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ONTARIO GUIDELINES FOR  
AQUATIC PLANT CONTROL

by

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## **ABSTRACT**

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Aquatic plants play a key role in maintaining the biological productivity of healthy aquatic ecosystems and are an important component of fish habitat. In southern Ontario, particularly, many waters now contain excessive plant growth. As a result, limited control of aquatic plants for recreational purposes may be appropriate. Such control must be carried out so as to protect fish habitat and sustain Ontario's aquatic resources. This report presents procedural and technical guidelines designed to provide for a rational and consistent approach to the review of public proposals for aquatic plant control. Among the factors considered are the identification of fish habitat, methods of aquatic plant control, equipment, timing, and the size and configuration of treated areas. The document is intended primarily for the use of staff of the Ontario Ministry of Natural Resources and of Fisheries and Oceans Canada who review public proposals for aquatic plant control in Ontario.

## **RÉSUMÉ**

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Les plantes aquatiques ont une fonction essentielle dans le maintien de la bioproduktivité des écosystèmes aquatiques en bon état; elles sont aussi une composante importante de l'habitat du poisson. Dans le sud de l'Ontario, notamment, beaucoup de plans et de cours d'eau sont envahis par les plantes. C'est pourquoi un contrôle limité des plantes aquatiques à des fins récréative pourrait être justifié. Ce contrôle doit être fait avec le souci de protéger l'habitat du poisson et d'assurer le maintien des ressources aquatiques de l'Ontario. On trouvera dans ce rapport des directives techniques et procédurales visant à établir une approche uniforme et rationnelle à l'examen des projets publics de contrôle des plantes aquatiques. Les facteurs considérés sont notamment la détermination des habitats du poisson, les méthodes de contrôle des plantes aquatiques, l'équipement, les calendriers ainsi que la superficie et la configuration des surfaces traitées. Ce document est destiné avant tout au personnel du ministère des Ressources naturelles de l'Ontario et de Pêches et Océans Canada qui font l'examen des projets de contrôle des plantes aquatiques en Ontario.

## **Acknowledgements**

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Serge Metikosh of the Department of Fisheries and Oceans also reviewed the guidelines during their development and offered advice and ideas. In addition, assistance was provided by John Onderdonk and Geoff Carpentier of the Ministry of the Environment and Energy and by Wayne Mitchell and Jim Norris of the Canadian Parks Service.

The guidelines were also reviewed by a number of non-governmental organizations having an interest in matters of aquatic plant control. These included the Federation of Ontario Cottagers' Long Lake Milfoil Action Committee, the Ontario Federation of Anglers and Hunters, the Ontario Marina Operators Association, Resorts Ontario, and South Bay Stoney Lake Cottagers.

The helpful advice and assistance provided by all who reviewed the guidelines during their development are gratefully acknowledged.

## 1.0 INTRODUCTION

Aquatic plants are a natural part of healthy aquatic ecosystems. They play a key role in maintaining the biological productivity of these systems by fixing energy available from sunlight and making it available to other parts of the food web. Without aquatic plants, lakes and streams would lose much of their ability to sustain life.

Aquatic plants are of two main types: algae, which may be single-celled or multi-celled; and aquatic macrophytes (vascular plants) which generally possess true leaves, stems and root systems (MOEE 1994, Bix and Schierup 1989). Macrophytes can be categorized as submergent (stems and leaves below the water surface), emergent (much of the stem above the water surface), and floating-leaved (rooted or free-floating).

Aquatic plants provide many benefits. Macrophytes in particular are an important component of fish habitat, providing spawning, nursery and feeding areas for many species (Janecek 1988, Keast et al. 1978, Werner et al. 1983). They also provide essential habitat for many species of wildlife, including food, nesting sites and protective cover for waterfowl. Rooted aquatic plants also act to stabilize shorelines and lake bottoms. This helps maintain water quality by reducing erosion and turbidity.

Some waters contain too much aquatic plants. In southern Ontario many waters now contain excessive plant growth, reaching amounts which are detrimental both to healthy aquatic communities and to recreational use. Most waters in northern Ontario and on the Canadian Shield do not suffer from this problem, although there are exceptions.

The development of algal "blooms" or dense growths of macrophytes can lead to levels of dissolved oxygen which are too low to support aquatic life. In addition, decomposition of these plants releases nutrients to feed future plant growth and perpetuate the problem. Dense plant growth can also severely impair boating, swimming, fishing and other recreational uses.

Increased plant growth often occurs over very long periods of time as a result of the natural aging process of a lake. It is therefore part of an ecological cycle and should be recognized as such. However, plant growth is often accelerated by human activities occurring in the watershed. Addition of nutrients through shoreline development, lot clearing use of lawn fertilizers and high-phosphate dishwashing detergents, and agricultural runoff contributes to the excessive growth of aquatic plants.

In some Ontario lakes Eurasian water milfoil, an introduced plant species, has largely displaced native plants. In other waters milfoil has invaded areas which had for the most part been unvegetated. In both cases dense growths of milfoil now cover large areas of many of these waters.

The control of nutrient and sediment inputs to surface waters generally provides the best

long-term protection against excessive aquatic plant growth. Where heavy plant growth already exists, limited aquatic plant control for recreational purposes may be appropriate.

## **2.0 FISHERIES MANAGEMENT OBJECTIVES**

In Ontario, the Ministry of Natural Resources (MNR) and the Department of Fisheries and Oceans (DFO) share responsibility for the management of fisheries resources. In meeting this responsibility, the two agencies are guided by direction contained in the Strategic Plan for Ontario Fisheries (SPOF) and the DFO Policy for the Management of Fish Habitat (DFO 1986). SPOF identified the loss of fish habitat as one of the major issues facing Ontario fisheries (MNR 1990a).

