ No

☐ Privately-owned lake, interested parties includes all who have access to the lake.
If the lake has an inlet and outlet stream, interested parties includes the public at large.
☐ Yes ☐ No

B. Conduct public meetings during the following times:
(Use as a checklist)

☐ At the formative stages ☐ Yes ☐ No

☐ Alternatives have been developed, but before a recommended one is selected.
☐ Yes ☐ No

☐ After alternative is selected, but before implementation. ☐ Yes ☐ No

☐ During implementation, if necessary. ☐ Yes ☐ No

☐ During evaluation and surveillance phases, as necessary. ☐ Yes ☐ No

C. Obtain and document support or acceptance from interested parties.

(Use as a checklist) ☐ Yes ☐ No

XI. Conduct a State Environmental Policy Act. (SEPA) Review

Ecology and other permitting agencies should review the draft plan before it goes through the SEPA process. If there are substantive comments, from these agencies, they can then be incorporated in the plan prior to the SEPA process. After this preliminary review is completed, send three copies of the completed plan to Ecology with a completed SEPA Plan Elements for SEPA review and comment, initiating a fourteen to twenty-one day comment period. Other entities that may be notified include Washington Department of Fish and Wildlife, the Department of Natural Resources, local tribes, local governments and interest groups. Open-house (informational) meetings should be offered by the SEPA lead agency, if needed. Comments received are included in the official permit record. For more information see, http://www.ecy.wa.gov/programs/sea/sepa/e-review.html

Plan Elements for Section XI

☐ Three copies of your plan and the Plan Elements have been sent to Ecology.

XII. Develop an Action Strategy

Plans are considered to be "living" and adaptive documents. Sometimes the selected methods do not work as well as expected or new technologies may be developed and may be more effective than older methods. The plan should be reevaluated at periodic intervals. In addition, each aquatic vegetation management method should be evaluated for efficacy. Develop a plan for monitoring the efficacy of the management methods and reporting the relative degree of success. Success can be measured by the increase or improvement of the beneficial uses of a waterbody.

XIII. Monitoring and Evaluation of Plan

Monitoring plans, which include sampling for the applied herbicide, shall be included in the IAVMP for all whole lake herbicide applications, herbicide applications near drinking and stock watering water withdrawal sites, where native vegetation or threatened or endangered species are likely to be affected, and applications to sites where the total area of treatment exceeds ten acres. To effectively evaluate an herbicide application, consider pre-monitoring to develop base-line information. However, the monitoring at a minimum shall include sampling and analysis for the pesticide of use according to the following schedule:

Adverse weather conditions, lack of daylight, and other relevant factors related to safety considerations may justify altering the timing of monitoring, but will not preclude the requirement that a minimum level of monitoring be performed. The burden of proof for establishing safety-related alterations to the monitoring schedule shall rest with the permit holder(s).

☐ Is this a whole lake treatment?
☐ Is this a single or combined treatment greater than ten acres?
☐ Are there drinking water or stock watering withdrawal sites nearby?
☐ Is there native vegetation or threatened or endangered species likely to be affected?

If any of the boxes above are checked, the monitoring plan must include the Monitoring Requirements of Condition S5 in the Nuisance Plant and Algae Control Permit.

1. Herbicide Monitoring Requirements

Category	Chemical	Timing	Unit	Sample Point	Sample Type
Receiving water within application site	2,4-D	5 days after initial Application	Mg/l	Within boundaries of the treatment site	One areal composite
Receiving water within application site	Fluridone	90 days after initial application	Mg/l	Within boundaries of the treatment site	One areal composite
Receiving water within application site	Endothall	5 days after initial application	Mg/l	Within boundaries of the treatment site	One areal composite
Receiving water within application site	Green Clean	Not required		Within boundaries of the treatment site	
Receiving water within application site	Diquat	Not required		Within boundaries of the treatment site	
Receiving water within application site	Glyphosate	Not required		Within boundaries of the treatment site	
Receiving water outside the application site	2,4-D	Within 24 hours after completion of the application	Mg/l	100 feet from boundary of the application site	One areal composite of the perimeter
Receiving water outside the application site	Fluridone	Within 24 hours after completion of the application	Mg/l	Within boundaries of the treatment site	One areal composite of the perimeter
Receiving water outside the application site	Endothall	Within 24 hours after completion of the application	Mg/l	Within boundaries of the treatment site	One areal composite of the perimeter
Receiving water outside the application site	Green Clean	Not required		Within boundaries of the treatment site	
Receiving water outside the application site	Diquat	Not required		Within boundaries of the treatment site	
Receiving water outside the application site	Glyphosate	Not required		Within boundaries of the treatment site	

All IAVMPs shall include a post application evaluation of the site(s). The timing of this evaluation shall be appropriate for the herbicide or algaecide used at the site. This evaluation shall include an estimate of the effectiveness of the application (qualitative or quantitative), any dead or dying organisms, algae conditions, and may include any other environmental data which may be available (dissolved oxygen, pH, Secchi disk, turbidity, etc.).

Identified success measures for plant management. Measures can be

1) an increase of recreation or some other beneficial use of the lake,
2) evidence of fewer problem plants,
3) other suggested appropriate measures, or

4) an estimate of the effectiveness of the application (qualitative or quantitive) and any dead or dying organisms, algae conditions.

Plan Elements for Section XII

(Use as a checklist)

☐ How will you monitor the effectiveness of each treatment method?
How will this be documented?
(Monitoring can be as elaborate as taking biomass samples in management areas, or as simple as taking photographs before and at an appropriate interval after the method has been implemented.)

☐ How will you determine how successful each method was in meeting your plan goals?

☐ How will you determine appropriate timing intervals for each management method?

Plan Appendices

The plan appendix is an appropriate place to put information such as meeting minutes, newsletters, and meeting notices. Details of the selected management methods could be placed here too. For instance, if harvesting is selected as a management method, it would be appropriate to put information about harvester types and costs, sample harvesting programs, harvesting contractors, etc. in the appendix. If chemicals are selected, it is appropriate to have label and MSDS information in the appendix along with information about toxicity, and questions and answers about toxicity, human health, etc. You may also want to copy and paste information about each control method in the appendixes so that readers can have an overview of the various technologies available for vegetation management.

References

Gibbons, M., H. Gibbons, and M. Sytsma. 1994. *A Citizens Manual for Developing Integrated Aquatic Vegetation Management Plans*. Washington Department of Ecology. Ecology Publication #93-93, Olympia, WA

Holdren, C., W. Jones, and J. Taggart. 2001. *Managing Lakes and Reservoirs*. North American Lake Management Society and the Terrene Institute in cooperation with the Office of Water Assessment, Watershed Protection Division, United States Environmental Protection Agency, Madison, WI.

Washington State Department of Ecology. 2001. *Final Supplemental Environmental Impact Statement for Freshwater Aquatic Plant Management.* Ecology Publication #00-10-040, Olympia, WA.

When you have completed the review of this document, please sign and return the entire document to your regional office.

By signing this document, you are certifying that the information provided is true to the best of your knowledge.

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