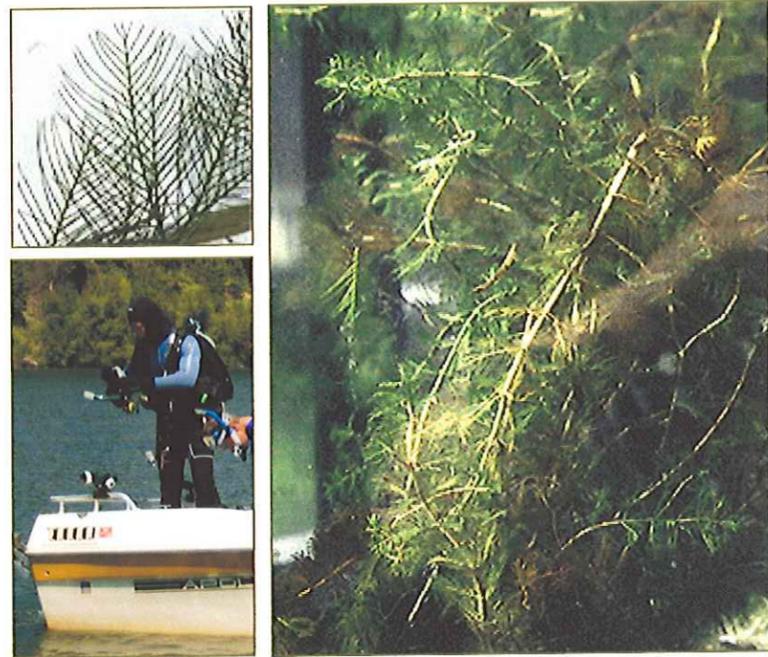


# Lake Spokane Integrated Aquatic Plant Management Plan

February 2001



Stevens County Conservation District



Prepared by  
**TETRA TECH, INC.**  
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HB-0099  
c.2

Lake Spokane  
integrated aquatic  
plant management  
plan

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# Lake Spokane Integrated Aquatic Plant Management Plan (IAPMP)

## Stevens County Conservation District

232 Williams Lake Road  
Colville, WA 99114  
509/685-0937  
[www.homepage.plix.com/sccd/](http://www.homepage.plix.com/sccd/)

Development of this plan was funded in part through an Aquatic Weeds  
Fund grant from the Washington State Department of Ecology

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## **Acknowledgements**

### **Stevens County Conservation District**

Bob McBlair  
Claudia Michalke

### **Avista Utilities**

Tim Vore

### **Stevens County Noxious Weed Control Board**

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### **Spokane County Noxious Weed Control Board**

David Mundt

### **Spokane Tribe**

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### **Willow Bay Resort**

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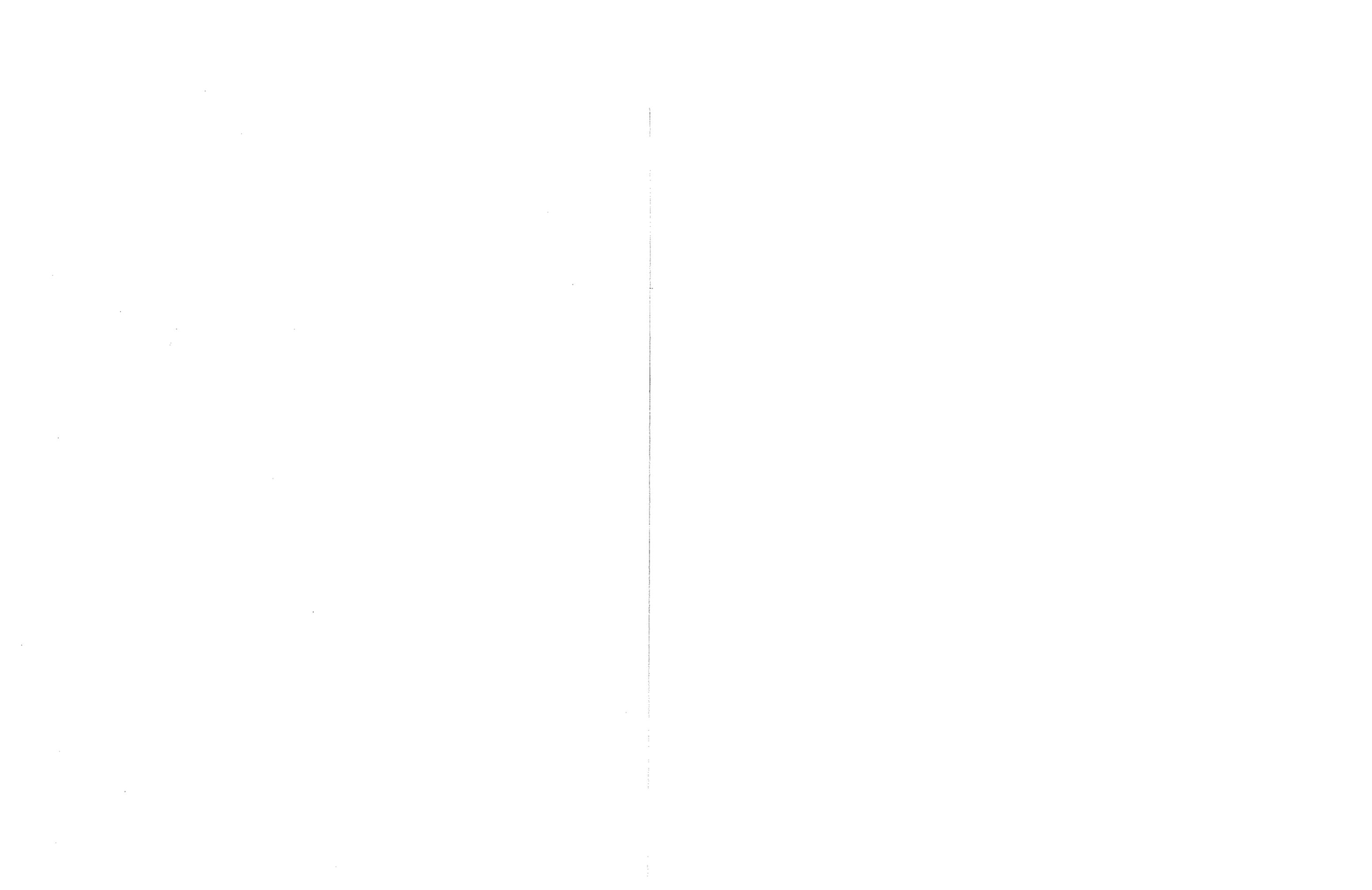
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Special Thanks are given to Clem and Roger for their many hours of hard work and project vision, and to Tim Vore for his hands on assistance.



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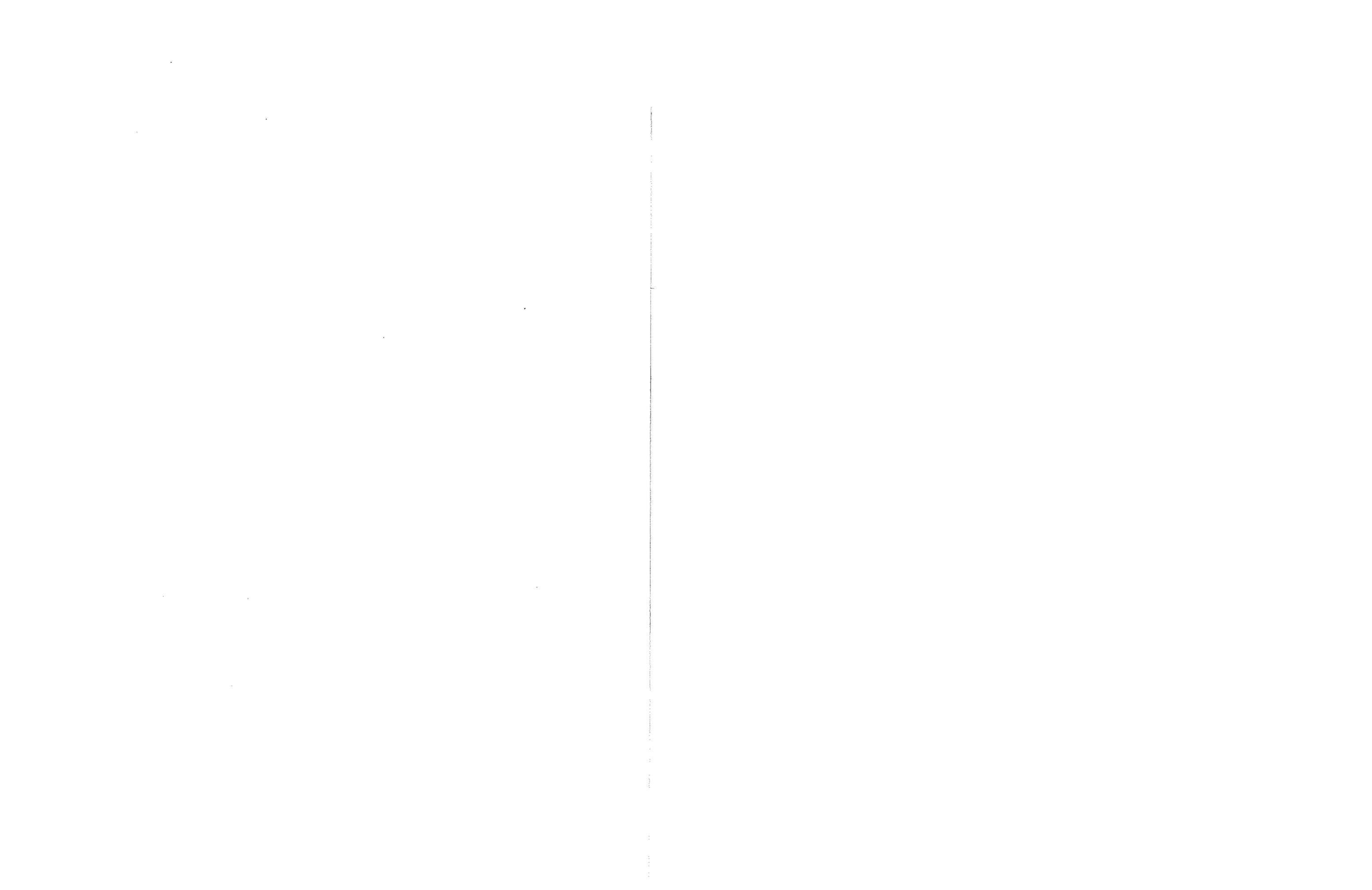
## INTRODUCTION

Lake Spokane, located in the northeastern part of Washington State, was created by and is the operating reservoir for Avista Utilities, Long Lake Hydroelectric Facility. Lake Spokane supports communities of both native and non-native aquatic plants. Although residents along the lake have lived with these aquatic plants for years, they have become increasingly concerned about the problems excessive densities of plants may cause. This concern was intensified with the recent discovery of Eurasian watermilfoil (*Myriophyllum spicatum*), a non-native, invasive plant. Native "pondweeds" and other plants have surrounded private and public docks and boat launches making travel along the shallow shoreline as well as swimming difficult in some areas. In recent years, the frequency of aquatic plants entangling boat propellers has increased. The non-native, invasive species have also begun to take over the lower depths of the littoral region (shallow water) and parts of the shoreline. Residents and county officials are concerned that these plants will continue to expand and cause increased impairment to the beneficial uses of the lake. Lake Spokane is a popular site for both full-time and part-time residences. Recreational uses include boating, fishing, skiing and swimming.

Aquatic plants are an integral part of a lake ecosystem. Native aquatic plants provide food and habitat for waterfowl and fish. However, when aquatic plants grow too densely, they can have adverse impacts on lakes. Under certain environmental circumstances, native plants can cause nuisance conditions, making it difficult to boat or swim without becoming entangled in plants. Those conditions occur when there are ample supplies of nutrients and light available for the plants to grow. Non-native, invasive plants cause significant problems in lakes around the world. The shallow character of a lake is changed when non-native plants invade the shoreline and littoral regions. Non-native plants often provide little if any benefit for the existing ecosystem and have a tendency to out-compete the native, more beneficial plants. In most cases, non-native plants are introduced to a body of water by human action, often via boats and boat trailers transporting plant fragments to the water body from another.

The Lake Spokane Integrated Aquatic Plant Management Plan (IAPMP) provides guidance for the management and control of non-native aquatic plants in Lake Spokane. The Stevens County Conservation District, with support of Avista Utilities, Lake Spokane Protection Association (LSPA), Stevens County Noxious Weed Board, Spokane County Noxious Weed Board, Willow Bay Resort and Spokane Tribe, and with technical assistance from Tetra Tech, has developed the IAPMP. Principal funding for development of this plan comes from an aquatic plant management grant from the Washington Department of Ecology with local in-kind services provided by the above organizations.

Eurasian watermilfoil (*Myriophyllum spicatum*) is a non-native, invasive aquatic plant that has become established in Lake Spokane within the last decade. The invasion of Eurasian watermilfoil has severely affected the ecology and the public use of the lake. As observed in this study (see body of text) EWM has displaced native plant communities in



the littoral zone of the lower reservoir, thus decreasing the aquatic habitat value. Eurasian watermilfoil is invading the native plant beds and forming a mono-culture of EWM instead of the native plant mix that is normally found. The gradual movement of EWM upstream is similar to the invasion that occurred in the Pend Oreille River in the early 1980's (Water Environmental Services, Inc., 1988; Water Environmental Services, Inc., 1987; Water Environmental Services, Inc., 1986; Water Environmental Services, Inc., 1985; Gibbons, et al., 1984; Gibbons, et al., 1983a; Gibbons et al., 1983b; Gibbons and Gibbons, 1988. Gibbons and Gibbons, 1985; Verhalen et al., 1985). The expanding nature of EWM has also led to the additional concern that Lake Spokane could be the source from which EWM could spread to other lakes or water bodies within the surrounding area.

Other invasive aquatic plants are causing similar habitat and recreational problems in Lake Spokane. These include purple loosestrife (*Lythrum salicaria*), yellow floating heart (also called dollar pads, *Nymphoides peltata*) and the yellow iris (*Iris pseudacorus*). Purple loosestrife is a non-native, noxious plant that is highly damaging to wetland habitats. This plant creates monotypic growths (dense strands of purple loosestrife so thick there is no room for other plants). The crowding out of native emergents results in the loss of habitat diversity. Purple loosestrife can over take a wetland area in a few seasons. Few native wildlife species can use this plant to any significant degree.

Yellow floating heart has been well established in Lake Spokane for over a half a century (personal communication Harold Crowston, Roger Hauge, and Bill Demaris). Its coverage has been reported by some local residents to be stable and others have reported it to be increasing. This may be due to the increased awareness of aquatic plants, leading to the identification of plant beds that were previously unnoticed, or it may be due to a real increase in water surface coverage. Although it is a non-native aquatic plant, yellow floating heart may be providing some aquatic habitat benefits such as cover and structure for fish species such as bass, northern pike, and yellow perch. Nevertheless, it is growing in some areas where it is adversely impacting recreational activities and could also be contributing to water quality degradation. Both potential adverse impacts are due to plant density.

The yellow iris is an attractive, non-native emergent plant that grows in dense clumps along shorelines and in saturated soils. It replaces native plants such as cattails, sedges, rushes and bulrushes. In some cases, the yellow iris provides some shoreline protection from erosion due to wave and boat wake action.



## WATER BODY/WATERSHED FEATURES

The Spokane River flows westerly out of Coeur d'Alene Lake through Kootenai County, Idaho and through Spokane, Lincoln and Stevens Counties, Washington. Lake Spokane was formed in 1915 by the construction of the Long Lake Dam. The Lake Spokane Watershed covers a large area in Idaho and eastern Washington (See Appendix A). The watershed includes the Coeur d'Alene and St. Joe River basins, Coeur d'Alene Lake Watershed, Latah Creek Watershed, and the Little Spokane River Watershed. Land use within this watershed is diverse, ranging from wilderness areas and forest lands to mining and agricultural lands to dense urban development (residential, commercial, and industrial) within the cities of Coeur d'Alene and Spokane.

Lake Spokane stretches 23 miles in length and has over 100 miles of shoreline. The reservoir has a maximum depth of approximately 170 feet located near the Long Lake Dam. The width and depth of the littoral region of the lake varies depending on the slope of the banks and water clarity. Relatively undisturbed habitat exists along the undeveloped shoreline zones, mainly in the lower portion of the reservoir. A significant reach of the upper half of the lake's shoreline is developed residentially, or as parks, resorts, and public access areas. The Little Spokane River drains into the upstream end of Lake Spokane. The upper most area of the lake is rocky, shallow and the more riverine part of the reservoir. This section provides little habitat for aquatic plants in comparison to the more lacustrine, lower portions of the reservoir where aquatic plant beds are found. Just below the merger of the Little Spokane River into the Spokane River, as the reservoir transitions from riverine to lacustrine, a few natural and man-made islands can be found.

Lake Spokane is a multi-use resource that supports a variety of beneficial uses (see Figures 17.1 through 17.3) that can be affected by, and need to be protected from the adverse impacts of invasive non-native plants such as Eurasian watermilfoil and purple loosestrife. Lake Spokane beneficial uses include:

1. Recreation
2. Fish and wildlife habitat
3. Water supply
4. Hydroelectric generation.

Potentially affected recreational uses include contact recreation such as swimming, boating and water skiing, and non-contact recreation such as fishing, aesthetics and camping. There are several resorts, parks and campgrounds on the lakefront. Most facilities have boat launches, swimming areas and fishing docks. Aquatic plants hinder recreational experience in these areas by interfering with boating/fishing access, swimming safety, and by directly affecting habitat therefore reducing fishing and aesthetic experiences. The value of fish and wildlife habitat can be decreased by these



non-native plants since they eliminate food and shelter, and reduce water quality. Water supply can be affected when plants clog water intakes. The Long Lake Hydroelectric Facility was built in 1915 to generate power, but not all the water that flows into the reservoir is used for power generation. Water is spilled when there is excess water runoff from the Lake Spokane watershed during the spring snow melt period. At this time, hydroelectric generation has not been significantly impacted by non-native plants.

Much of the upper portion of the lake perimeter and nearby lands have been developed for single-family homes. Aesthetically, the people living near the lake and/or recreating on or near it enjoy the beauty of the lake, and may observe a variety wildlife using the lake habitat. Fish that are supported by this lake include carp, smallmouth bass, largemouth bass, northern pike, rainbow trout, brown trout, yellow perch, and bullhead. Many of these fish populations are maintained by stocking. The lake also provides nesting, forage, and cover to a number of resident or migrating waterfowl species, and to a wide variety of other bird, mammal, and amphibian species.