An important factor in the loss of fish habitat has been poorly planned shoreline development. In many cases, physical alterations of the shoreline have led to a reduction in the capacity of the waterbody to support a healthy fishery. The control of aquatic plants can have a major impact on nearshore habitat.

MNR, in meeting its obligations under the Canada-Ontario Fisheries Agreement (1988), is committed to ensuring there is “no net loss” of habitat. In the case of aquatic plants, any proposal for plant control must be carefully reviewed to ensure that the project will not result in a net loss of habitat.

Limited removal of plants, particularly in waters containing heavy plant growth, may benefit fish by increasing edge and habitat diversity. For example, the presence of open water adjacent to vegetated areas improves feeding efficiency for certain size classes of some fish species (Mittelbach 1981). Feeding efficiency and growth rates may also increase with a reduction in plant density (Gotceitas 1990, Crowder and Cooper 1982). In addition, partial removal of plants in areas of dense vegetation provides better access to inshore areas for large fish as well as anglers (Engel 1985, Killgore et al. 1989).

The Ministry understands the desire for water-based recreation and recognizes that people are an integral part of aquatic ecosystems. However, MNR must also ensure that all activities are carried out so as to protect fish habitat and sustain Ontario's aquatic resources. In developing these guidelines, the Ministry has tried to strike a reasonable balance between the need to sustain healthy aquatic ecosystems and the public's desire for recreational opportunities.

## **3.0 LEGAL RESPONSIBILITIES**

The Fisheries Act (Canada) prohibits the harmful alteration, disruption or destruction of fish habitat. Fish habitat is defined in the Act as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to



carry out their life processes”. MNR is responsible for administering the Act in Ontario and is committed to ensuring “no net loss” of habitat.

Persons proposing to remove aquatic plants must also comply with other federal, provincial and municipal legislation. Anyone proposing to apply a herbicide for the control of aquatic plants must first obtain a permit issued by the Ministry of Environment and Energy (MOEE) under the Pesticides Act (Ontario).

The Public Lands Act (Ontario) prohibits the clearing of public lands without a valid work permit issued by MNR. The beds of most waterbodies in Ontario are public lands which belong to the province. The physical or mechanical removal of aquatic plants on such lands has been determined to fall within the definition of “clearing”. Therefore, MNR may require persons proposing to carry out aquatic plant control by physical means to obtain a work permit. No permit from MOEE is required for plant control by physical or mechanical means.

Where aquatic plants grow on federal lands, such as most of the Trent-Severn and Rideau waterways, plant control activities must be authorized by the appropriate federal agency (e.g. Canadian Parks Service).

Other legislation may also apply to the control of aquatic plants. For example, disturbing or destroying nests or eggs of migratory birds is prohibited under the Migratory Birds Convention Act (Canada). Destroying or interfering with the habitats of endangered species is prohibited under the Endangered Species Act (Ontario). Further, persons removing aquatic plants by physical or mechanical means must remove cut vegetation from the water. Failure to do so can result in prosecution under the Water Resources Act (Ontario) or the Environmental Protection Act (Ontario).

#### **4.0 PURPOSE**

The purpose of these guidelines is to provide for a rational and consistent approach by Ministry staff in reviewing public proposals for aquatic plant control.

Use of the guidelines will ensure that the Ministry’s review is consistent with its fisheries management objectives and responsibilities. The guidelines are not intended to provide comprehensive direction concerning other Ministry objectives (e.g. management of wildlife habitat). However, in reviewing proposals for aquatic plant control, Ministry staff should have regard for related objectives such as the protection of provincially significant wetlands.

Guidelines cannot be written to address all possible situations to which they might be applied. These guidelines should therefore be used with some flexibility, bearing in mind local conditions and circumstances. However, use of the guidelines must always be

consistent with fulfilling the Ministry's responsibilities for fisheries management.

## **5.0 PROCEDURAL GUIDELINES**

### **5.1 General**

In view of the benefits provided by aquatic plants, the need for plant removal should always be evaluated carefully. In some cases the public may choose not to remove vegetation if they are made aware of the disadvantages of plant control (see Section 1.0 and Appendix 1). In other cases removal of aquatic plants may benefit both aquatic communities and recreational use. Each case should be assessed on its own merits.

Review of individual proposals for aquatic plant control must also involve a consideration of shoreline developments elsewhere on the same waterbody. The potential cumulative effects of all shoreline alterations, including plant control activities, must be assessed. Consequently, persons wishing to control aquatic plants should be advised to apply for permission early to allow proposals to be reviewed on a whole-lake basis. Applicants should also be cautioned that many similar applications may be received and that a site inspection during the open water season may be required (MNR-DFO, 1993). To allow the necessary time for processing, it is recommended that applications be made to the appropriate agency (see Sections 5.2 and 5.3 by April 1 of the year in which the proposed activity would be carried out.

### **5.2 Chemical Methods**

The use of chemical pesticides (herbicides) to control aquatic plants is regulated by the Ministry of Environment and Energy through a licence and permit system under the authority of the Pesticides Act. Applications for herbicide permits should be made to MOEE, which then forwards them to the appropriate MNR district for review. On federal lands MOEE also ensures that the appropriate federal agency (e.g. Canadian Parks Service) has an opportunity to review all applications.

To avoid requiring an applicant to obtain another permit (i.e. a work permit as well), MNR district staff should impose any conditions on the project during their review of the application for a herbicide permit.

Conditions which MNR managers intend to apply commonly to permits should be discussed with MOEE at an early stage so that when permits are received, review by MNR can be expedited. In cases where MNR refuses to approve a project or attaches conditions to its approval, MNR must provide a written statement to MOEE explaining the basis for refusal or for the conditions imposed. Under the Pesticides Act, applicants have

the right to appeal refusal of the project or any conditions placed on it. Managers should therefore be prepared to defend their decision at a hearing before the Environmental Appeal Board.

Although it is MOEE's responsibility to calculate the amount of herbicide required for a project, when imposing permit conditions such as size of treatment area, MNR managers should take into consideration the quantity of herbicide required. The minimum quantity of Reglone A that can be bought is a 1 litre container. This amount normally treats an area of approximately 460 square metres (5000 square feet). Where possible, the size of treatment area should be selected so as to avoid the need to store small leftover quantities of herbicide (e.g. <0.2 litres). Larger amounts of leftover chemicals should be saved for future use.

### **5.3 Physical /Mechanical Methods**

For projects involving physical or mechanical control of aquatic plants located on provincial Crown land (see Section 6.5.1 for a partial list of methods), proponents (or the contractor who would do the work) may be required to obtain a work permit. This permit is issued by MNR under the Public Lands Act. A work permit is not required for projects on privately owned shorelands unless the proposal involves dredging or filling.

Where a work permit is required, applicants should be required to provide the following information for all plant control projects:

- name of lake/stream
- a map identifying the location of the property in relation to neighbouring properties and main roads and indicating the names of adjacent landowners
- a sketch of the project area showing:
  - the lot sidelines of the property
  - the length of frontage (in metres)
  - the location of docks or other structures on the shoreline
  - the location of aquatic plants adjacent to the property
  - the location of aquatic plants proposed for removal and approximate size of area (in square metres)
  - the location of any areas in which fill has previously been placed on the bottom for beach creation

- the type of aquatic plants proposed for removal (emergent, submergent, or floating)
- predominant type of lake/stream bottom in areas of plants proposed for removal (mud, sand, gravel or other)
- purpose of plant control (e.g. swimming, boat access)
- proposed method of plant removal (e.g. hand removal, mechanical harvester)
- proposed location and method of disposal of harvested plants.

The above information requirements are in addition to any others required by MNR staff to carry out their responsibilities. Some of the information may have to be provided as an attachment to the work permit application form (if a permit is required).

If available, copies of appropriate low-level aerial photographs of shoreline areas can be provided to applicants to help them identify the project area. Alternatively, the applicant may wish to provide a photograph or videotape of the shoreline, taken in mid-summer, to illustrate the details of the proposed project. This may avoid the need for a site inspection and speed up the review process.

In cases where aquatic plants are located on federal lands, authorization for plant control activities must be obtained from the appropriate federal authority (e.g. Canadian Parks Service). In some cases MNR carries out the review of proposals on behalf of the Canadian Parks Service through local agreements between the two agencies.

## **6.0 TECHNICAL GUIDELINES**

### **6.1 General**

The acceptability of aquatic plant control in a given situation depends on many factors. Specific recreational needs and the effectiveness of plant control in meeting those needs are clearly important factors. However, the requirements to maintain a healthy aquatic ecosystem and to protect fish habitat, in particular, dictate that many other factors be considered.

Among the factors of importance to fish habitat are the species composition of both plants and fish in the waterbody in question. Exotic (non-native) plant species such as Eurasian water milfoil tend to crowd out native species and may provide less diverse and productive habitat than does a mixture of native species (Keast 1984, Smith and Barko

1990). Nevertheless, milfoil provides valuable habitat for some species of fish (Janecek 1988). It may increase fish production by providing habitat which did not exist previously (Borowa et al. 1979). The acceptability of removing plants therefore depends on their ecological value and the effects of removal, not whether they are native or exotic.

The habitat value of plants is also a function of the overall distribution and abundance of both plants and fish in a given waterbody. For example, plants of potential importance as nursery habitat should be close to the spawning areas of fish species which need them. Other things being equal, larger amounts of vegetation can be removed without resulting in loss of fish habitat where plants are abundant than where they are scarce. Where plant growth is very limited, as is typical of nutrient-poor lakes on the Canadian Shield, any plant removal may be unacceptable.

Whatever the circumstances, the control of aquatic plants should always be viewed from an ecological perspective, with full consideration of the benefits of plants to local ecosystems.

## **6.2 Identification of Fish Habitat**

Ministry staff should make every effort to identify and document the location of important fish habitat in the vicinity of areas proposed for treatment. Particular attention should be paid to the quality and quantity of spawning, nursery and feeding areas which could be affected by the treatment.

Special consideration should also be given to habitat types provided by plant species believed to be in limited supply in the waterbody in question. For example, wetland areas should be identified and their value as fish habitat documented.

In some cases man-made areas such as boat channels and dock areas provide fish habitat which did not exist previously. Fish habitat in these areas must be protected to the same degree as habitat of natural origin.

## **6.3 Timing**

Warmwater fish species require the spring and early summer period for spawning and early rearing activities. Removal of aquatic plants during this period may result in mortality to eggs and fry, and may disrupt the food web, thereby affecting young fish in particular.

In waters supporting warmwater fish communities, plant control should generally be prohibited until spawning and early rearing periods are complete. However, both the timing of local plant growth problems and the effectiveness of proposed control operations

must also be considered. For example, chemical control of Eurasian milfoil may not be very effective if carried out after July 1. Also, in southern Ontario purple loosestrife usually flowers and sets seed in August. The best time to remove loosestrife plants is when they are in flower, and therefore easily identified, but before they set seed.