Bull trout are listed as endangered according to the Endangered Species Act (ESA) within the Lake Spokane drainage. However, this species is not known to be present within Lake Spokane and the Washington Department of Fish and Wildlife has not defined the ESA issues for Lake Spokane at this time (John Waylon, person communication, 2000). Appendix B lists aquatic and wetland species that are known to occur in the Spokane River Watershed, but not necessarily within Lake Spokane according to the Priority Species and Habitat Database.



## PROBLEM STATEMENT

Infestations of non-native invasive aquatic plants are having adverse impacts on recreation, aesthetics, and habitat in Lake Spokane. Specifically, the adverse impacts are due to the invasion and establishment of Eurasian watermilfoil, purple loosestrife, and yellow floating heart (see plant survey section for coverage and location). Eurasian watermilfoil was first established in the lower portion of the reservoir. Its initial introduction and establishment was probably near the DNR boat launch. From that area, it has spread both down stream and upstream. It is invading native plant beds in many places. This encroachment has resulted in the near total displacement of native plants. Dense beds of EWM can reduce recreation by interfering with boating, fishing access and swimming. It also reduces aquatic habitat value and, in very dense strands, reduces water quality. Purple loosestrife is invading wetland areas and shoreline areas. Its expanding coverage is displacing native plants in some areas thus adversely impacting habitat. However, recent efforts (herbicide 1992-1997 and biological control agents, see Appendix D) may substantially impact this plant in the future. Yellow floating heart is limiting swimming, water skiing and boating.

The total water surface area of Lake Spokane is approximately 5150 acres. The available littoral area (shallow area where aquatic plants can grow) at summer mean pool is approximately 1100 acres. Non-native plants cover over 700 acres of that littoral area and native plants occupy the remainder of the area.

### Aquatic Plant Species of Concern

Eurasian watermilfoil, *Myriophyllum spicatum*, is a non-native, invasive aquatic plant that can have negative impacts on the uses and enjoyment of a water body. The plant out-competes native plants and attains densities that prevent other native plants from growing (Figure 1). Eurasian watermilfoil plant beds can interfere with recreational activities, such as boating, swimming and fishing. These dense plant beds limit colonization by aquatic invertebrates and restrict fish movement. Dissolved oxygen concentrations can approach zero within the dense Eurasian watermilfoil beds. Eurasian watermilfoil has the ability to grow and form dense beds such that no other aquatic plant is able to flourish. Eurasian watermilfoil can grow at depths up to 26 feet and can grow successfully in a broad range of nutrient or light conditions. The invasive success of the plant is due to its ability to reproduce through stem fragmentation. A single small segment of stem and leaves can take root and form a new plant. Eurasian watermilfoil is listed as a Class B Noxious Weed by the State of Washington, and its sale and transportation is prohibited. In the past several years, Eurasian watermilfoil has become established in Lake Spokane. Prior studies did not detect Eurasian watermilfoil in Lake Spokane, however the current infestation is quite dense and is adversely impacting recreational uses and aesthetics in several areas of the lake. The primary concern of the citizens at Lake Spokane is that Eurasian watermilfoil plants will eventually dominate the native aquatic plants and severely affect aesthetic enjoyment and recreational activities. The Eurasian watermilfoil plants established in Lake Spokane could also serve as a source for future spread into



nearby water systems. Eurasian watermilfoil should be managed and controlled in Lake Spokane to limit its spread and reduce current impacts on recreational uses.

Purple loosestrife (Figure 2) is a non-native noxious plant that is highly damaging to wetland habitats. This plant creates monotypic growths, crowds out all native emergents and destroys natural habitat diversity. It can over take a wetland area in a few seasons. No native wildlife species are known to use this plant. Purple loosestrife is listed as a Class B Noxious Weed by State of Washington, and its sale and transportation is prohibited. Removal of this plant (purple loosestrife) wherever it is found within the state is a priority.

Yellow floating heart (Figure 3) has been well established in Lake Spokane. Yellow floating heart is listed as a Class B Noxious Weed by State of Washington, and its sale and transportation are prohibited. Although a non-native aquatic plant, yellow floating heart may be providing some aquatic habitat benefits such as cover and structure for fish species such as bass, northern pike, and yellow perch. Nevertheless, it is growing in areas where it is adversely affecting recreational activities, and its coverage needs to be reduced. In addition, there is concern that in dense beds the plant may be adversely impacting water quality by creating conditions that reduce dissolved oxygen and enhance nutrient exchange between the sediment and overlying water.

The yellow iris is an attractive, non-native emergent plant that grows in dense clumps along shorelines and saturated soils (Figure 4). It replaces native plants such as cattails, sedges, and bulrushes. Homeowner benefits include shoreline protection against erosion from wave action.

.....



Figure 1. Eurasian watermilfoil



Figure 2. Purple loosestrife



Figure 3. Yellow Floating Heart

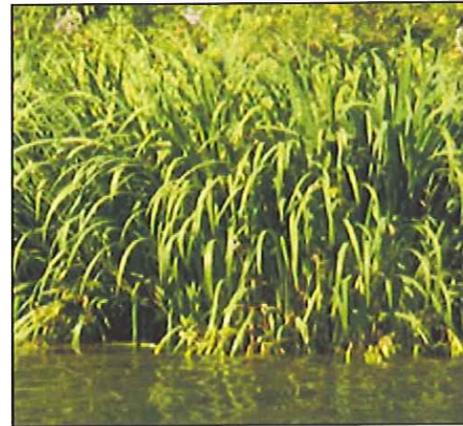
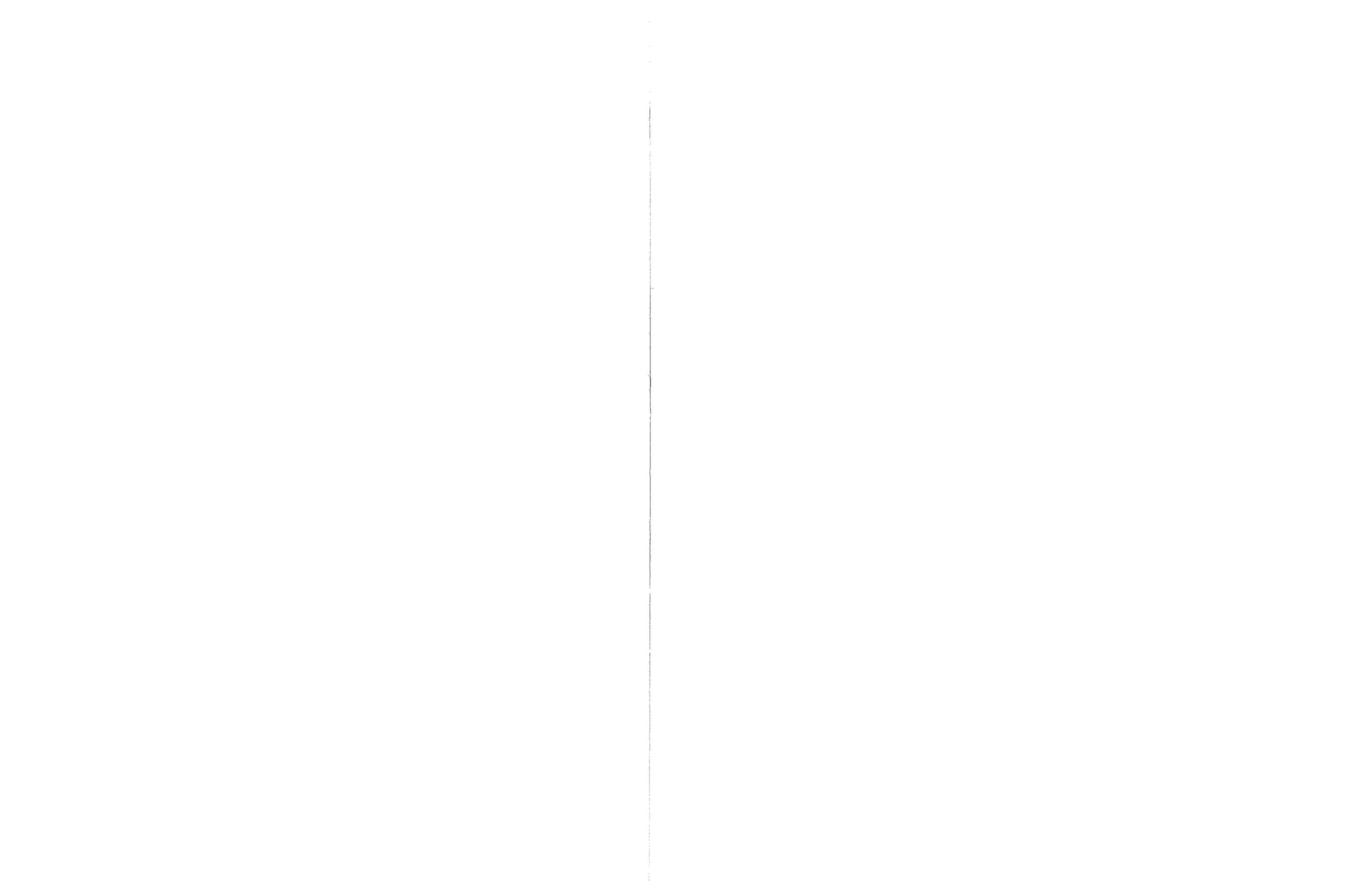


Figure 4. Yellow iris



## MANAGEMENT GOALS

The purpose of the IAPMP for Lake Spokane is to provide guidelines for the management of non-native invasive plants in Lake Spokane. The broad goal is to manage invasive non-native aquatic plants in Lake Spokane in order to limit their impact on recreational and other beneficial uses of the lake. The management goal seeks to balance actions that address non-native plant species to protect beneficial uses of the lake and preserve ecological functions, with the need to minimize environmental disturbances while using the most cost-effective long-term combination of control alternatives available.

Spokane Lake IAPMP implementation objectives are as follows:

1. Produce an integrated multi-year aquatic plant management program that is adaptive (dynamic flexibility with annual evaluation of plan elements).
2. Enhance or maintain aquatic habitat and other benefits provided by aquatic plants while maintaining or improving recreational access.
3. Provide guidance to a long-term management organization that will conduct management activities, seek funding, and implement the plan strategy.
4. Develop and implement a public education program
5. Identify nuisance plant control alternatives suitable for implementation by individual shoreline property owners.
6. Reduce the risk of problem aquatic plants colonizing new areas in Lake Spokane and nearby water bodies.



## AQUATIC PLANT SURVEY

In order to assess the magnitude of the aquatic plant population in Lake Spokane, an aquatic plant survey was conducted. The initial survey took place on June 15, 2000. Assisted by volunteers, surveyors scouted out the shoreline and littoral regions of the lake. The goal of this first survey was to estimate the magnitude of invasive non-native species present and obtain a general idea of the time required for a complete survey. The mapping of the aquatic plant communities in the lake occurred during the week of 17 through 21 July. The aquatic plant mapping was conducted by visual observation of divers swimming both along the shoreline and in transects from the water's edge to 24 feet in water depth, perpendicular to the shore. The entire littoral area was surveyed by divers and surface boat crews. Each day (Monday-Thursday) two volunteers (and boats) were used to navigate scientists and divers around the lake. In the mornings, boats were driven along the shoreline to help surveyors scout out purple loosestrife plants, yellow floating heart (dollar pads) and submerged weeds visible from the boat. Mornings and afternoons were spent with divers who surveyed the deeper portions of the lake's littoral region and identified submerged plants not visible from the water surface, primarily Eurasian Watermilfoil. Each time a plant or plant bed was located, the position of the boat was recorded using a global positioning system (GPS) unit. Each position in the GPS recorded data was labeled with plant species and identification number. The information stored in the GPS unit was then downloaded to a computer and used to help create aquatic plant distribution maps. The exact GPS position data are in a GIS database, along with the bathymetric map of the lake showing the plant community coverage, on a CD held by Stevens County Conservation District. Figures 5 through 16 illustrate the location and extent of aquatic plant coverage in the lake. Eleven different plant species were observed and are listed in Table 1 by both common name and scientific name. The total littoral area occupied by aquatic plants, both native and non-native, is approximately 1100 acres. Table 2 is a summary of plant community coverage, excluding purple loosestrife and yellow iris because they tend to occur in fairly small, discrete groupings. Approximately 80 purple loosestrife plant groupings were found along the shoreline and on islands within the lake.

Eurasian watermilfoil dominates more than 230 acres of littoral area. Based on observations made of plant densities and root crown structure and size, EWM is expanding its coverage from the lower reservoir toward the mid to upper portions of the reservoir. The native plant communities made up of pondweeds, waterweeds, and Coontail are at risk of being displaced, in part or in total, by Eurasian watermilfoil, as observed in nearby Pend Oreille River in earlier studies (Water Environmental Services, Inc., 1988; Water Environmental Services, Inc., 1987; Water Environmental Services, Inc., 1986, Water Environmental Services, Inc., 1985; Gibbons, et al., 1994; Gibbons, et al., 1993; Gibbons et al., 1992, Gibbons and Gibbons, 1988. Gibbons and Gibbons, 1985; Verhalen et al., 1985). The aquatic plant beds in Lake Spokane demonstrate the same patterns.



**Table 1. Common and Scientific Names of Aquatic Plant Species Observed in 2000 at Lake Spokane.**

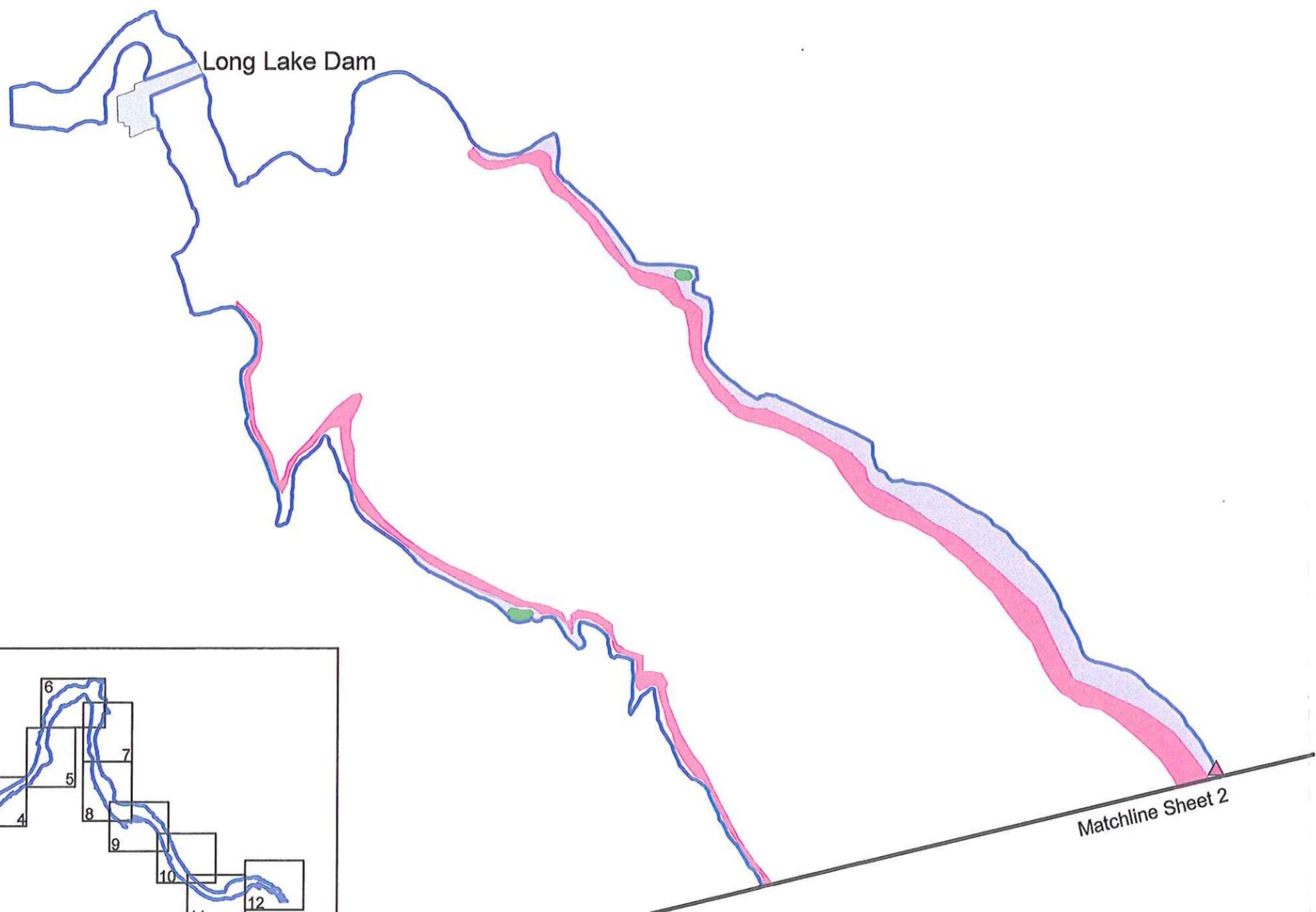
Common Names	Scientific Names
<b>Eurasian Watermilfoil</b>	<i>Myriophyllum spicatum</i>
<b>Purple Loosestrife</b>	<i>Lythrum salicaria</i>
<b>Yellow Floating Heart (dollar pads)</b>	<i>Nymphoides peltata</i>
<b>White Lily</b>	<i>Nymphaea odorata</i>
<b>Yellow Iris</b>	<i>Iris pseudacorus</i>
Sago Pondweed	<i>Potamogeton pectinatus</i>
Long-leaf Pondweed	<i>Potamogeton nodosus</i>
Curly Pondweed	<i>Potamogeton crispus</i>
Pondweed	<i>Potamogeton robbinsii</i>
Common Waterweed	<i>Elodea canadensis</i>
Coontail	<i>Ceratophyllum demersum</i>