In some cases the selective removal of dense plant growth in early spring to provide boat access in early summer (June) may precede fish spawning. Decisions as to the timing of control activities should therefore involve a consideration of the species of plants to be removed, the timing of plant growth problems, the fish community, and prevailing weather conditions. Regions should consider developing criteria for timing restrictions which are appropriate to local situations.

#### **6.4 Size and Configuration of Treated Areas**

It is impossible to specify criteria for determining acceptable plant control activities in all situations. However, some activities should not be permitted, either because they are likely to contravene legislation or Ministry policy, or because they may interfere with the proprietary rights of some other person. The following activities should not be permitted:

- removal of rare, threatened or endangered plant species (MNR 1994)
- removal of plants required during any life stage of vulnerable, threatened or endangered fish species (MNR 1991)
- removal of plants from areas containing the nests of migratory birds; removal after the nesting season may be acceptable
- treatment of areas outside the straight line extension of lot sidelines (except for boat channels; lot configuration should also be considered)
- treatment of areas beyond the centreline of rivers and streams
- harmful disruption of adjacent littoral areas (e.g. movement of sediment into adjacent areas)

In addition, certain activities should generally not be permitted because they are likely to have adverse effects on the environment, including local resources. The following activities should generally not be permitted:

- removal of significant wild rice stands

- complete removal of large blocks of aquatic vegetation (for details see Section 6.4.1 A)
- control of aquatic plants by methods judged unacceptable in these guidelines (see Section 6.5.1)

In general, the removal of plants should be kept to the minimum necessary to meet recreational needs (e.g. providing boat access or a swimming area) as opposed to removal for aesthetic reasons.

In areas of heavy plant growth, boat channels accessing individual properties should generally be oriented perpendicular to the shoreline and should not exceed 6 metres in width. Boat channels serving a number of properties may need to be wider (see Section 6.4.1 A). Creation of a swimming area should not normally require clearing an area larger than 60 square metres (e.g. 6 m x 10 m).

Where plant growth is extensive, many landowners may wish to remove plants fronting their property. In order to prevent the removal of large blocks of vegetation, it may be necessary to impose a limit on the proportion of each landowner's frontage in which the growth of plants may be controlled. Such a limit should reflect a judgement as to the potential cumulative effect on fish habitat of all proposed projects on the waterbody in question. Examples of maximum limits are given in Section 6.4.1 A.

Removal of aquatic plants on a large scale, such as across entire frontages or bays, would invariably result in a loss of fish habitat and must not be permission.

#### **6.4.1 Examples**

It is impossible to describe acceptable plant control activities in every type of situation that might occur. However, indicated below are some examples of common situations together with some guidelines in determining permissible levels of plant control.

The guidelines provided in this section are intended to apply to waters with heavy plant growth, as in many parts of the Trent-Severn and Rideau systems. Consequently, they represent maximum levels of plant control which may be appropriate in waters which contain extensive plant growth. They are not intended to apply to waters in which plant growth is limited, such as most waters on the Canadian Shield. The acceptability of plant control activities under conditions of limited plant growth must be determined on a site-specific basis.

Wherever possible, acceptable levels of plant control should be determined on the basis of local knowledge, conditions and experience.

#### A. Individual Properties

In waters with extensive plant growth, the area in which plant control is permitted for individual properties should generally be based on the frontage of each property. Recommended limits for plant control are as follows:

<u>FRONTAGE OF PROPERTY</u>	<u>MAX. WIDTH OF REMOVAL</u>	<u>MAX. DISTANCE OFFSHORE</u>	<u>MAX. WIDTH BOAT CHANNEL</u>
> 22 m	15 m	30 m	6 m
< 22 m	8 m	30 m	6 m

The limits recommended here are designed to prevent removal of large blocks of vegetation while still permitting a reasonable amount of plant control by each property owner. In addition, the creation of alternating areas of vegetation and open water creates increased edge and increases fish habitat diversity.

These limits represent maximum areas in which plant control should be permitted. In many cases the treated area need not be as large as indicated here. However, in waters with heavy plant growth the potential ecological benefits of plant control should always be considered.

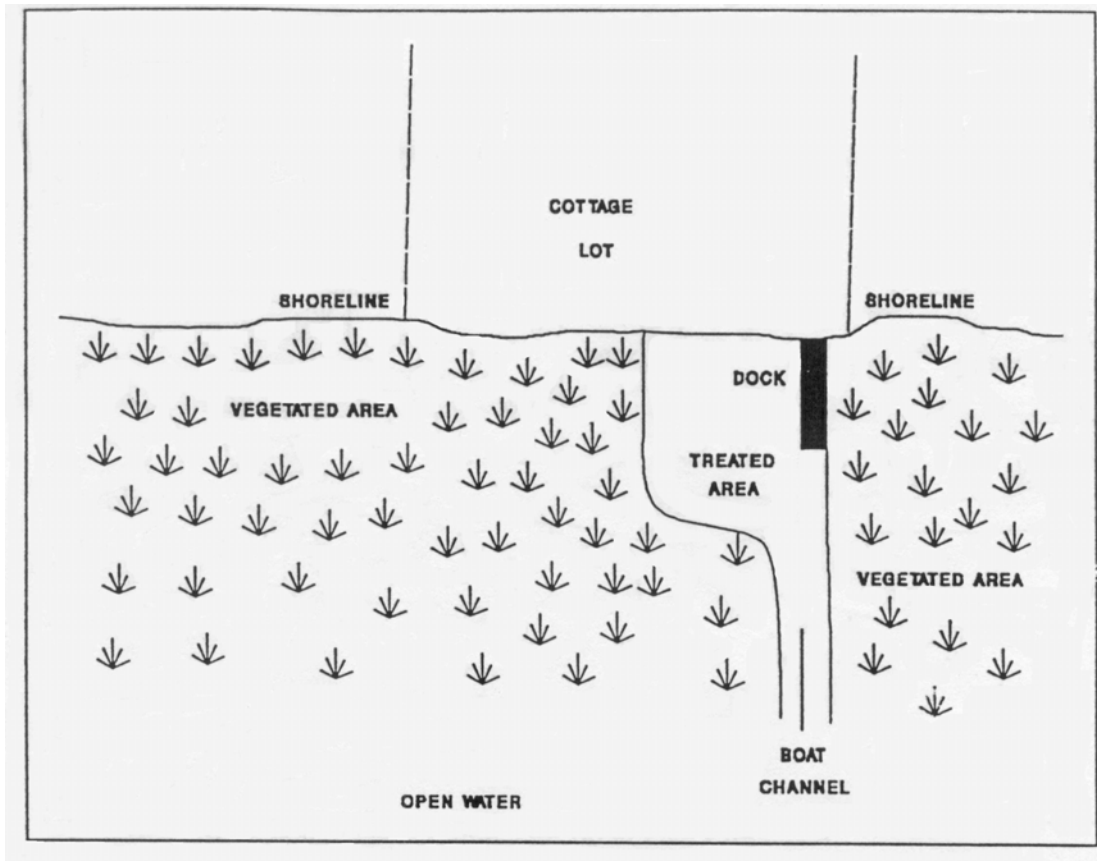
The boat channels referred to above are those serving individual properties. Boat channels are not included in the main treated areas described above (i.e. maximum 15 x 30 m or 8 x 30 m). They are calculated separately. However, if possible, boat channels should back on to the main treated area so as not to increase the frontage treated (see Figure 1). Boat channels can be as long as necessary in order to reach open water.

Where server adjacent properties are to be treated, a single boat channel can be shared among property owners. A general rule of thumb is one channel for every 5 properties (see Figure 2). For safety reasons these “community” channels usually need to be wider than those serving individual properties. However, they seldom must be wider than 8 m.

#### B. Commercial Establishments

Extensive plant growth in the vicinity of commercial establishments (e.g. resorts, marinas) may restrict recreational opportunities for many people who depend on these establishments for water-based recreation. The ability to provide recreational and other benefits from nearshore areas may also seriously affect people’s livelihoods. Consequently, there is a need to be particularly flexible in determining the timing and amount of plant control permitted.



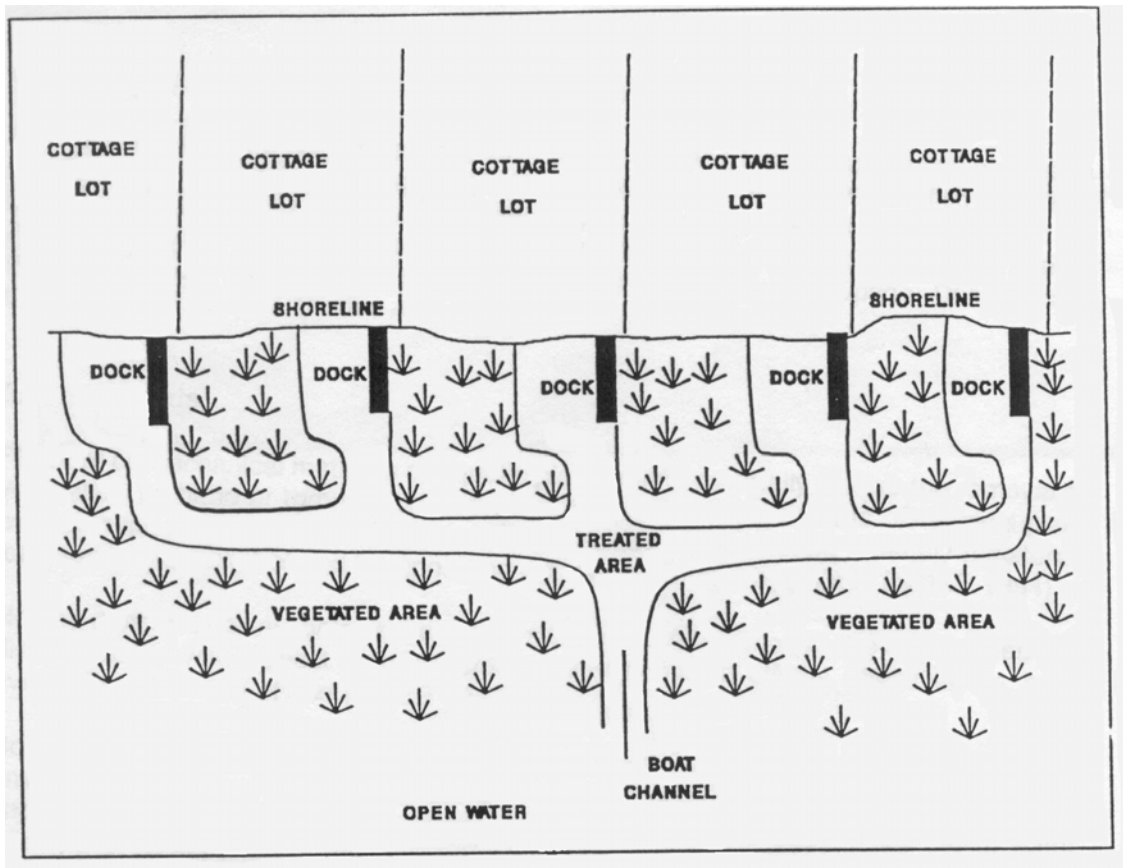


**Figure 1:** Boat Channel for a Single Property.

Where these establishments are concerned, permissible plant control activities must be determined on a case by case basis. As a general rule, in the case of lakeshore resorts only areas around beaches and those required for boating need be subject to plant control. The use of a common area for swimming should be encouraged. Large areas or bays should not be cleared of plants purely on the basis of aesthetic concerns.