\*Non-native plants appear in bold type

**Table 2. Approximate Acreage Covered by Selected Aquatic Plant Species and Communities in Lake Spokane in July 2000.**

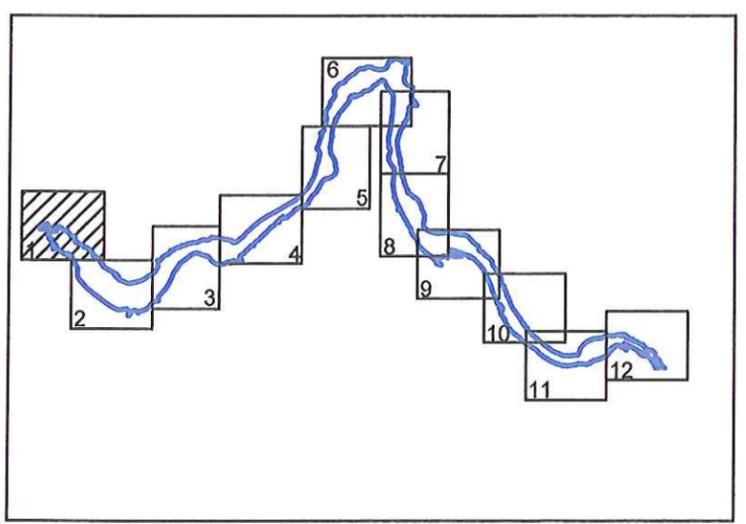
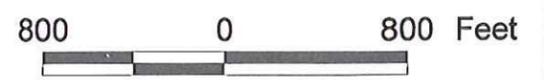
Invasive Plant	Approximate Acreage Covered
Eurasian Watermilfoil	230
Yellow Floating Heart/White Lily	470
White Lily	15
Pondweeds, Waterweed and Coontail	380
<b>Approximate Total</b>	<b>1095</b>





### Legend

-  Matchlines
-  Campgrounds/Resorts
-  Roads
-  Boat Launch
-  Lythrum salicaria (Purple loosestrife)
-  Lake Shoreline
-  Myriophyllum spicatum (Eurasian milfoil)
-  Nymphoides peltata/Nymphaea odorata (Yellow Floating Heart/White Lily)
-  Nymphaea odorata (White Lily)
-  Potamogeton spp. (Pondweed), Elodea canadensis (Water weed), Ceratophyllum demersum (Coontail)
-  Upstream Islands
-  Long Lake Dam

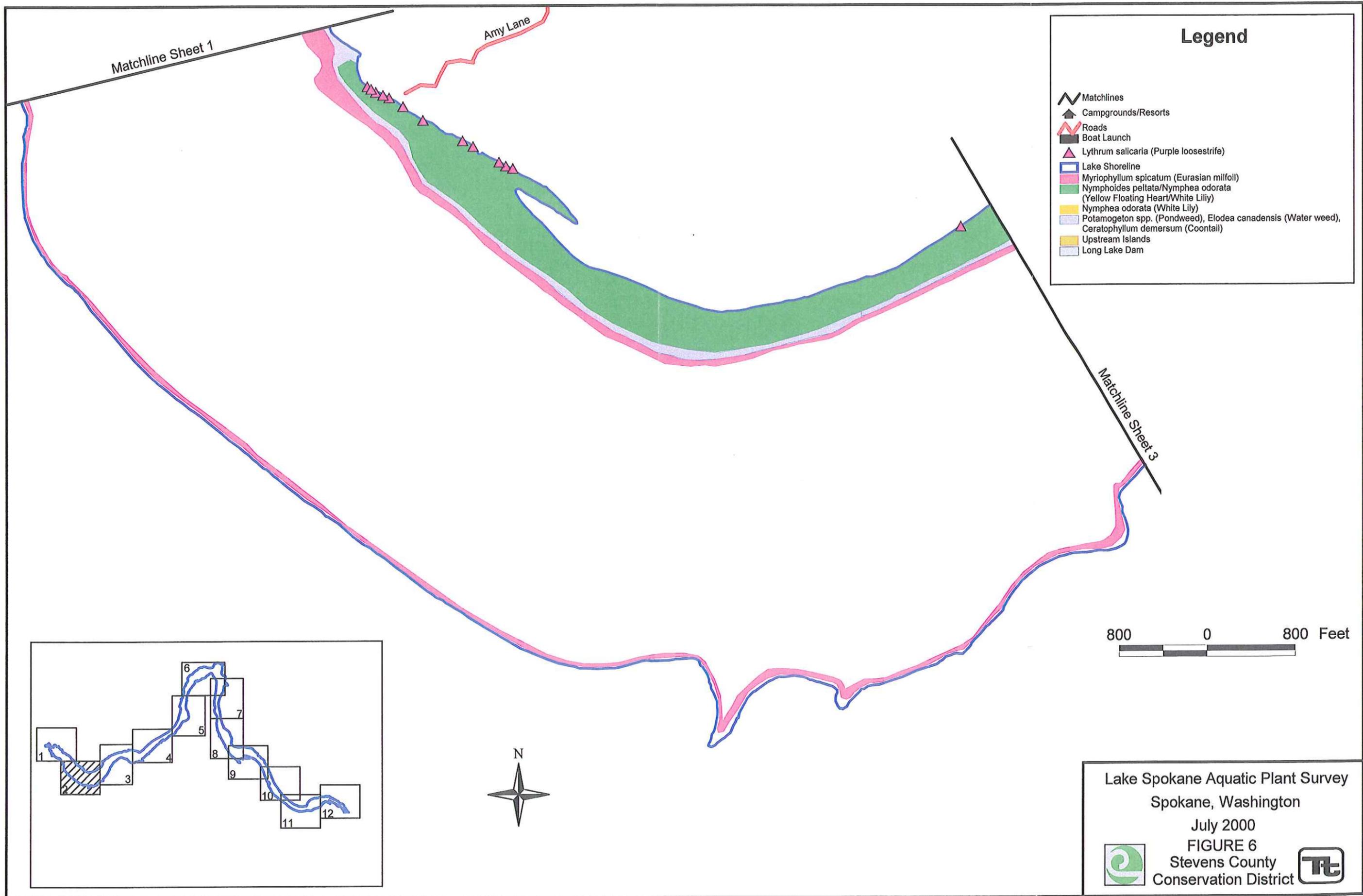


Matchline Sheet 2

Lake Spokane Aquatic Plant Survey  
Spokane, Washington  
July 2000  
FIGURE 5  
Stevens County Conservation District







Matchline Sheet 1

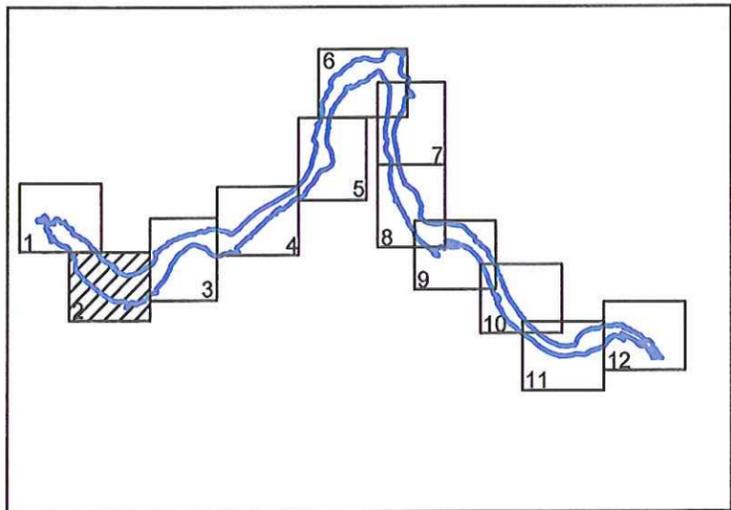
Amy Lane

**Legend**

- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum (Eurasian milfoil)
- Nymphoides peltata/Nymphaea odorata (Yellow Floating Heart/White Lily)
- Nymphaea odorata (White Lily)
- Potamogeton spp. (Pondweed), Elodea canadensis (Water weed), Ceratophyllum demersum (Coontail)
- Upstream Islands
- Long Lake Dam

Matchline Sheet 3

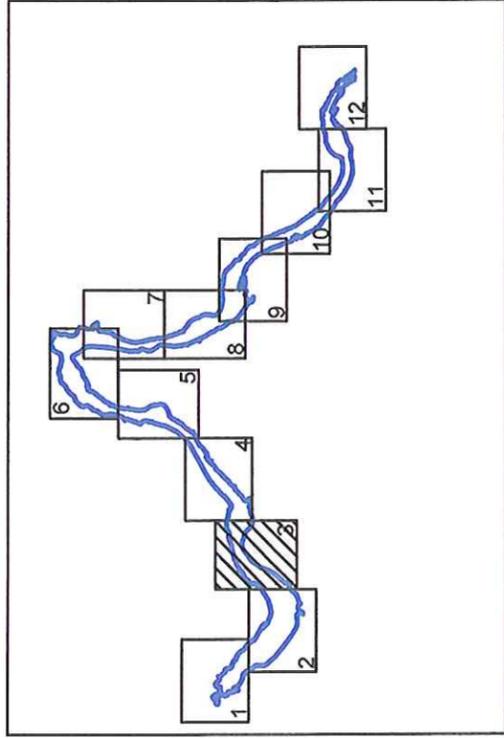
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Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 6  
 Stevens County  
 Conservation District







DNR Campground

Boat Launch

Matchline Sheet 4

Matchline Sheet 2

### Legend

-  Matchlines
-  Campgrounds/Resorts
-  Roads
-  Boat Launch
-  *Lythrum salicaria* (Purple loosestrife)
-  Lake Shoreline
-  *Myriophyllum spicatum* (Eurasian milfoil)
-  *Nymphoides peltata*/*Nymphaea odorata* (Yellow Floating Heart/White Lily)
-  *Nymphaea odorata* (White Lily)
-  *Potamogeton* spp. (Pondweed), *Elodea canadensis* (Water weed), *Ceratophyllum demersum* (Coontail)
-  Upstream Islands
-  Long Lake Dam



Lake Spokane Aquatic Plant Survey  
Spokane, Washington

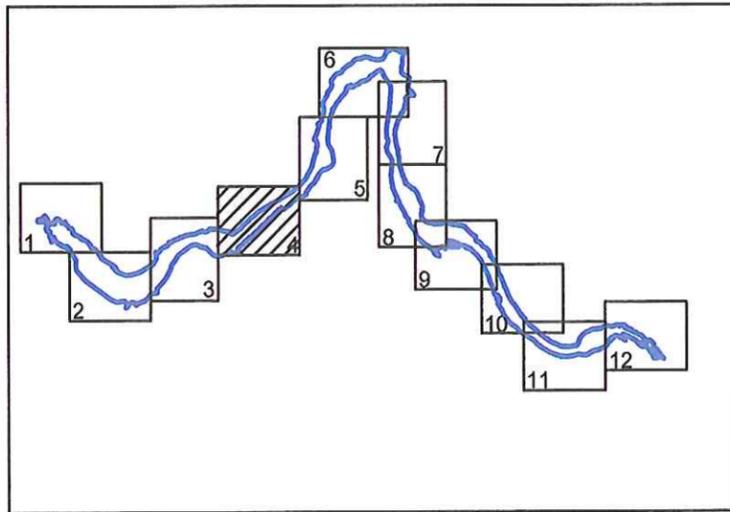
July 2000

FIGURE 7

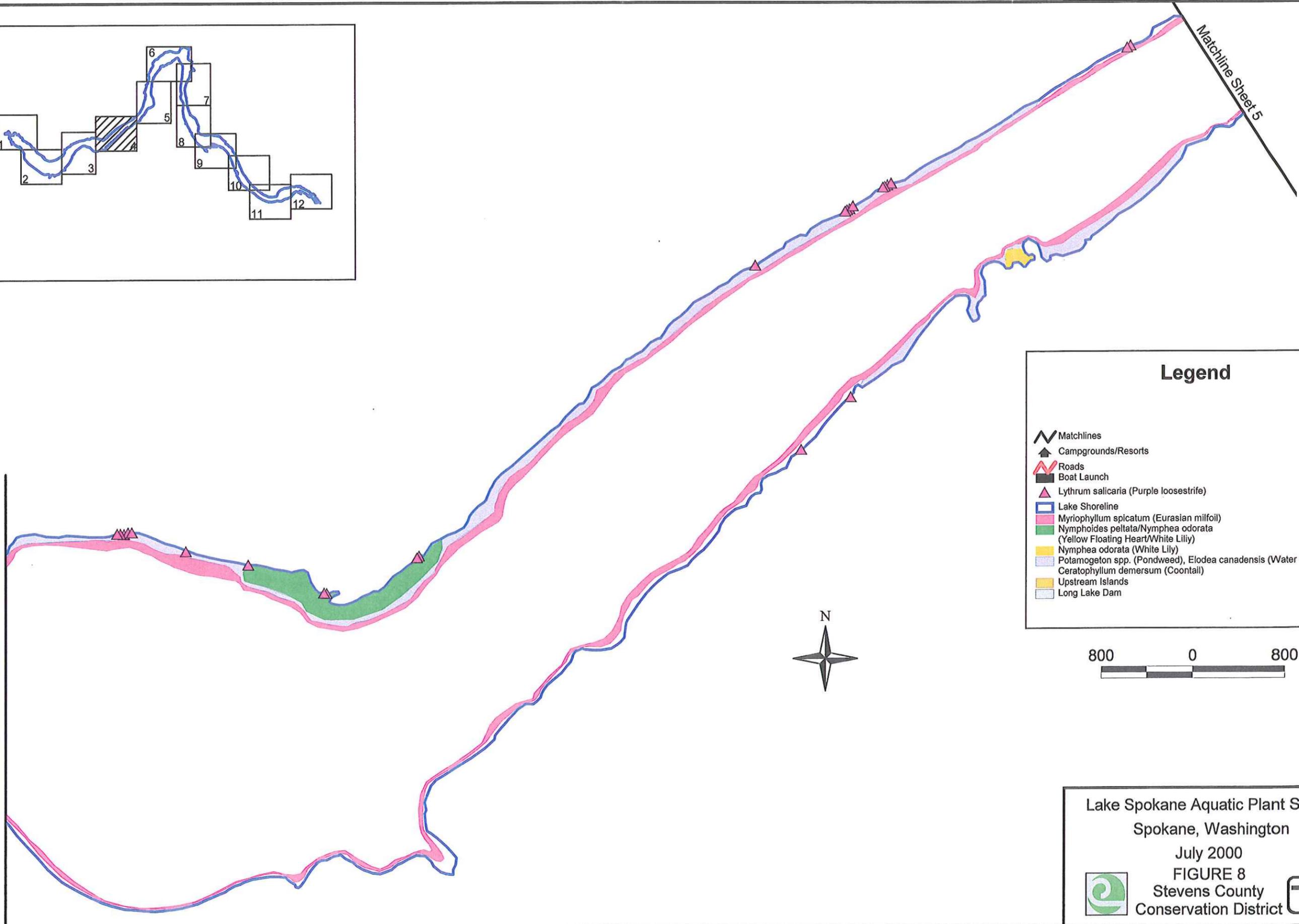
Stevens County  
Conservation District







Matchline Sheet 3



Matchline Sheet 5

### Legend

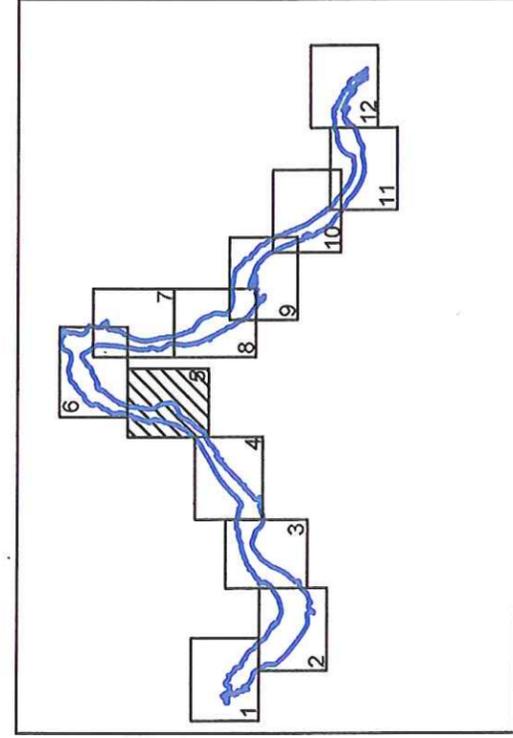
- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria (Purple loosestrife)
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- Nymphaea odorata (White Lily)
- Potamogeton spp. (Pondweed), Elodea canadensis (Water weed), Ceratophyllum demersum (Coontail)
- Upstream Islands
- Long Lake Dam



Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 8  
 Stevens County  
 Conservation District





Matchline Sheet 6



### Legend

- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum (Eurasian milfoil)
- Nymphaeoides peltata/Nymphaea odorata (Yellow Floating Heart/White Lily)
- Nymphaea odorata (White Lily)
- Potamogeton spp. (Pondweed), Elodea canadensis (Water weed), Ceratophyllum demersum (Coontail)
- Upstream Islands
- Long Lake Dam