### C. Navigation Channels

In some waters it may be necessary to remove plants in navigation channels. AThis typically involves clearing channels sufficiently large for the safe movement of large boats. Many of these channels are located primarily offshore in deeper portions of the waterbody. Since the clearing of such channels is usually only required in waters containing very extensive plant growth, removal of aquatic plants in these deep channels will generally have a limited effect on fish habitat.



**Figure 2:** Community Boat Channel for up to Five Properties

Given the potential impact of aquatic plants on navigation channels and the generally limited effect of plant removal on fish habitat, a good deal of flexibility is needed in determining permissible plant control activities for navigation purposes. However, plant removal should generally be confined to buoyed areas or navigation channels as designated by the appropriate authority.

Where physical or mechanical control methods are used, cut vegetation must be removed from the water.

#### D. Private Ponds

The Fisheries Act applies to private as well as Crown waters. Proposals for aquatic plant control in private ponds should therefore be reviewed by MNR for their potential impact on fish and fish habitat. However, unless a pond discharges to Crown waters, the Ministry will generally have little or no concern about such projects.

Where a private pond discharges to Crown waters and the inflow and outflow cannot be shut off during treatment, the potential effect of plant control activities on fish habitat in receiving waters must be assessed. Although work permits are not required under the Public Lands Act for private ponds, proposals should be reviewed using the “Interim Referral Process for Authorization of Fish Habitat Alterations, Disruption, Destruction – Section 35 (2) of the Fisheries Act”.

## **6.5 Methods**

Physical or mechanical methods of aquatic plant control generally involve the removal of vegetation by hand or through the use of various mechanical devices. Chemical plant control involves the use of herbicides. All herbicides used must be federally registered for aquatic plant control and be approved for use in Ontario by MOEE (MOEE 1994).

No one method of plant control is best in all situations. All methods have advantages and disadvantages with respect to such factors as environmental effects, effectiveness, cost, availability and ease of use (MOEE 1994).

Both chemical and physical/mechanical control methods may have negative environmental effects unless projects are carefully planned and carried out. If used improperly, herbicides may pose problems of toxicity to other aquatic life. Also, water quality may be impaired through oxygen depletion if large amounts of dead vegetation are left to decompose. Physical or mechanical methods may disturb bottom sediments and impair water quality if cut plants are left in the water. Such methods may also encourage spreading of plants through fragmentation (e.g. Eurasian water milfoil). Any method of plant control may potentially destroy fish habitat. Careful consideration must therefore be given to the use of various methods in a particular situation.

In some cases it is illegal to use chemical control methods. For example, the use of herbicide to kill purple loosestrife in aquatic environments is not permitted. The best method of removing loosestrife is to pull out the entire plant, including the root, by hand.

Some of the advantages and disadvantages of various control methods are summarized in Appendix 1. An assessment of the general acceptability of each method from an environmental perspective is also given. Judgements of acceptability assume that direction contained in these guidelines is followed and that, in particular, measures are taken to protect important fish habitat such as spawning and nursery areas.

General conclusions as to the acceptability of various methods are indicated below.

6.5.1 Acceptability of Aquatic Plant Control Methods  
Physical/Mechanical Methods

- |     |                       |  |
|-----|-----------------------|--|
| (a) | Hand Removal          | Generally Acceptable, provided pulled or cut vegetation is removed from the water  |
| (b) | Raking                | Generally Acceptable, provided raked vegetation is removed from the water  |
| (c) | Chains or Harrows     | Not Acceptable, because of bottom disturbance and inability to collect loose plant material  |
| (d) | Cutter-bar Devices    | Generally Acceptable, provided: (1) small devices are used which limit the volume of cut plant material produced, (2) bottom disturbance is minimized, and (3) cut vegetation is removed from the water  |
| (e) | Mechanical Harvesting | Generally Acceptable, provided: (1) bottom disturbance is minimized, and (2) cut vegetation is removed from the water  |
| (f) | Mechanical Derooting  | Uncertain at this time; some devices may be acceptable if cut and/or derooted vegetation is removed from the water but needs further evaluation  |
| (g) | Dredging              | <p>Not Acceptable, except where removal of sediment as well as plants is approved; examples of where dredging may be considered include:</p> <ul style="list-style-type: none"><li>▪ creation or maintenance of boat channels or drainage ditches</li><li>▪ providing access for fish or improving water circulation within marshes</li><li>▪ providing increasing water storage for flood control</li></ul> |

(h)	Filling	Not Acceptable, except where addition of fill is approved for other purposes (e.g. beach creation)
(i)	Surface Films	Not Acceptable, because of limited effectiveness and nuisance potential
(j)	Bottom Barriers	Generally Acceptable, provided: (1) proper materials (opaque, durable, gas permeable) are used, and (2) the barrier is properly installed using adequate weights or other devices
Chemical Methods		
(a)	Herbicides	Generally Acceptable, provided all permit and label conditions are complied with

## 6.6 Equipment

Use of equipment which will seriously disturb the bottom (e.g. chains, harrows) must not be permitted. Similarly, draglines or suction dredges must not be used to remove aquatic plants unless the removal of sediment is approved (see Section 6.5.1 (g), above). Whatever equipment is used, proponents must be advised to remove cut plants from the water.

Mechanical harvesting equipment must be properly maintained to avoid contamination of water by spills or leakage of oil, gasoline and other petroleum products.

To avoid possible erosion and disruption of fish habitat, harvesting equipment should be launched and removed at appropriate launching facilities, not from unprotected shoreline.