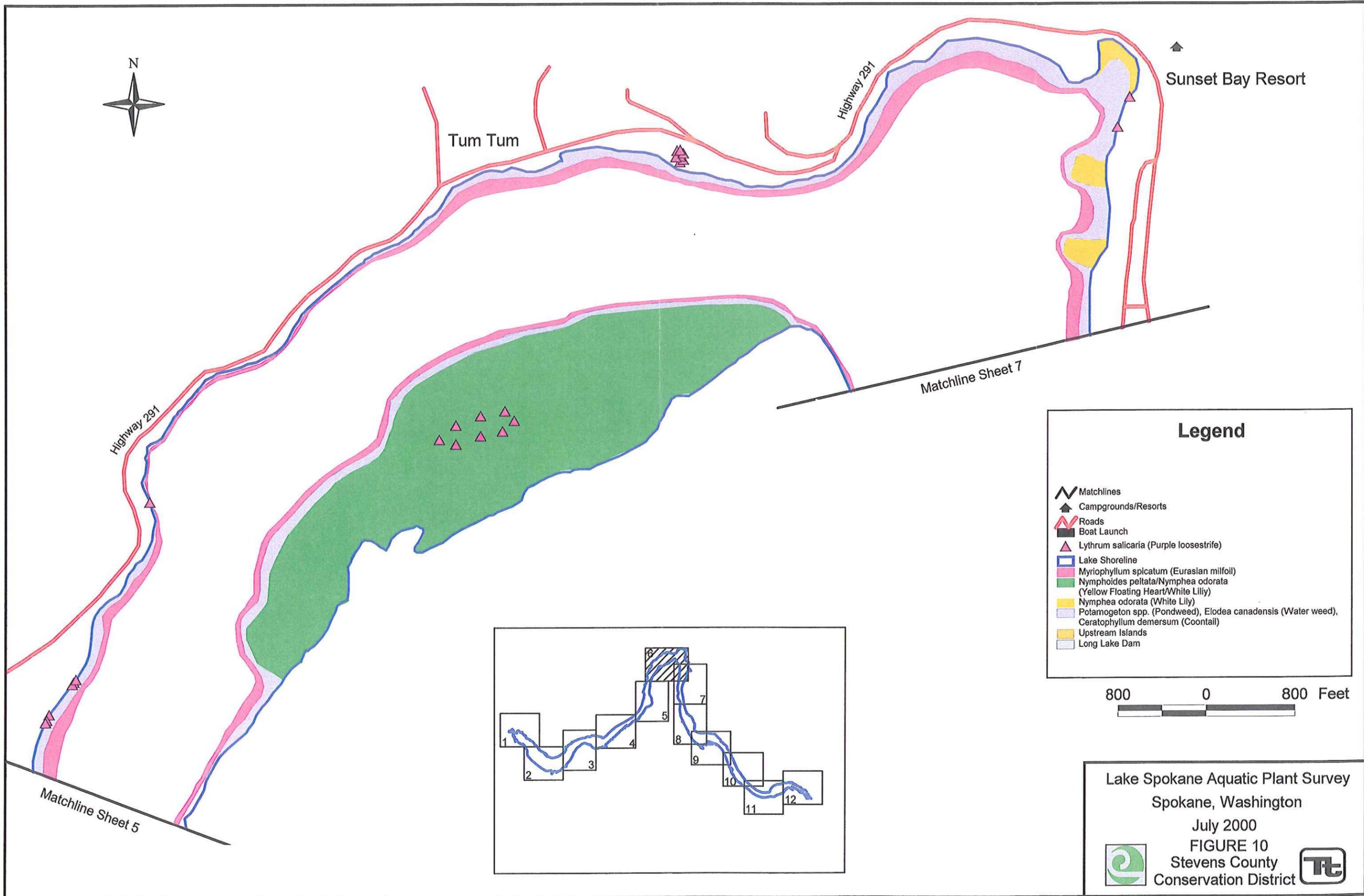


Matchline Sheet 4

Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 9  
 Stevens County  
 Conservation District







### Legend

-  Matchlines
-  Campgrounds/Resorts
-  Roads
-  Boat Launch
-  *Lythrum salicaria* (Purple loosestrife)
-  Lake Shoreline
-  *Myriophyllum spicatum* (Eurasian milfoil)
-  *Nymphaeodes peltata*/*Nymphaea odorata* (Yellow Floating Heart/White Lily)
-  *Nymphaea odorata* (White Lily)
-  *Potamogeton* spp. (Pondweed), *Elodea canadensis* (Water weed), *Ceratophyllum demersum* (Coontail)
-  Upstream Islands
-  Long Lake Dam

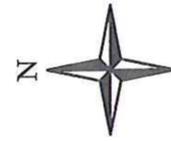
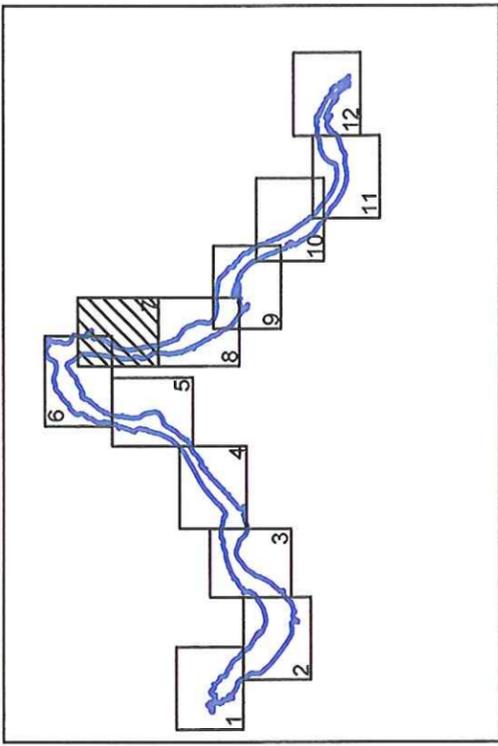
800      0      800 Feet



Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
**FIGURE 10**  
 Stevens County  
 Conservation District





### Legend

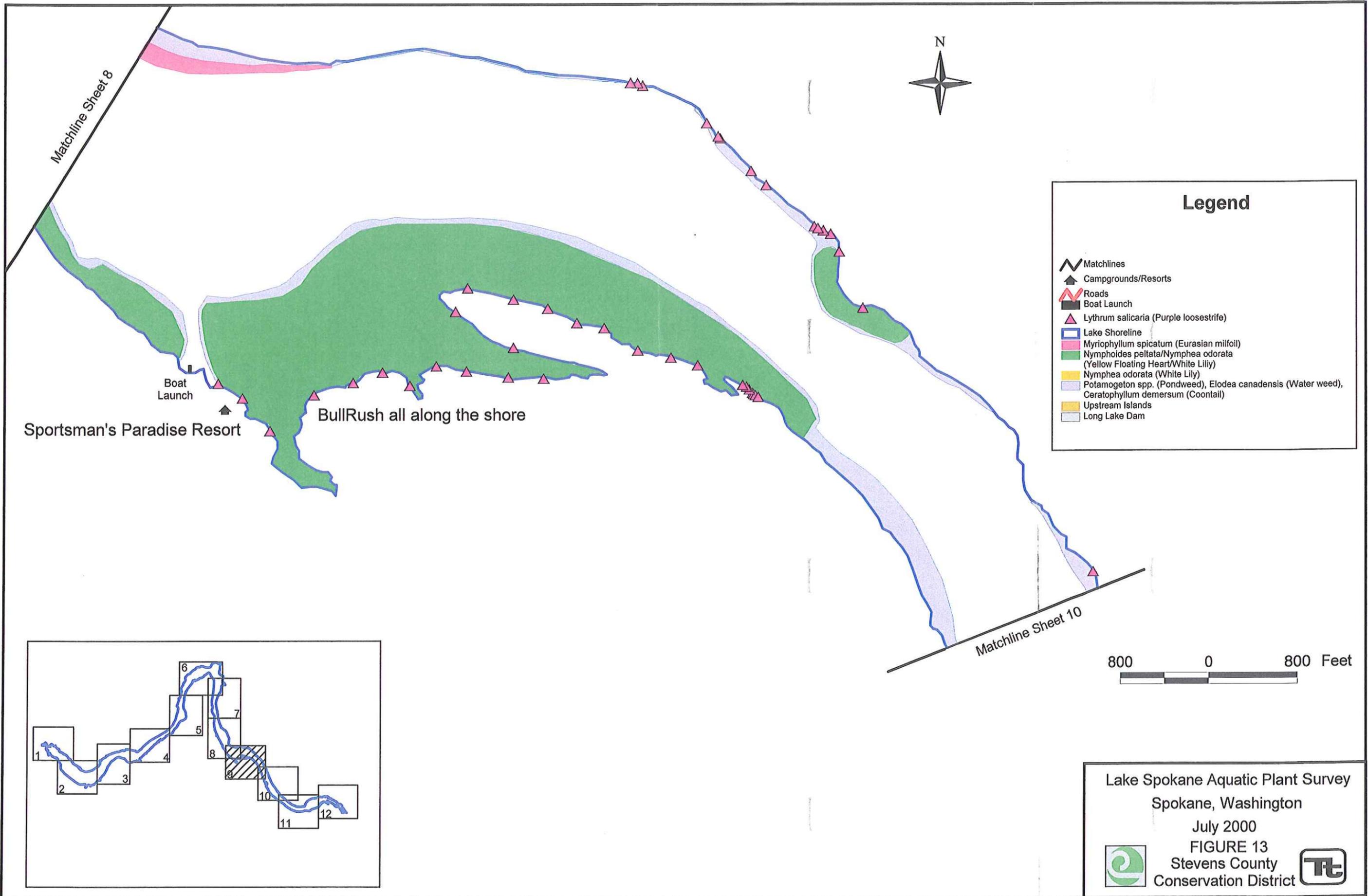
- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum (Eurasian milfoil)
- Nymphaeodes peltata/Nymphaea odorata
- Yellow Floating Heart/White Lily
- Nymphaea odorata (White Lily)
- Potamogeton spp. (Pondweed)
- Elodea canadensis (Water weed)
- Ceratophyllum demersum (Coottail)
- Upstream Islands
- Long Lake Dam



Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
**FIGURE 11**  
 Stevens County  
 Conservation District







**Legend**

- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria* (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum* (Eurasian milfoil)
- Nymphoides peltata*/*Nymphaea odorata* (Yellow Floating Heart/White Lily)
- Nymphaea odorata* (White Lily)
- Potamogeton* spp. (Pondweed), *Elodea canadensis* (Water weed), *Ceratophyllum demersum* (Coontail)
- Upstream Islands
- Long Lake Dam

Sportsman's Paradise Resort

Boat Launch

BullRush all along the shore

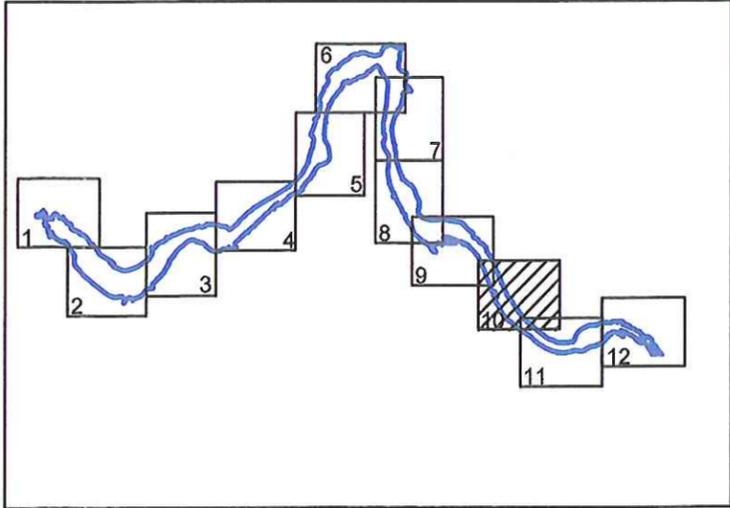
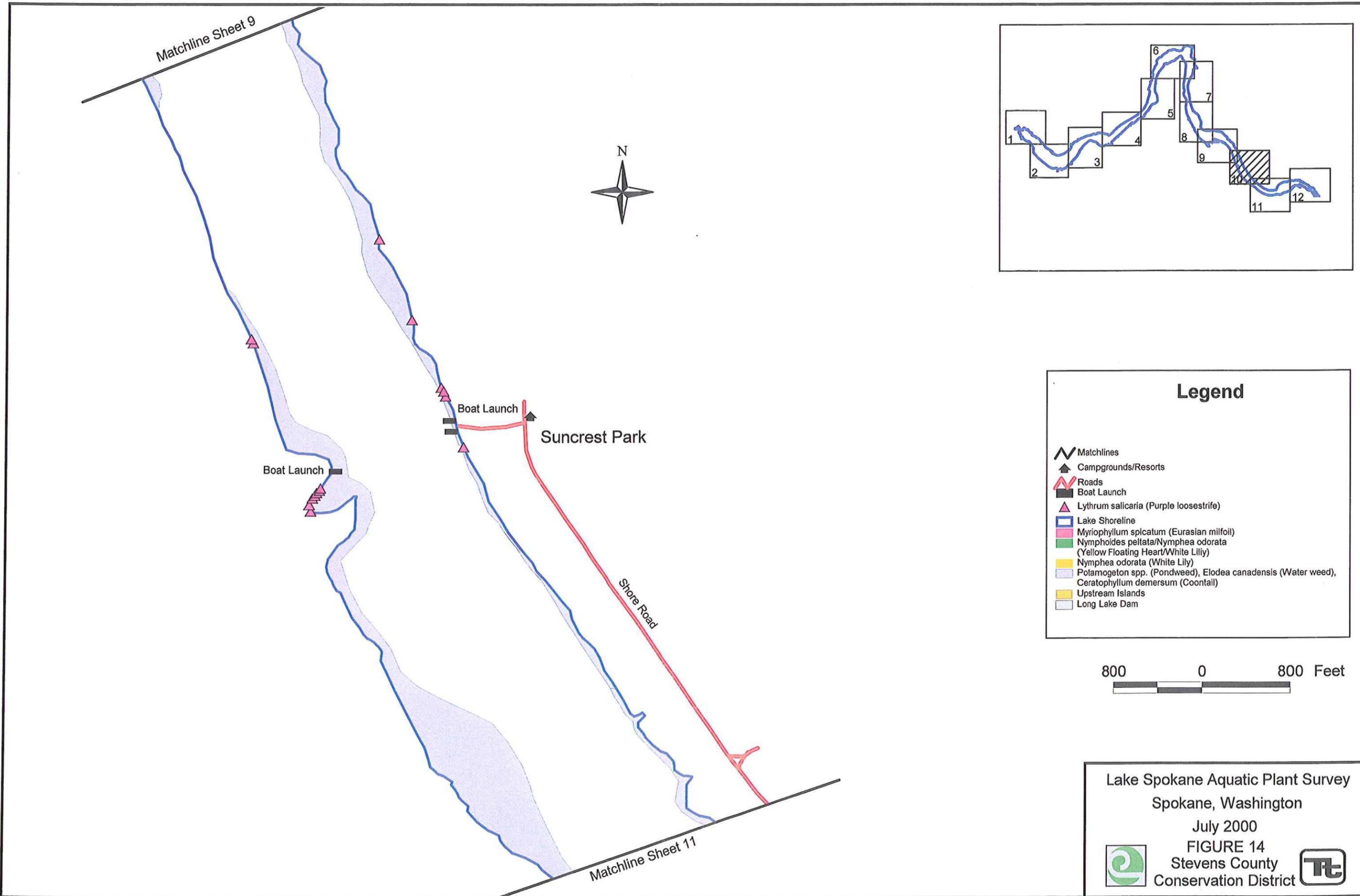
Matchline Sheet 10

800 0 800 Feet

Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 13  
 Stevens County  
 Conservation District







### Legend

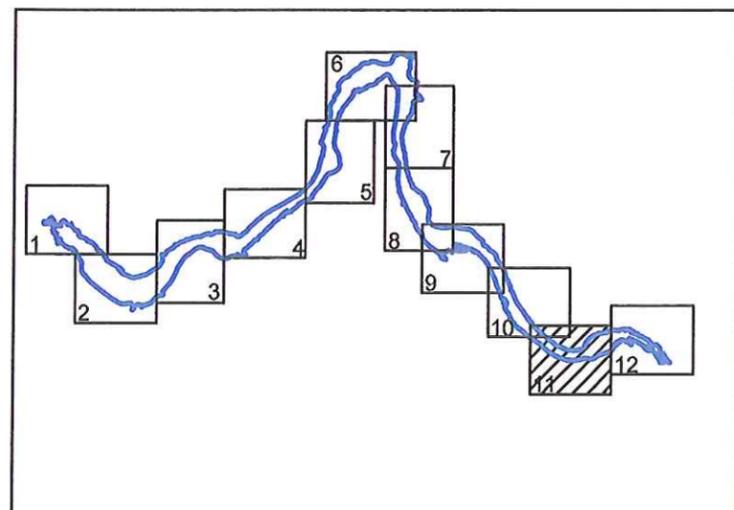
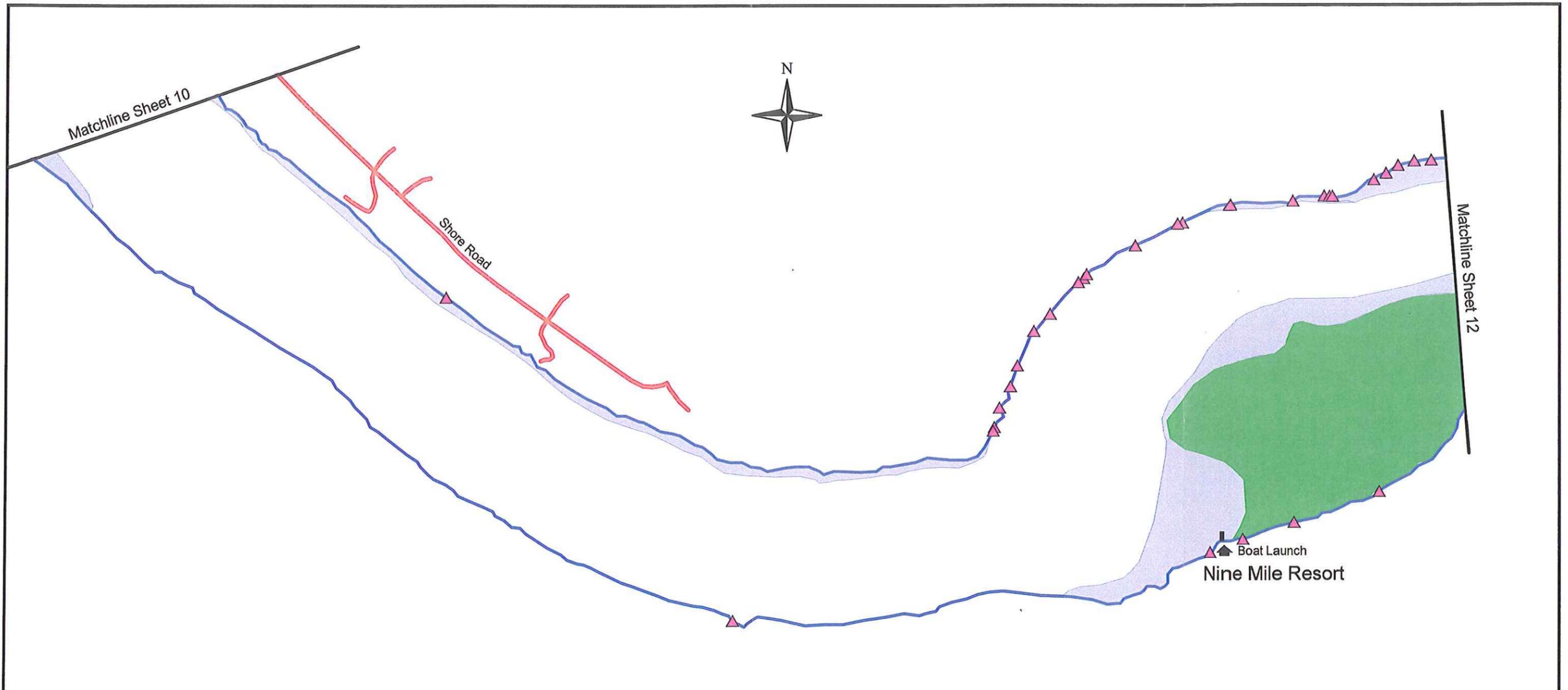
- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria* (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum* (Eurasian milfoil)
- Nymphoides peltata*/*Nymphaea odorata* (Yellow Floating Heart/White Liliy)
- Nymphaea odorata* (White Liliy)
- Potamogeton* spp. (Pondweed), *Elodea canadensis* (Water weed), *Ceratophyllum demersum* (Coontail)
- Upstream Islands
- Long Lake Dam



Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 14  
 Stevens County  
 Conservation District





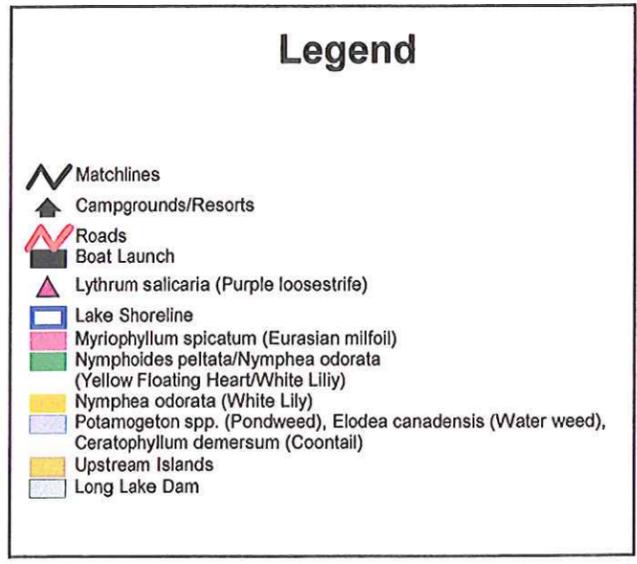
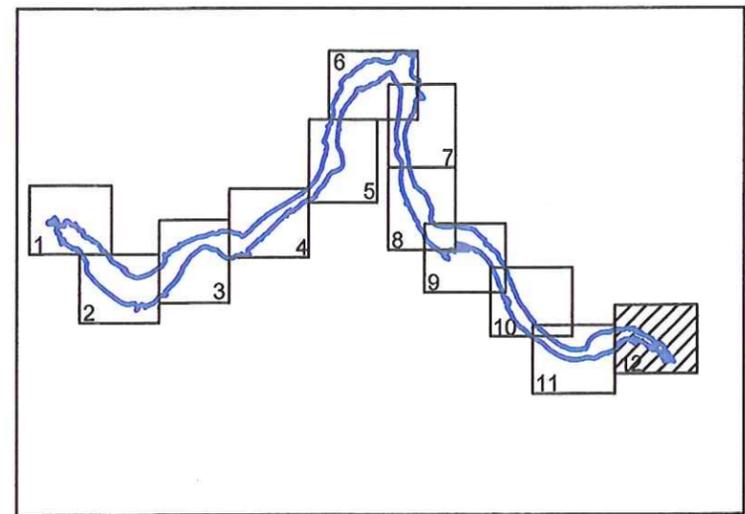
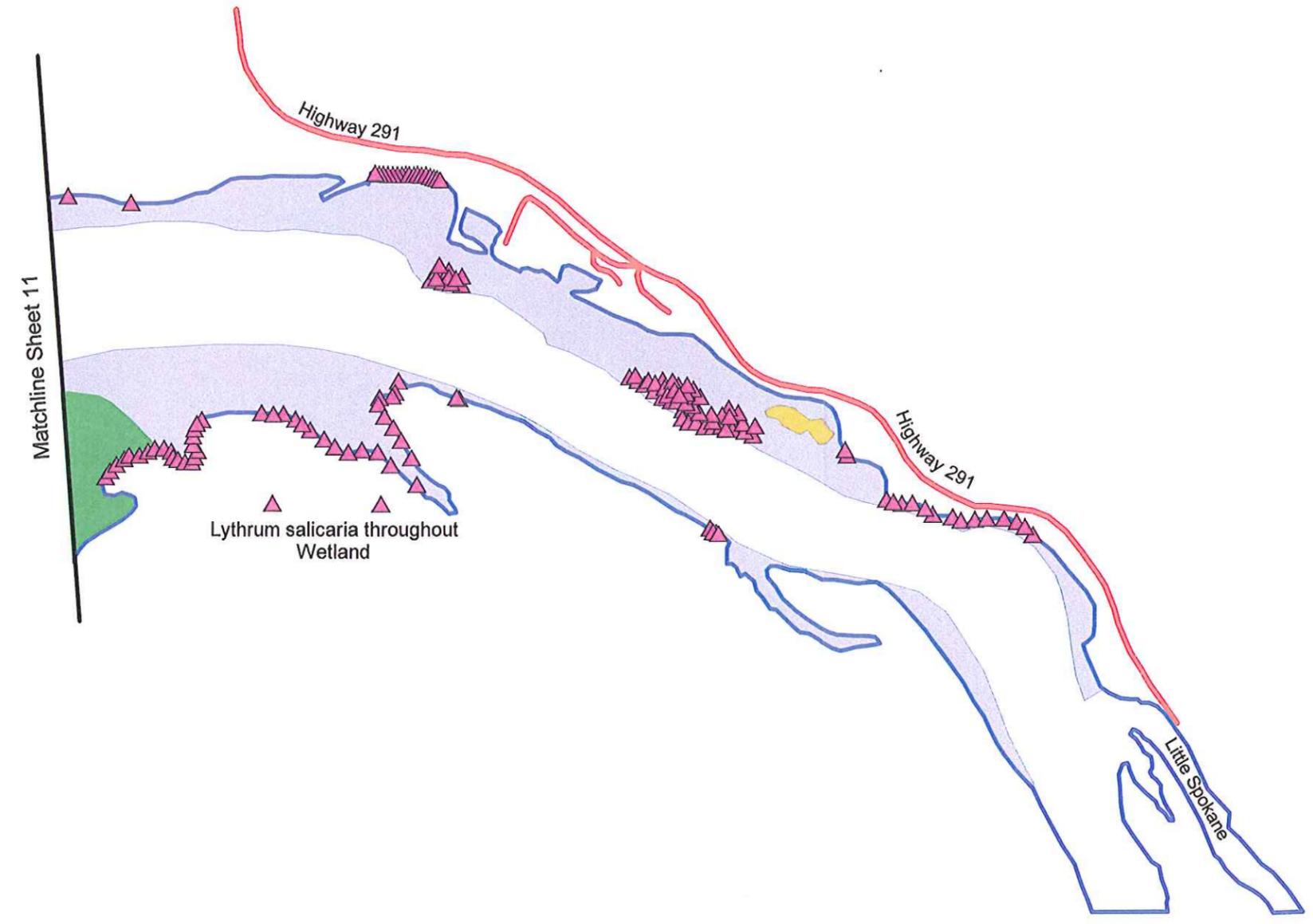
### Legend

- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria* (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum* (Eurasian milfoil)
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- Potamogeton* spp. (Pondweed), *Elodea canadensis* (Water weed), *Ceratophyllum demersum* (Coontail)
- Upstream Islands
- Long Lake Dam



Lake Spokane Aquatic Plant Survey  
 Spokane, Washington  
 July 2000  
 FIGURE 15  
 Stevens County  
 Conservation District





Lake Spokane Aquatic Plant Survey  
Spokane, Washington  
July 2000  
FIGURE 16  
Stevens County  
Conservation District





## CONTROL INTENSITY

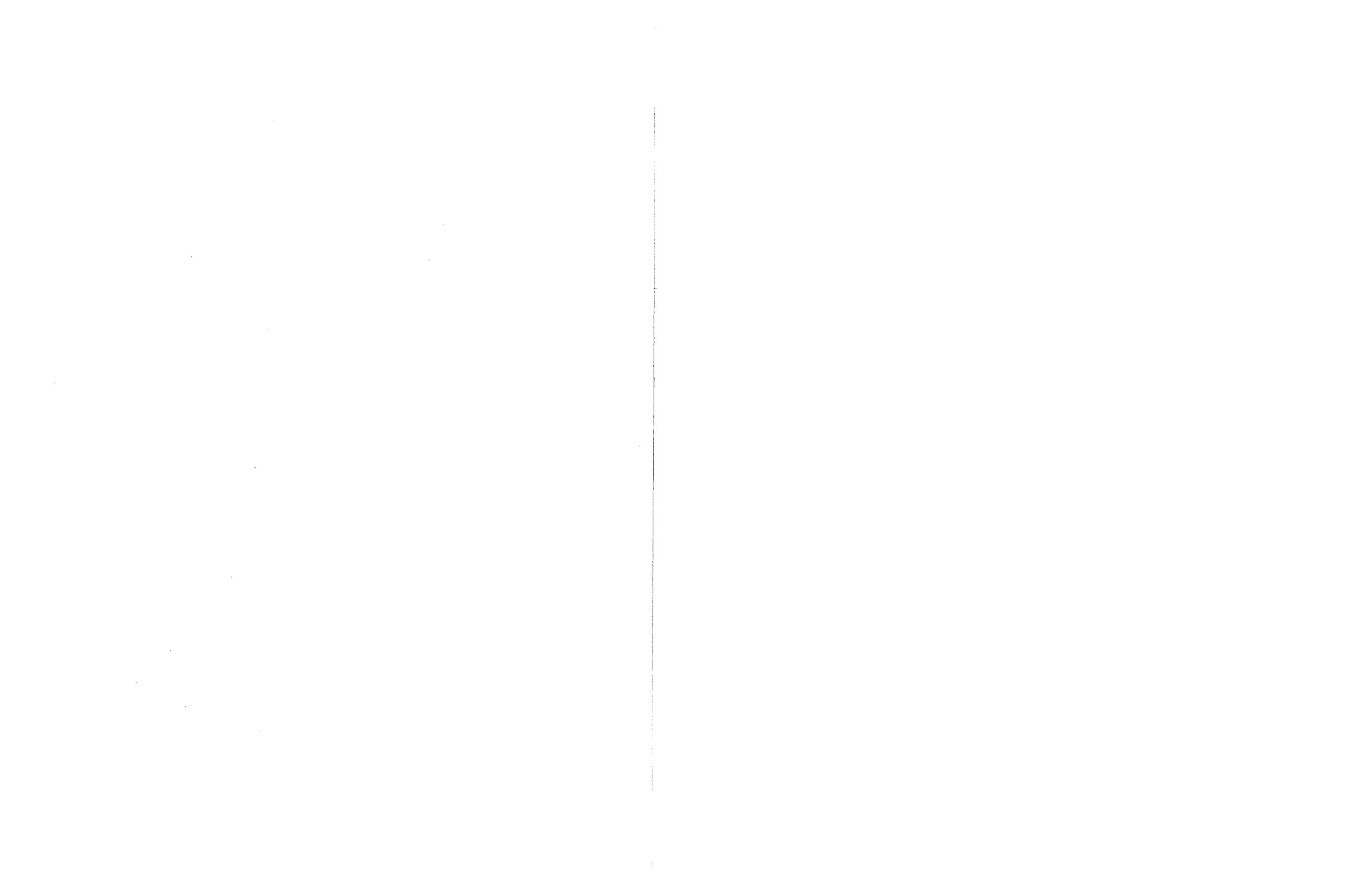
The level of control needed to maintain or restore beneficial uses in Lake Spokane is plant species and community dependent. In general, the aquatic plant management program will be one of control rather than eradication. The non-native plants including Eurasian watermilfoil, purple loosestrife, yellow floating heart, and yellow iris are established in Lake Spokane. Eradication of these species is not economically feasible and perhaps not technically feasible.

Given the large water volume of Lake Spokane and the relatively established presence of Eurasian watermilfoil in Lake Spokane, total eradication is not likely. This is particularly true since there are several bodies of water near the lake that contain Eurasian watermilfoil and would serve as sources for re-introduction even if total eradication in Lake Spokane was achieved. Control would be based on limiting the expansion and reducing the coverage of Eurasian watermilfoil in the lake. Priority should be given to high use recreational areas or high value habitat areas. Control efforts would take place in areas where Eurasian watermilfoil reduction or elimination will potentially increase the current beneficial uses or restore lost uses (e.g., native plant communities).

Purple loosestrife is well established in some wetland areas and some shorelines. The first step in continued control of this plant is to provide for the education of individual property owners on the methods of and need for control, as well as coordination with Stevens and Spokane County Noxious Weed Control Boards. Stevens County Noxious Weed Control Board in cooperation with Avista Utilities has engaged both biological and chemical control of purple loosestrife since 1992 through 1999. Their experience can be applied to the implementation of control efforts of purple loosestrife.

The control of yellow floating heart in high use areas where recreational access is adversely impacted by plant density is recommended. Coverage of significant littoral area by yellow floating heart may remain, and its total removal may not be practicable.

Limited control of yellow iris populations can be obtained by providing education to individual homeowners on methods for use along their shoreline properties. No substantial community effort to control yellow iris is recommended at this time because of the perceived benefit that it provides shoreline erosion control.



## AQUATIC PLANT CONTROL CONSIDERATIONS AND ALTERNATIVES

Several methods of treatment to control nuisance aquatic plant populations are available, including chemical, mechanical, biological, and physical controls. The appropriate method of control depends on the characteristics of the plant being targeted and the management goals for the lake.

### Chemical Control

Application of all aquatic herbicides requires an aquatic herbicide application permit from the Washington Department of Ecology and must be applied by a licensed aquatic herbicide applicator (applicators are licensed by Washington State Department of Agriculture). An Aquatic Pest Management Permit Application can be obtained from Washington State Department of Ecology offices or the Ecology website. It is also attached as Appendix E.

*Fluridone:* This is a slow acting systemic herbicide (capable of killing the entire plant) control method for large-scale infestations of Eurasian watermilfoil and other submersed plants. For planning purposes, it can produce effective control (up to 80 percent) carry-over reduction in plants where there is little water movement and where contact concentration of the herbicide in the water can be maintained for an extended period of time (approximately eight weeks). It is appropriate for use in isolated bays and small lakes where dilution is limited. Fluridone requires a long contact time, but some species specificity can be achieved with correct application rates. It may alter the levels of nutrient and dissolved oxygen due to plant decline and decay. It is not label restricted for swimming or fishing. As in all chemical applications, it is possible that fluridone may travel out of the application area. Fluridone costs approximately \$1300 to \$1800/acre to apply. Fluridone would not be effective for large or small-scale use in Lake Spokane because it would begin to drift out of the target zone immediately upon release into the water. This drift would reduce the contact time available for the chemical to be absorbed by the target plants, reducing control effectiveness. Fluridone is therefore not recommended as a control agent in this IAPMP.

*Glyphosate:* This is also a large-scale, non-selective method that may offer a year or more of control. It is also a systemic herbicide that is non-toxic and will not affect swimming or fishing uses. Costs are relatively low at \$55 to \$400/acre. Glyphosate is intended for use on emergent plants only. This herbicide could be used to control purple loosestrife, yellow iris, and yellow floating heart. It is estimated that a cost in excess of \$49,500 would be required the first year to treat the entire area of Lake Spokane that is occupied by these plants (i.e., over 450 acres for the latter species alone). However, glyphosate is a tool that can be used in small, localized target areas or as a primary tool for the control of yellow floating heart. Glyphosate is generally applied to the leaves of plants and a repeat application may be required to control plants missed in the first application. The herbicide can be painted onto the surface of the leaves or spread onto the leaves.



The current EPA label for Glyphosate (Rodeo<sup>®</sup>) is attached in Appendix F. As part of the application for a permit from Ecology, residential water rights will need to be identified and, prior to treatment with Glyphosate, these water right holders must be notified. Glyphosate dissolves quickly in water. Glyphosate and aminomethylphosphonic acid (main breakdown product) persist in the sediment for more than a year, but residuals are not released back into the water. Glyphosate does not bioaccumulate and has little to no toxic impact on aquatic invertebrates and fish. The United States Environmental Protection Agency has concluded that Glyphosate is non-mutagenic and poses no long term health effects in humans due to exposure.

*Endothall:* Endothall is a fast acting non-selective contact aquatic herbicide. The herbicide acts by destroying the vegetative parts of the plant but does not kill the roots. Thus, the controlled plants will grow back. They will either grow back the following season, or if treated in the spring, the treated plant may re-grow by the end of that growth season. It requires a short contact time and can be used in small as well as large area application. Although generally considered a non-selective herbicide, EWM has in some cases been selectively controlled by low doses of endothall. Drift of the herbicide out of the target area is low and it will dissipate from the water column fairly quickly. There are label restrictions on fish consumption and irrigation when it is in use. Costs are moderate, ranging from \$400 to \$700/acre. Since the short control duration is undesirable and the use restrictions are potentially problematic, endothall is not recommended for use under this IAMAP.

*Copper Compounds:* Copper is a fast acting non-selective herbicide or algaecide. There are no use restrictions for swimming or fishing and a short contact time is necessary. However, Copper Chelates have potential toxic effects to fish and wildlife since it persists in the environment. In Washington, copper compounds may be used only for algae control in non-salmonid-bearing waters. The cost of using Copper Chelates ranges from \$120 to \$340/acre. Due to the short length of control offered with this approach and its restricted use by the state it is not recommended as part of this IAPMP.

*Triclopyr:* Although triclopyr is not yet registered for use by the U.S. Environmental Protection Agency, it is anticipated that it will receive registration. This herbicide is selective and systemic (kills plant including roots). This fast acting herbicide has proven to be effective against purple loosestrife and in spot treatments of EWM. The label (when registered) may contain restrictions for fishing within the treated area. Costs are estimated to be in excess of \$1,600 per acre. Upon receiving its full label, triclopyr may be considered to control Eurasian purple loosestrife, but until that time it is not included in this IAPMP.