## 6.7 Use of Cut Vegetation

All cut or uprooted vegetation must be removed from the water to maintain water quality and to avoid interference with other water users.

Where large quantities of vegetation are removed, they should be placed temporarily at a suitable holding site, prior to use or disposal. The site should be sufficiently distant from the shoreline to prevent leaching of nutrients back into the water.

Where quantities of cut vegetation are limited, they can generally be composted and used

as a soil conditioner or garden mulch. However, the flowers of purple loosestrife should not be composted as the seeds may remain viable and result in the growth of new plants. Loosestrife can also be spread by leaving plant fragments on land. The best method of disposing of loosestrife is to burn all parts of these plants.

If plants cannot be used for beneficial purposes, the homeowner may dispose of them with garden waste (e.g. leaves). However, if a contractor intends to remove vegetation from the property to a disposal site, approval from MOEE for transport and disposal is required.

## **7.0 MONITORING**

Any fish kills are harmful alterations of fish habitat resulting from aquatic plant control activities must be reported at once to MOEE or MNR.

MNR field offices should develop programs for monitoring compliance with conditions imposed on activities involving the control of aquatic plants.

## **8.0 PROCEDURAL SUMMARY**

**STEP 1**      The proponent seeks permission to control aquatic vegetation. To allow time for processing of applications, requests should be submitted by April 1 of the year in which the proposed activity would be carried out.

If the proponent wishes to use a herbicide, he or she must obtain a Permit to Purchase and/or Perform a Water Extermination from MOEE. MOEE provides the appropriate form and forwards the completed form to MNR for review. If MNR refuses the project or attaches conditions, written reasons must be provided to MOEE explaining the basis for the refusal or the conditions imposed.

If the proponent wishes to use physical or mechanical methods of plant control, only approval from MNR is normally required. However, approval must be sought for all projects regardless of project size.

Plant control activities on federal lands must be authorized by the appropriate federal agency (e.g. Canadian Parks Service).

**STEP 2**      MNR staff review the proposal. All proposals must be reviewed with respect to their potential effects on fish habitat.

As with other forms of shoreline alteration, reviewers should refer to the “Interim Referral Process For Authorization of Fish Habitat Alterations, Disruption, Destruction – Section 35 (2) of the Fisheries Act”.

**STEP 3** If the proposal is for the physical or mechanical control of aquatic plants, the proponent (or contractor) may be required to obtain a work permit issued under the authority of the Public Lands Act. The proponent must provide all information required for proper review, as described in Section 5.3. Appropriate terms and conditions can be stated on the permit.

In general, a permit should be required for all proposals which involve contractors as well as those of a size or nature that warrant strict control.

A work permit is not required for projects on privately owned shorelands (except where dredging or filling is involved), or for projects on private ponds.

**STEP 4** In waters with extensive plant growth, the local Ministry manager may choose not to require authorization by a work permit if the proposed project is small in size. For example, a cottager may wish to remove plants around a dock or create a small wading or swimming area less than 60 square metres in area. If the proponent agrees to remove cut plants from the water, the manager may authorize the project by a letter or other means.

Whatever form of authorization is used, the approved activity and any conditions of approval should be clearly specified.

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## APPENDIX

Some of the advantages and disadvantages of different methods of aquatic plant control are indicated below. An assessment of the general acceptability of each method from an environmental perspective is also given, assuming the present guidelines are followed.

### Physical/Mechanical Methods

#### (a) Hand Removal

Pros	<ul style="list-style-type: none"><li>- economical</li><li>- simple to do</li><li>- removes some plant roots, so may provide relatively long-term control (1 year +)</li><li>- allows treatment of small, nearshore areas</li><li>- facilitates removal of plant material from water</li><li>- non-toxic to aquatic life</li></ul>
Cons	<ul style="list-style-type: none"><li>- labour-intensive</li><li>- ineffective for clearing boat channels or moderate sized swimming areas</li><li>- may create minor turbidity</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Generally Acceptable, provided pulled or cut vegetation is removed from the water</li></ul>

#### (b) Raking

Pros	<ul style="list-style-type: none"><li>- same as for hand removal (above)</li></ul>
Cons	<ul style="list-style-type: none"><li>- labour-intensive</li><li>- ineffective for clearing boat channels</li><li>- may create minor turbidity and release nutrients and contaminants to the water</li><li>- may destroy aquatic invertebrates</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Generally Acceptable, provided raked vegetation is removed from the water.</li></ul>

### (c) Chains or Harrows

Pros	<ul style="list-style-type: none"><li>- removes some plant roots, so may provide relatively long-term control</li><li>- non-toxic</li></ul>
Cons	<ul style="list-style-type: none"><li>- causes major physical disturbance of the bottom</li><li>- creates turbidity, and may release nutrients and contaminants to the water</li><li>- destroys aquatic invertebrates</li><li>- doesn't allow collection of plant material which may move onto the property of others</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Not Acceptable, because of bottom disturbance and inability to collect loose plant material</li></ul>

### (d) Cutter-bar Devices

Pros	<ul style="list-style-type: none"><li>- allows treatment of small, nearshore areas</li><li>- no physical disturbance of the bottom</li><li>- non-toxic</li></ul>
Cons	<ul style="list-style-type: none"><li>- provides only short-term control</li><li>- ineffective for clearing boat channels</li><li>- improper use pulls, instead of cutting, plants potentially resulting in increased turbidity, and nutrient and contaminant release</li><li>- difficult to collect cut plant material</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Generally Acceptable, provided: (1) small devices are used which limit the volume of cut plant material produced, (2) bottom disturbance is minimized, and (3) cut vegetation is removed from the water.</li></ul>

### (e) Mechanical Harvesters

Pros	<ul style="list-style-type: none"><li>- removes cut plant material from the water</li><li>- removes nutrients from the water (in cut vegetation)</li><li>- non-toxic</li></ul>
Cons	<ul style="list-style-type: none"><li>- relatively costly</li></ul>

- provides only short-term control
  - availability of equipment may be limited
  - may be difficult to use in small, nearshore areas
  - difficult to use in shallow water containing obstructions (e.g. logs, rocks)
  - may disturb bottom sediments in shallow waters
  - collects large volumes of plant material which require proper disposal
  - removes invertebrates and small fish with the cut vegetation
- Acceptability
- Generally Acceptable, provided: (1) bottom disturbance is minimized, and (2) cut vegetation is removed from the water

(f) Mechanical Derooting Devices

- Pros
- removes most plant roots so provides relatively long term control ( 1 year +)
  - some devices can operate in relatively deep water (6 metres)
  - may rejuvenate gravel spawning beds by clearing away plants and sediment
  - non-toxic
- Cons
- costly
  - causes physical disturbance of the bottom
  - creates turbidity, may release nutrients and contaminants to the water
  - destroys aquatic invertebrates
  - may be difficult to use in shallow water containing obstructions
  - may be difficult to collect cut plant material
- Acceptability
- Uncertain at this time; some devices may be acceptable if cut and/or derooted vegetation is removed from the water but needs further evaluation

(g) Dredging

- Pros
- removes plant roots so provides long term control if dredging is sufficiently deep

	<ul style="list-style-type: none"> <li>- may improve water circulation in heavily vegetated areas (e.g. cattail marshes)</li> <li>- may improve access for fish to habitat within heavily vegetated areas (e.g. marshes)</li> </ul>
Cons	<ul style="list-style-type: none"> <li>- costly</li> <li>- causes major physical disturbance of the bottom</li> <li>- creates turbidity and releases nutrients and contaminants to the water</li> <li>- destroys aquatic invertebrates</li> <li>- creates problems with disposal of dredged material, particularly if contaminated</li> </ul>
Acceptability	<ul style="list-style-type: none"> <li>- Not Acceptable, except where removal of sediment as well as plants is approved. Examples of where dredging may be considered include: <ul style="list-style-type: none"> <li>• creation or maintenance of boat channels or drainage ditches</li> <li>• providing access for fish or improving water circulation within marshes</li> <li>• providing increased water storage for flood control</li> </ul> </li> </ul>

#### (h) Filling

Pros	<ul style="list-style-type: none"> <li>- simple to do in shallow areas</li> <li>- provides immediate plant control</li> <li>- use of granular material may improve fish habitat</li> </ul>
Cons	<ul style="list-style-type: none"> <li>- control may be short term if fill material washes away or if plants grow on the fill</li> <li>- creates major physical disturbance of the bottom</li> <li>- creates turbidity</li> <li>- may release nutrients and contaminants to the water unless clean fill is used</li> <li>- material may move into adjacent areas</li> <li>- may destroy spawning or nursery habitat</li> <li>- destroys aquatic invertebrates</li> </ul>
Acceptability	<ul style="list-style-type: none"> <li>- Not Acceptable, except where addition of fill is approved for other purposes (e.g. beach creation)</li> </ul>

(i) Surface Films

Pros	<ul style="list-style-type: none"><li>- simple to use</li><li>- permits treatment of small, nearshore areas</li><li>- non-toxic</li></ul>
Cons	<ul style="list-style-type: none"><li>- effectiveness is limited since light can enter from the sides</li><li>- easily displaced by wind, waves, etc.</li><li>- may cause littering of the shorelines</li><li>- may interfere with boating and swimming</li><li>- not aesthetically pleasing</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Not Acceptable, because of limited effectiveness and nuisance potential</li></ul>

(j) Bottom Barriers (Blankets or Mats)

Pros	<ul style="list-style-type: none"><li>- provides effective, long term control (many years) if proper materials are used (opaque, durable, gas permeable)</li><li>- permits treatment of small areas</li><li>- non-toxic</li></ul>
Cons	<ul style="list-style-type: none"><li>- may be costly, depending on material used and installation requirements</li><li>- requires removal of rocks, stumps, etc. prior to installation</li><li>- requires cleaning to prevent deposit of sediment on top and subsequent regrowth of plants</li><li>- may require installation and removal each year in turbid waters</li><li>- seals off the bottom and destroys invertebrates</li></ul>
Acceptability	<ul style="list-style-type: none"><li>- Generally Accepted, provided: (1) proper materials (opaque, durable, gas permeable) are used, and (2) the barrier is properly installed using adequate weights or other devices</li></ul>

## Chemical Methods

### (a) Herbicides

- |               |   |
|---------------|---|
| Pros          | <ul style="list-style-type: none"><li>- quick and economical</li><li>- permits treatment of small, nearshore areas</li><li>- control lasts one full season including period of heavy recreational use</li><li>- no physical disturbance of the bottom</li><li>- use when plants are still small may minimize dissolved oxygen depletion in the long term</li></ul>  |
| Cons          | <ul style="list-style-type: none"><li>- not effective against all plant species</li><li>- may not be effective for small, strip treatments in heavy plant growth</li><li>- effective for one season only</li><li>- some concerns about toxicity to not-target species</li><li>- leaves plant debris on the bottom</li><li>- provides nutrients for plant regrowth</li><li>- may reduce dissolved oxygen in the short term</li></ul> |
| Acceptability | <ul style="list-style-type: none"><li>- Generally Acceptable, provided all permit and label conditions are complied with</li></ul>  |