*2,4-D:* This systemic herbicide, 2,4-dichlorophenoxyacetic acid, is available for use on limited infestations of EWM. It is relatively selective and suitable for spot treatments at a dose rate of 100 pounds per acre. Application costs are estimated to be \$300 to \$450 per acre. However, carryover effectiveness has been inconsistent in large water bodies where dilution occurs (Gibbons, et al., 1984; Gibbons, et al., 1983; Gibbons et al., 1983;



Gibbons and Gibbons, 1985; Verhalen et al., 1985). Navigate, a granular form of 2,4-D, may reduce the drift of 2,4-D from target areas as compared to liquid formulations. However, EWM most likely will not be eradicated by the use of 2,4-D in Lake Spokane. As with other 2,4-D applications to control established populations of EWM, this herbicide may slow its expansion but rarely prevents its dispersion within the lake (Smith and Barko, 1990). In addition, the carry-over effectiveness of 2,4-D is such that some EWM will remain and continue to grow (Goldsby et al., 1978). There are many factors that can reduce the exposure of EWM to 2,4-D herbicide including water depth, and water movement due to winds, waves and currents (Adams, 1983; Smith et al. 1995). Given the current condition of the plant communities and the potential for dilution within Lake Spokane 2,4-D is not recommended in this IAPMP.

### **Biological Methods**

**Grass Carp:** The use of a herbaceous fish (white amur, *Ctenopharyngodon idella*) to control aquatic plants, including EWM, has been used in other lakes in the state with varying success (Gibbons et al., 1998). Grass carp may provide long-term control for relatively low costs (\$50 to \$200/acre depending on stocking density). The fish offer a low maintenance alternative, can cover a large area, and will not reproduce due to sterility. Only sterile triploid fish may be introduced into the waters of the state with a specific permit issued by the Washington Department of Fish and Wildlife. However, it is difficult to determine the correct number of fish to introduce into a water body to provide a definable effect on the aquatic plant community. The planting of grass carp into a lake usually results in either removal of all plants or limited impact on the observed standing crop of plants. Thus, either over-stocking or under-stocking of grass carp is the normal outcome of this fish's introduction. Non-target ecological impacts are under debate, and several unpredictable elements (e.g., predation, angler harvest, emmigration, etc.) may render the control ineffective. Recent studies in Washington State (Gibbons et al., 1998) have also shown that the native plant species present in Lake Spokane, such as *Potamogeton* spp and *Ceratophyllum demersum*, appear to be highly preferred by grass carp. If carp are stocked in Lake Spokane, it is likely that they will selectively feed on the native plants. So, grass carp may ultimately provide EWM control in Lake Spokane, but observable decreases in the plant densities may not occur for 3-5 years and would likely result in a decrease in native plant densities. This may even allow Eurasian watermilfoil to increase its coverage of the littoral area at a faster rate, at least until most of the native plants are removed and the fish begin to eat EWM. In addition, the inability to control the movement of grass carp out of the lake into little Spokane River or downstream might make obtaining a permit to introduce the fish into the lake difficult or impossible. Hence grass carp are not a recommended part of this IAPMP.

**Milfoil Weevil:** The milfoil weevil, *Euhrychiopsis lecontei*, has been associated with declines of EWM (Creed and Sheldon, 1995). In eastern Washington, the milfoil weevil is found on both Eurasian watermilfoil and native northern watermilfoil, *Myriophyllum spicatum*, (Tamayo et al., 1999). There have been no reported declines in EWM in Washington State attributed to the milfoil weevil. In addition, as with most biological



controls, eradication is usually not achieved by a single bio-control agent. Given the uncertainty associated with this technique, it is not a recommendation of this IAPMP. However, if future information demonstrates that the milfoil does in fact significantly control EWM in the Pacific Northwest, then its use should be re-visited.

*Galerucella Beetle:* In Stevens County the *Galerucella* beetle, *pusilla*, populations have been established and is actively impacting purple loosestrife (Steven County Noxious Control Board web-page, see Appendix D). Both the adult and larva stages of beetle affect purple loosestrife causing the plant to be defoliated. U.S. Fish and Wildlife Service suggested in the mid 1990's that within 10 to 20 years from the first establishment of the *Galerucella* beetle (1992) the national population of purple loosestrife would be reduced by 90 percent. This biological control holds promise for control of this plant. Citizens are encouraged to coordinate with Spokane and Stevens County Noxious Weed Boards on promoting the further impact of the *Galerucella* beetle on purple loosestrife.

### **Mechanical Methods**

Any action involving ground disturbing activities within the Lake Spokane area may potentially impact cultural resources. There have been many diverse communities that have inhabited this area over time. Remains of their history are protected within the earth. There are laws that protect these resources. If a resource is unexpectedly discovered, the activity should stop immediately and the Washington State Historic Preservation Office should be contacted at 360.407.0752 for further information and assistance.

*Harvesting:* Mechanical harvesting is a short-term technique to temporarily remove plants from a water body. Harvesting involves cutting plants below the water surface, with or without collection of cut fragments for onshore disposal. Harvesting provides limited control for less than one season, and at times requires 3 to 4 cuttings per year. Harvesting immediately removes the plant to cutting depth (usually 4 feet). It may reduce internal loading of nutrients related to plant decomposition if harvested plants are removed from the waterbody. Collected plant materials may be composted instead of more costly disposal methods. Drawbacks of harvesting include; 1) substantial production of fragments that can re-root later and encourage spread into new areas, 2) limitations on extent of control (depth), 3) impacts of machinery on fish and invertebrate species, 4) plant disposal considerations, 5) it is not species specific depending on plant bed characteristics, and 6) the high initial capital costs associated with purchase or rental of harvesting equipment. Furthermore, harvesting operations may require a specialist and inclement weather may delay schedules. Costs vary depending on disposal transportation and equipment and are estimated at \$600 to \$1400/acre. Because fragmentation is the primary means of reproduction for Eurasian watermilfoil, use of this mechanical option as a major, large-scale control element in Lake Spokane is not recommended.

*Rotovation/Cultivation:* Rotovation or cultivation is the process of physically removing the roots of plants from the lake sediments. This control can provide 2 to 3 years of



perennial plant control through removal of plants and root disruption. Winter treatment minimizes summer season recreation impacts. In some cases, plant diversity may increase with this treatment. This control method is not species specific; native plants will be removed along with target species. This method would also have impacts on fish and invertebrate species through bottom disturbance, increased turbidity, and loss of native submerged plant habitat. Any obstructions on the lake bottom impair machinery operation. This approach may be useful in providing control of Eurasian watermilfoil in Lake Spokane, but a cost of \$1,800 per acre plus a capital cost of \$150,000 to \$200,000 for a rotovator may make this approach too expensive. The method also put cultural resources at risk (see discussion at the beginning of the Mechanical Methods section). Rotovation is not recommended in this IAPMP.

*Diver-operated Dredge:* This method offers potentially long-term, control of aquatic plants. But unlike most other methods, a diver-operated dredge offers only small-scale control. It is species specific, site specific, can be done at any depth where aquatic plants can be found, and can be used near obstructions. Bottom disturbance and increased turbidity are only temporary impacts. Drawbacks include labor and time requirements, potential fragment production, and a high cost of \$1100 to \$1300/day (0.25 to 2 acres per day) depending on density and coverage of plant beds. A diver-operated dredge may be useful in removing small, isolated patches of EWM. However, the high cost of treatment and the limited area of control offered by this method makes this control method insufficient for use in Lake Spokane.

### **Physical Methods**

*Hand-Digging:* This option involves digging out each individual plant including the root system to ensure removal of the entire plant by hand, or with the aid of a spade or long knife. This technique is labor intensive and most suitable in low plant density areas that cover less than 5,000 square feet. In waters less than 3 ft deep, no special gear is required. However, beyond 3 feet of water depth, divers must be used to complete removal. Costs depend on size and extent of target plant beds and the need for contract divers and range from very little with volunteer labor to \$3,200/day for contract divers. Environmental impact is typically short-term and due to turbidity increases that result from removal activities. Hand digging of plant stems and roots could be used for small-scale, intensive removal of Eurasian watermilfoil around private dock areas and short shoreline segments. If roots systems are completely removed, this technique provides a more long-term control (compared to hand-cutting described below). However, Lake Spokane has too large an infestation to be addressed by any type of hand removal alone. Hand-pulling used in conjunction with other control methods is an approach likely to meet the various removal and control needs in Lake Spokane, although maximum removal of all resulting EWM plant material is recommended. Handpulling and digging can also be used to remove purple loosestrife, but care must be taken to remove all of the plant so as not to stimulate growth of new plants.



*Hand-Cutting:* This technique employs a hand removal system that leaves the aquatic plant root system intact. This method is less intensive than hand-digging, and is accomplished by pulling scythes, rakes, or other specialized devices through the plant bed from a boat, from shore, or while wading. Cut plants must be removed from the water if there are concerns with fragmentations of plants leading to the increased distribution of plants. This is particularly true for EWM. Effectiveness of hand-cutting is usually short-term as since Eurasian watermilfoil and other target plants may resprout from the remaining, intact root systems. Costs depend on the cutting implements purchased or rented and labor. Hand-cutting would, like mechanical harvesting and other active plant removal and disturbance methods, create stem fragments and fail to provide the long-term control of Eurasian watermilfoil and is not recommended for use within this IAPMP. However, private property owners with a few purple loosestrife plants on their shoreline can cut and bag flowering spikes to reduce spread by seed.

*Bottom Barriers:* Placement of a physical barrier over plant beds provides a small-scale, high intensity control for up to 3 years. A number of materials can be applied to the lake bottom, including sand-gravel, polyethylene, polypropylene, synthetic rubber, burlap, fiberglass screens, woven polyester, and nylon film. The effectiveness of bottom barriers depends on materials used, application techniques, and sediment composition. Bottom barriers are best suited for plant growth control in localized areas where exclusion of all plants is desired (e.g., around docks and boat launches, at swimming areas, etc.). Costs depend on materials used, size of area covered, and labor. Material costs may range from \$0.15 to \$0.75/sq. ft. and installation from \$0.25 to \$0.50/sq. ft. More expensive materials may be more effective in control, while less costly materials may require more frequent replacement. Periodic maintenance is necessary to remove silt and rooting fragment accumulations on barrier materials. There is a possibility of suspension of barrier materials due to water movement or gas accumulation beneath the fabric. Bottom barrier application requires an HPA (Hydraulic Project Approval) from Washington Department of Fish and Wildlife. Bottom barriers are a useful method of spot treatments of Eurasian watermilfoil and yellow floating heart in Lake Spokane. Although barriers can be expensive, the use of burlap is relatively inexpensive. Bottom barriers, and specifically the use of burlap anchored by sandbags and rocks, are recommended as part of this IAPMP.

*Drawdown:* Lowering water levels during freezing weather conditions that freeze, dryout, and kill aquatic plants can offer large-scale control. Drawdown has shown to be species specific in that it has no apparent effect on some species, eliminates others and stimulates other species to re-establish in areas where other plants have been removed by this technique (Cooke, et al., 1993). Drawdown alters aquatic plant composition but does not always produce desirable changes because the responses of various aquatic plant species to drawdown vary widely and at times unpredictably. (Hayes and Confield, 1997). Specifically, drawdown may encourage growth of beneficial native plant species while discouraging the growth of non-native plants. However, drawdown may cause a loss of recreation access and opportunity during implementation, can affect dissolved oxygen and



nutrient levels, and affect benthic invertebrates, fish, wildlife, and wetlands in a variety of ways.

Costs of a drawdown are variable depending on the uses the waterbody supports and any potential adverse affects of a drawdown. Recreation, irrigation, and hydroelectric production are a few of the uses supported by Lake Spokane. Costs of a drawdown on Lake Spokane may be minimal if there is no change to the normal operation of the reservoir.

Normal operation of the Long Lake Hydroelectric Development (HED) has included periodic winter drawdowns to different depths and for different lengths of time depending on energy demand, weather and operating conditions. The Long Lake HED is operated as a water storage facility for power generation purposes, but with several other considerations taken into account. During the summer recreation season, Avista attempts to keep the reservoir within 1.5 feet of the full pool elevation. More significant reservoir drawdowns typically occur during the cold weather, low water winter period of some years.

Historically, Lake Spokane has had drawdowns to 24 feet. However, the last winter drawdown to 24 feet occurred in the winter of 1988-1989. Since that time, the drawdowns have usually been limited to no more than 14 feet as a result of moderate weather conditions and energy demand, and concerns over affecting a dozen or so nearby, domestic wells when the lake surface drops below a 14 foot drawdown. The only recent exception to this was during the 1990-1992 winter, when energy demand and low water conditions required a drawdown of approximately 17 feet. While reservoir drawdowns of approximately 14 feet have occurred during five of the last 12 winter periods (i.e. since the 1988-1989 winter), just as many years have seen winter drawdowns of less than 4 feet.

Drawdowns of Lake Spokane in excess of 6 feet (i.e. the depth to where many invasive aquatic plants were located) have occurred during 7 of the last 12 winters. Non-native aquatic plants may be affected by these drawdowns as the recent survey of Lake Spokane found little EWM in the 0-6 foot depth. Yellow floating heart, however, was noted in the 0-6 foot depth. Drawdown alone appears to offer some potential control opportunities for eurasian watermilfoil but not for yellow floating heart. Drawdown may be especially effective when combined with other control methods, such as the placement of bottom barriers or chemical treatments.

As a management option for yellow floating heart and eurasian watermilfoil in Lake Spokane, the normal, periodic winter drawdown combined with the placement of bottom barriers or chemical treatments at high use recreation sites appears to offer an effective way to achieve management goals. The control effectiveness of the combined treatments may last 3 to 4 years. Typically, normal operational drawdown to 6 feet or more will occur sometime during a 2-3 year period, which allows for effective combined treatments. When a normal operational drawdown of 6 feet or more occurs, the appropriate aquatic

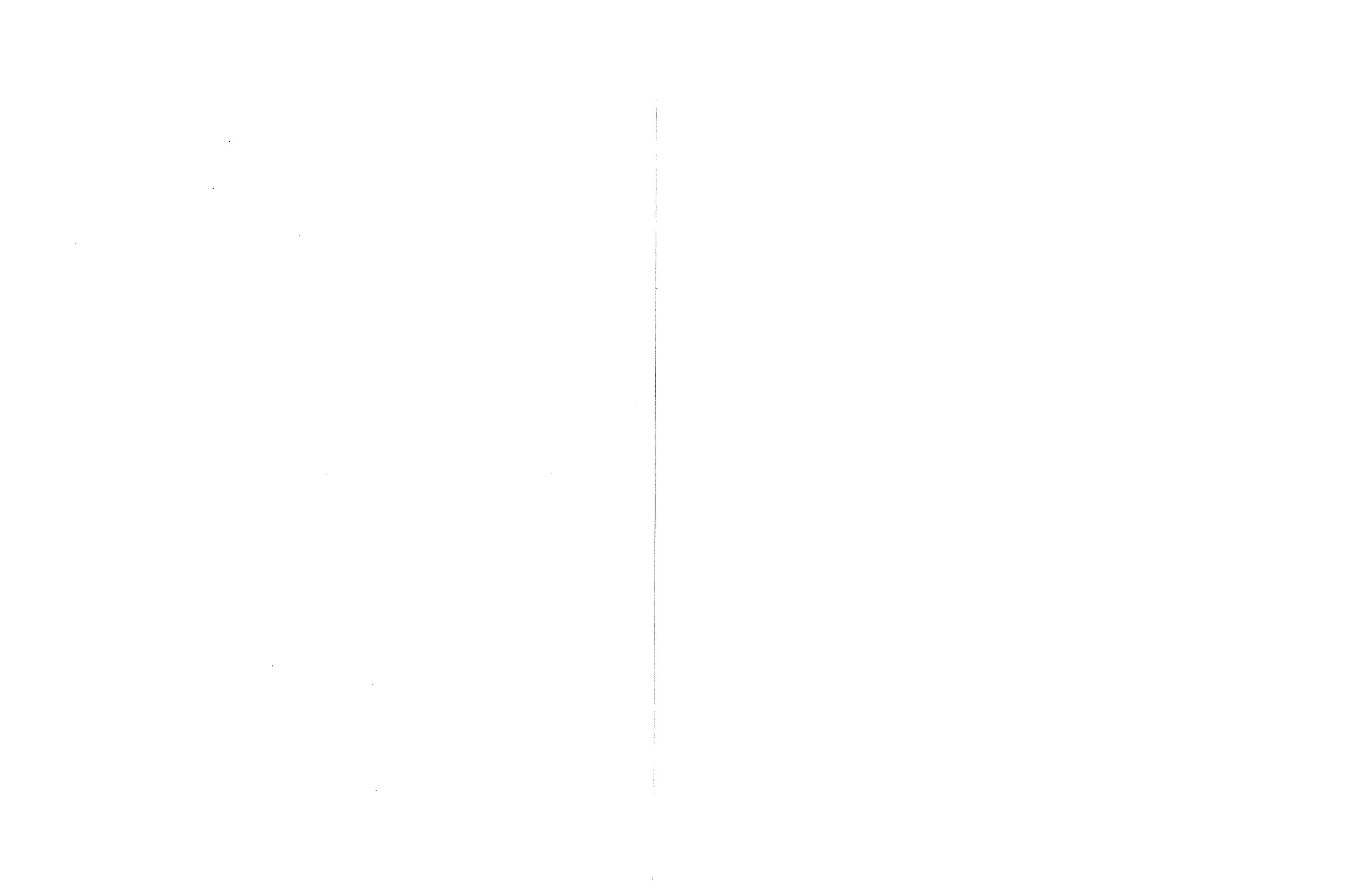


plant management group could implement additional accepted aquatic plant control measures. During years when drawdown of less than 6 feet occur, other control methods not requiring low water levels could be applied.

This technique does provide some potential control opportunities in Lake Spokane especially when use in combination with other techniques, such as placement of bottom barriers.

*Watershed Controls:* This method involves using best management practices (BMPs) to reduce the sources and input of external nutrient and sediment, into the receiving water body(s). Nutrients and sediment tend to support and encourage plant growth, including exotic plant invasions. BMPs are primarily carried out by individual landowners and those engaged in certain land use activities (e.g., agricultural, forestry, landscaping, etc.) and can provide a small to large-scale, low intensity control alternative. Examples for use by near-shore homeowners applicable to Lake Spokane include: 1) maintaining septic systems, 2) using prudent lawn and garden fertilizing practices, and 3) disposing of yard litter or shredding or composting well away from water's edge. The noted BMPs are relatively easy to implement, can be wide-ranging, and expenses are generally very small. However, BMPs alone will not result in immediate, substantial reduction in the coverage or density of the non-native plant species within the lake. While this control alternative may not create an obvious change in the density of aquatic plants, it is always a good idea to follow BMPs as part of an education program.

*Water Column Dye:* This low intensity treatment requires dark colored dyes to be applied to the water, which suppress aquatic plant growth by shading out sunlight needed for photosynthesis. Aquashade (Applied Biochemists, Inc.) is the only dye registered as an herbicide. All others are sold strictly as pond dyes. Aquashade is a blue dye that is reported to be non-toxic to humans, livestock and aquatic organisms. It can be applied by pouring it into the water from shore or from a boat. Effective use of dyes is limited to water bodies with no outflow and of relatively small size, is not reviewed by Ecology's EIS and is not available for use. Hence, use of dye is not a feasible alternative in Lake Spokane and is not recommended.



## INTEGRATED ACTION STRATEGIES

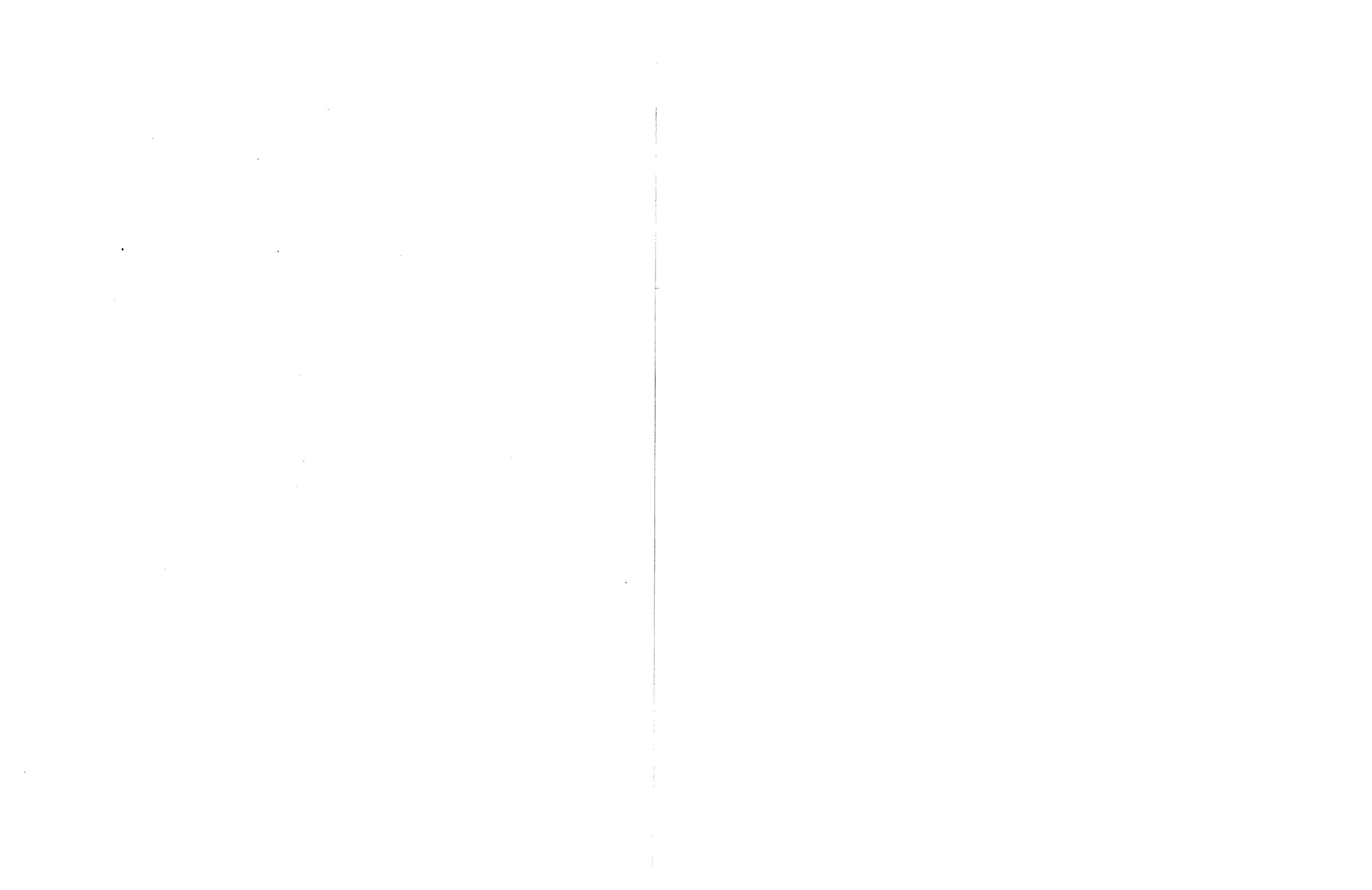
Guidelines and recommendations for an integrated aquatic plant management program for Lake Spokane are outlined below. This program identifies initial action control strategies that could be implemented along with regular review of implemented measures for evaluation of effectiveness. A lead agency to implement this program will need to be identified. It can be any organization that made-up the steering committee with interlocal agreements between agencies or it can be a new body such as a Lake Management District. For example, Stevens County Conservation District was the lead agency to produce this plan, and may continue as the lead agency for the implementation program.

It should be acknowledged that the benefits of any control alternative or combination of alternatives are unlikely to be realized without some adverse impacts. No alternative is 100% effective, species specific, environmentally safe, and at the same time cost-effective. Selecting nuisance plant treatment strategies involves weighing each factor and finding a balance between acceptable ecological and economical benefits and drawbacks.

A no-action alternative is not considered acceptable for the nuisance plant condition in Lake Spokane. It fails to meet project goals and, due to continued expansion of non-native plant communities in the lake and beyond, would likely lead to further decline in lake environmental conditions. This expansion of nuisance plant species will lead to reduced habitat value and increased degradation of recreational opportunities.

### Management Strategies

There are five management strategies for consideration: no action, drawdown with physical controls, drawdown with chemical controls, drawdown with biological controls and drawdown with physical, chemical and biological controls. Except for no action, these strategies are summarized in Table 3. All but the no action strategy will include a degree of monitoring to define the effectiveness of a given course of action. The monitoring plan is outlined in the Action Plan section following this section.



**Table 3: Management Strategies for Lake Spokane**

Strategy	Treatment Element	Cost		
		1 <sup>st</sup> year	2 <sup>nd</sup> year	
Drawdown w/physical	Drawdown	\$0	\$0	
	Bottom Barriers	\$31,600	\$0	
	Hand-Digging	\$0	\$0	
	Monitoring	\$7,000	\$7,000	
	Permitting & Administration	\$3,125	\$825	
	Contingency	\$9,500	\$0	
	Public Education	\$1,250	\$1,250	
<b>Strategy Totals</b>		<b>\$52,475</b>	<b>\$9,075</b>	
		<b>\$61,550</b>		
Drawdown w/chemical	Drawdown	\$0	\$0	
	Chemical Treatment of Yellow Floating Heart	\$7,600	\$0	
	Monitoring	\$4,000	\$4,000	
	Permitting & Administration	\$1,325	\$525	
	Contingency	\$2,300	\$0	
	Public Education	\$1,250	\$1,250	
	<b>Strategy Totals</b>		<b>\$16,475</b>	<b>\$5,775</b>
		<b>\$22,250</b>		
Drawdown w/biological	Drawdown	\$0	\$0	
	Biological control of Purple Loosestrife	\$5,000	\$5,000	
	Monitoring	\$2,000	\$2,000	
	Permitting & Administration	\$825	\$825	
	Contingency	\$1,500	\$0	
	Public Education	\$1,250	\$1,250	
<b>Strategy Totals</b>		<b>\$10,575</b>	<b>\$9,075</b>	
		<b>\$19,650</b>		
Drawdown w/physical, chemical and biological	Drawdown	\$0	\$0	
	Bottom Barriers	\$31,600	\$0	
	Hand-Digging	\$0	\$0	
	Chemical Treatment of Yellow Floating Heart	\$7,600	\$0	
	Biological Control of Purple Loosestrife	\$5,000	\$5,000	
	Monitoring	\$11,000	\$11,000	
	Permitting & Administration	\$4,325	\$1,725	
	Contingency	\$13,260	\$1,500	
	Public Education	\$1,250	\$1,250	
	<b>Strategy Totals</b>		<b>\$74,035</b>	<b>\$20,475</b>
			<b>\$94,510</b>	

\*Normal operating cost by Avista Utilities. Note strategy implementation may slip a year or two depending on climatic and operational conditions allowing drawdown.

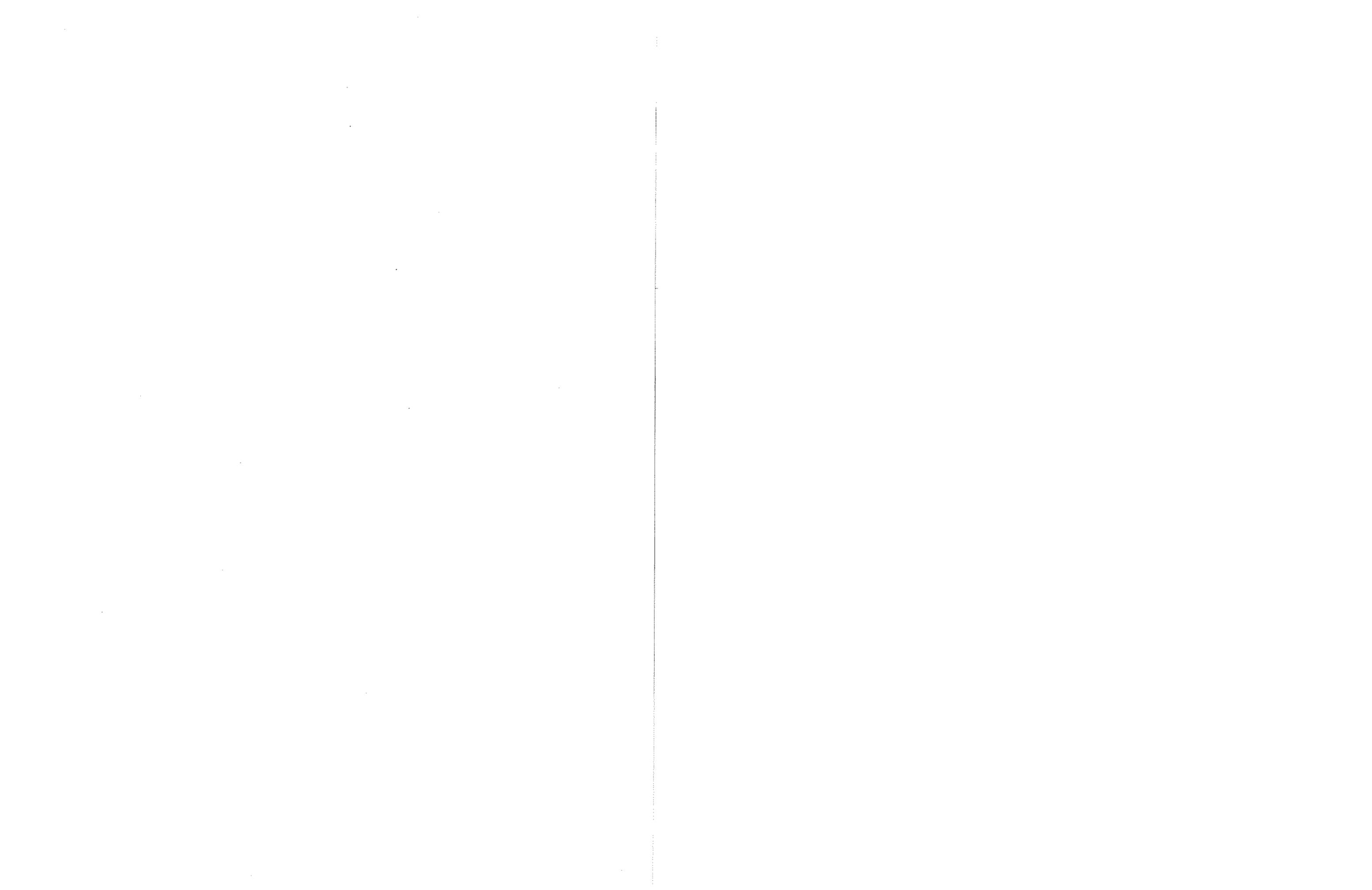


*No Action:* No action means no direct action will be taken as a result of implementation of this IAPMP. It does not imply that the operational drawdowns conducted by Avista Utilities or the purple loosestrife control efforts by the Stevens and Spokane County Noxious Weed Boards will be impacted. The no action strategy does not meet the goal of this IAPMP and is not developed further.

*Drawdown with physical controls:* Lake Spokane is the reservoir for Avista Utilities' Long Lake Hydroelectric Facility that was built in 1915 to generate electric power. Normal operation of the facility has included periodic drawdowns to different depths and for different lengths of time depending on energy demand, weather, and operating conditions. Avista makes every effort to balance the demand for power generation with the other interests of the community (e.g., summer recreation opportunities, concerns related to nearby wells, etc.). Therefore, normal operational drawdown by itself may provide some control. During periods when water level drawdowns of 8 feet or more occur through the normal operation of the hydroelectric facility, Avista Utilities will notify the appropriate county weed control boards in order to allow for the implementation of other possible aquatic plant control measures dependent on drawdown conditions.

During a suitable drawdown, bottom barriers would be placed in six locations as indicated in Figure 17.1-17.3. At the DNR Campground site, bottom barriers will be placed in two different locations along the shoreline to control submerged aquatic plants. Approximate dimensions of each bottom barrier location are 120ft x 330ft and 105ft x 130ft. Bottom barriers will be placed along the shoreline near the Willow Bay Resort as well. At this location, bottom barriers will cover an area of 120ft x 270ft. South of the Willow Bay Resort, three different areas have been chosen for bottom barrier treatment. The focus at each area is to provide a boat access channel and fishing channel through the yellow floating heart bed. These three areas have approximate dimensions of 80ft x 380 ft, 55ft x 920ft and 50ft x 700ft, respectively.

Bottom barriers placed on top of plant beds would provide effective control of Eurasian watermilfoil for selected sites (recreation use related, both public and private) in Lake Spokane. To treat an area of one acre with bottom barrier would require 200 sheets of burlap (105 inches by 25 feet each). Each burlap sheet would control 219 square feet. The sheets can be applied individually or in groups to control larger areas. Citizens, homeowners, and contractors can place the bottom barriers in the exposed plant beds (application depths below mean summer pool elevation would depend on extent of the drawdown). While spreading the burlap barrier down, sand bags (also made of burlap) can be placed on top of the barrier to keep it in place. The cost of bottom barriers (burlap) would be approximately \$22.50 (including shipping) per sheet, bags would cost \$0.50 per bag at 2000 bags per acre and sand or peagravel would be \$20.00 per cubic yard at 10 cubic yards. The per acre cost for bottom barriers would be \$5,700 for materials including sand and shipping costs. Labor for application is estimated at \$2,200 per acre.



The required permit for bottom barriers is an HPA from Washington Department of Fish and Wildlife. The ecological impact of bottom barriers is minimal, and limited to a very slight reduction in the overall spawning area in Lake Spokane. During drawdown, application of bottom barriers in high use areas and by individuals around their private docks could be implemented. Hand-digging can be used in areas where isolated patches of Eurasian watermilfoil grow, or where underwater obstructions prevent the use of bottom barriers.

*Drawdown with chemical controls:* Normal operational drawdown will not affect proposed chemical control of yellow floating heart in Lake Spokane because application will occur in the late spring or early summer. Near the Nine Mile Resort, a management demonstration area of 69 acres will be used to control the massive yellow floating heart plant bed that limits recreational activity in that area. Applying glyphosate to the leaf surfaces may control yellow floating heart in this high use area. Glyphosate will be applied to the management area at the recommended dosage of 2.5 quarts/gallon at \$55 per acre (personal communication, Dan Simmons). For planning purposes, the cost of glyphosate is assumed to be \$110 per acre to cover miscellaneous plant disposal costs. After the application, the plants will either decay or float on the water surface, it is unsure as to which will happen in Lake Spokane. If the plants float on the water surface actions may need to be taken to retrieve and remove the rhizomes from the lake. Plant and rhizome removal may require an HPA from the Department of Fish and Wildlife. The use of this herbicide may give up to two years of control depending on seed bank and then may have to be repeated.

*Drawdown with biological controls:* A management strategy for the control of purple loosestrife should be closely coordinated with the Stevens and Spokane County Noxious Weed Boards. The recommended control procedure is to continue and reinforce the Board's use of biological controls through the encouragement of Galerucella beetles, physical controls through hand pulling of plants and cutting and bagging of spikes (seed heads). The cost of importing (purchasing or collecting) and distributing the Galerucella beetles for the IAPMP activities is \$5,000 for labor or agent.

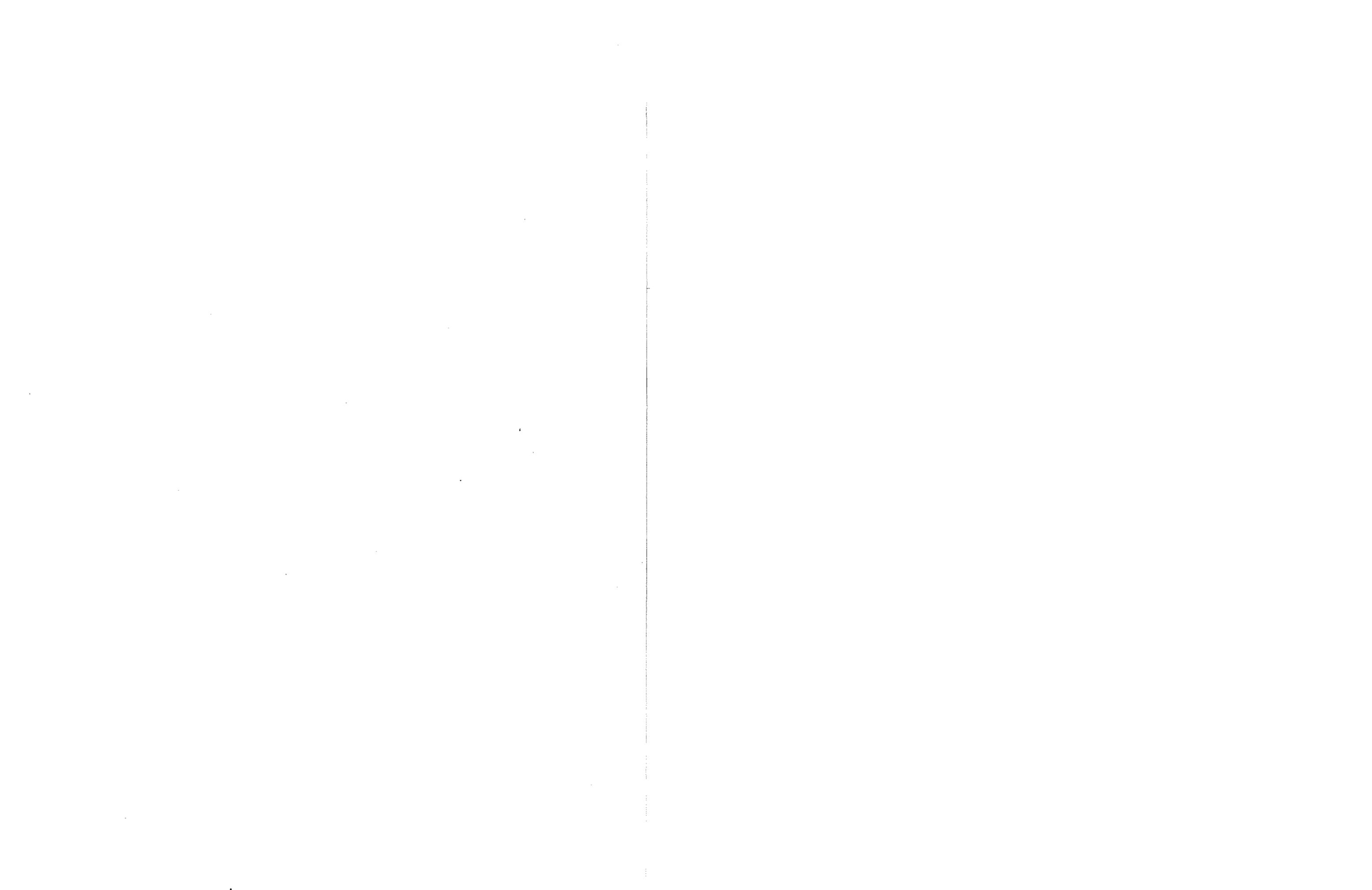
*Drawdown with physical, chemical and biological controls:* Physical, chemical and biological control methods can be combined with drawdown to successfully control non-native aquatic plant species in Lake Spokane. During normal operational drawdown bottom barriers will be placed on top of plant beds (as described in physical controls) to control submerged plants as well as some yellow floating heart. Normal drawdown may also contribute to the control of non-native aquatic plants. During late spring or early summer, Glyphosate will be applied to the leaf surfaces of designated Yellow floating heart plant beds to control the growth of the beds in high-use recreational zones. Biological control agents can be used to control purple loosestrife plants along the shoreline. The details of the Avista, Stevens and Spokane County Noxious Weed Boards' program can be found in Appendix D. Individual landowners can control yellow iris by hand removal. However no substantial control effort or action on public lands is recommended at this time. Implementing all three control strategies with normal

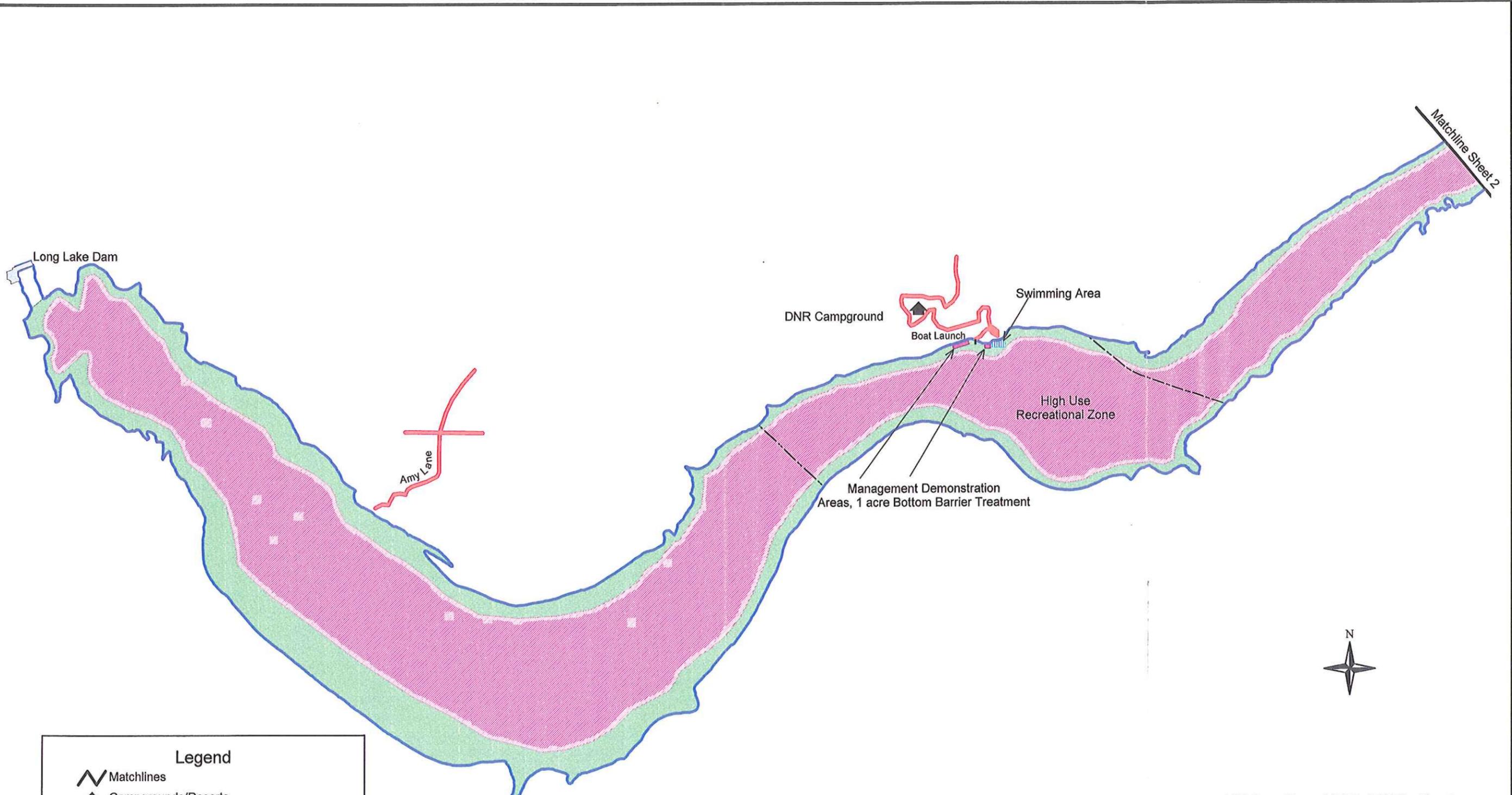


operational drawdown will result in an efficient way to control the non-native aquatic species that inhabit Lake Spokane.

*Management Demonstration Areas:* Lake Spokane supports a variety of beneficial uses including recreational uses (boating, fishing, swimming and water sports) and fish and wildlife habitat. The establishment of non-native, invasive plant species adversely impacts these beneficial uses. In order to maintain or restore beneficial uses to Lake Spokane, different levels of control intensity should be implemented depending on location. A large portion of the shoreline located in the lower part of the reservoir is undeveloped and consists of undisturbed habitat. These areas can be managed by leaving them in their current state and implementing a "no control" strategy.

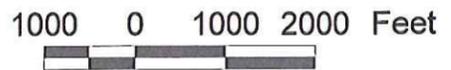
Figures 17.1 through 17.3 outline the beneficial uses of Lake Spokane and seven management demonstration areas, where two different control techniques will be implemented. In the middle portion of the reservoir, where high-use recreational zones are located, bottom barriers will be placed to control the expansion and establishment of problem aquatic plants. At the DNR Campground site, one acre of bottom barriers will be laid in two management demonstration areas. The application of these barriers will improve shoreline recreational activities, such as swimming, and improve boating access. With the application of these barriers, the chance of boats leaving the lake carrying plant fragments will decline. Bottom barriers will also be placed in a three-quarter acre management demonstration area near Willow Bay Resort. This control technique will improve swimming, boat access and other shoreline activities. South of Willow Bay Resort, near Felton Road, three management demonstration areas totaling two and one-quarter acres, will be used to create boat and fishing lanes for the residents along the shoreline. The application of bottom barriers in this location will help control the growth of yellow floating heart and restore recreational uses to the area. The seventh management demonstration area will be near the Nine Mile Resort in the upper portion of the reservoir. Yellow floating heart growth in this region has adversely impacted the resort's recreational activities, including water skiing, boating, fishing and swimming. In the 69-acre management demonstration area, a herbicide will be applied to control yellow floating heart in this location. The control of yellow floating heart will restore the recreational uses, as well as the aesthetic uses, around the resort.





**Legend**

- Matchlines
- Campgrounds/Resorts
- Boat Launch
- Roads
- Lake Shoreline
- High Use Recreational Zone
- Management Demonstration Areas
- No Use
- Swimming Areas
- Boating, Water Skiing Areas
- Fishing Areas



Lake Spokane Use Map with  
 Management Demonstration Areas  
 Spokane, Washington  
 July 2000

FIGURE 17.1  
 Stevens County  
 Conservation District








**Legend**

- Matchlines
- Campgrounds/Resorts
- Boat Launch
- Roads
- Lake Shoreline
- High Use Recreational Zone
- Management Demonstration Areas
- No Use
- Swimming Areas
- Boating, Water Skiing Areas
- Fishing Areas

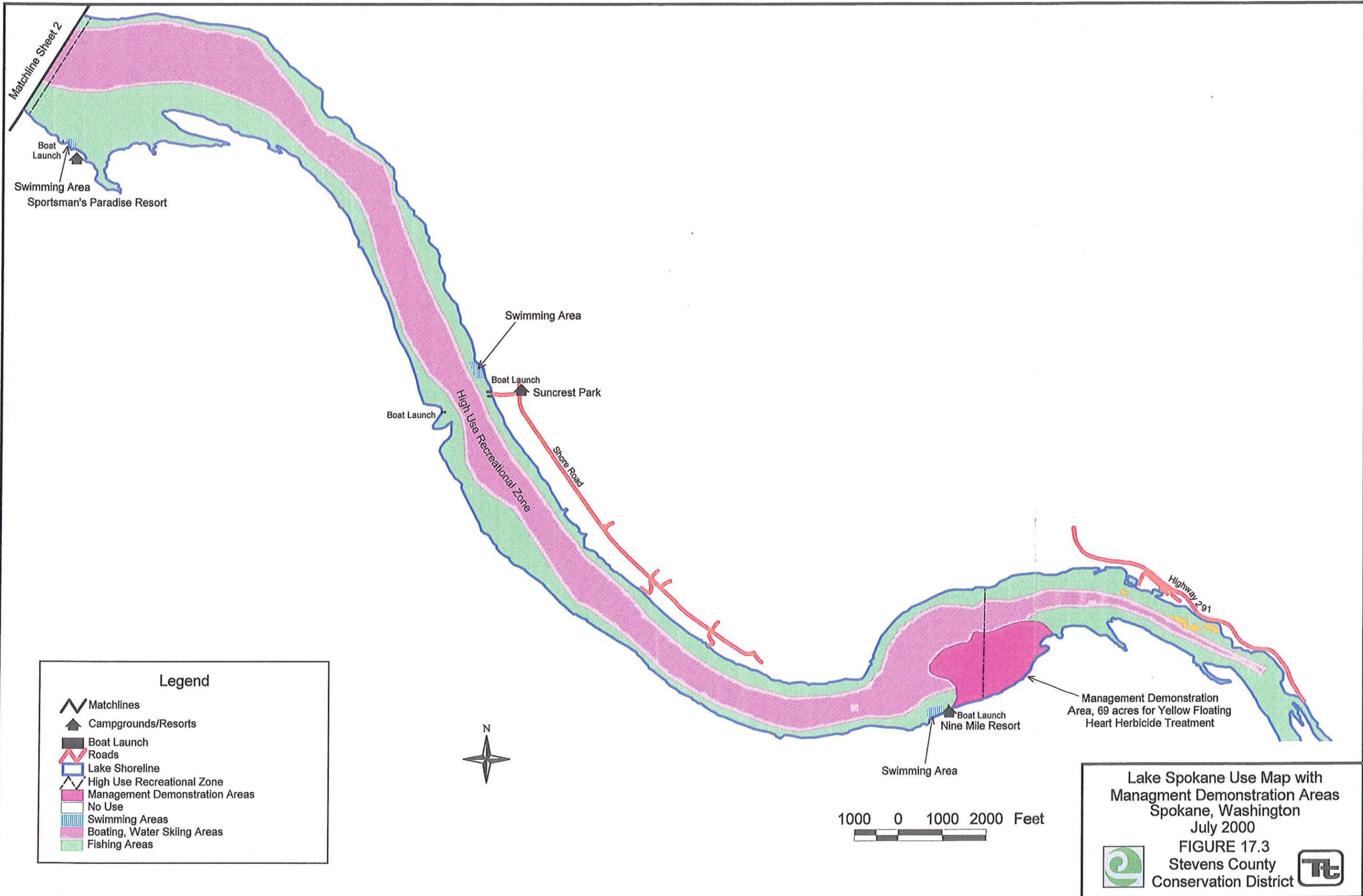


Lake Spokane Use Map with  
Management Demonstration Areas  
Spokane, Washington  
July 2000

**FIGURE 17.2**  
Stevens County  
Conservation District







## Action Plan

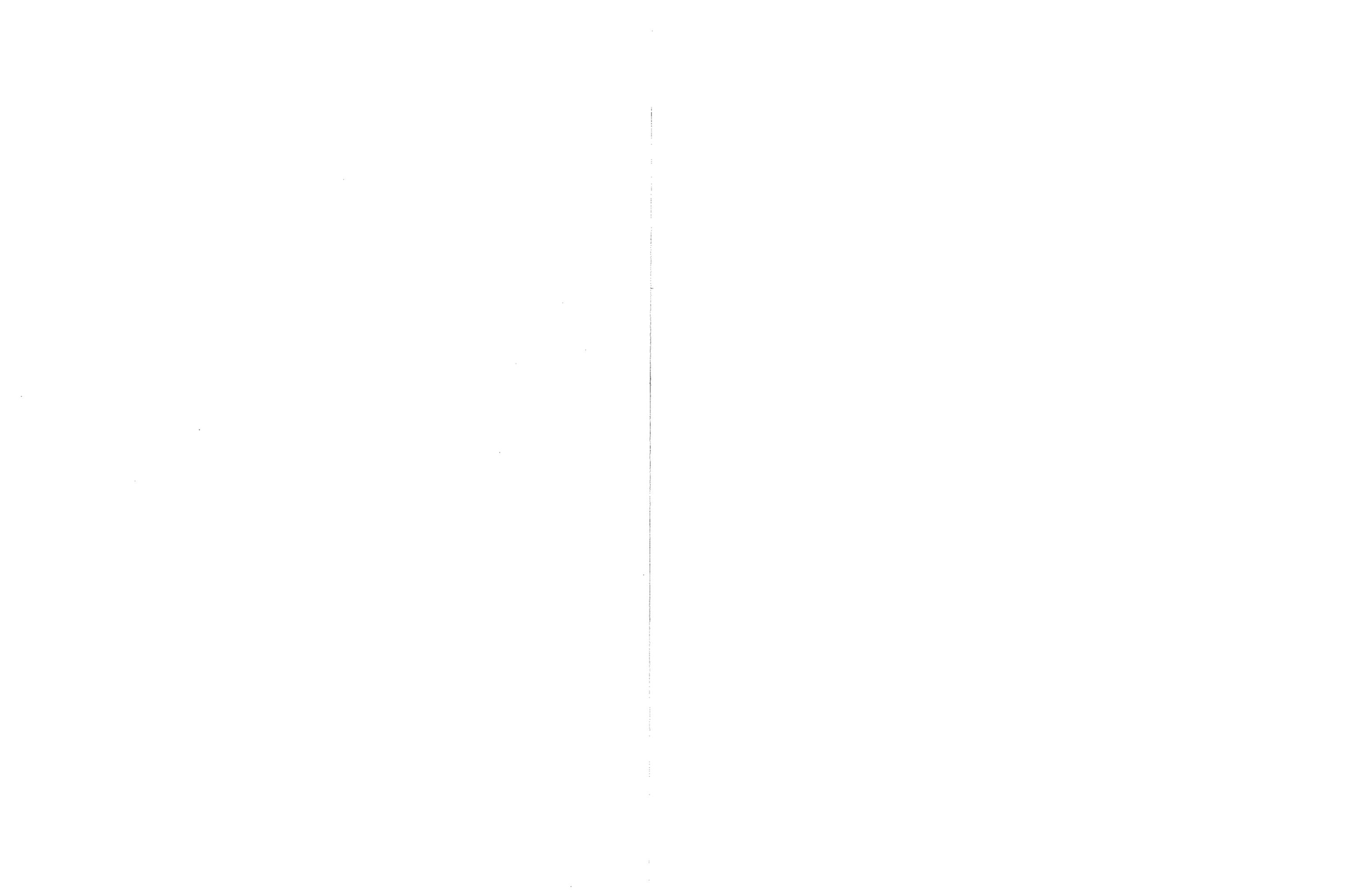
The IAPMP action plan cost and schedule are in Table 4. Stevens County Conservation District with its co-sponsoring agencies may be applying for an IAPMP implementation grant from the Washington Department of Ecology's aquatic plant management program based on the IAPMP. The grant application could include a two-year program that includes:

- Control and site specific control of EWM through the placement of bottom barriers at selected recreational access areas, both public and private. Total bottom barrier coverage of 4 acres at six sites is proposed. The cost of bottom barriers for 4 acres of coverage is estimated at approximately \$32,000 for this element of the management program.
- Control of yellow floating heart in a selected high use access area by application of glyphosate at an estimated cost of \$7,600 per year for the treatment of 69 acres near Nine Mile Resort.
- As a management option for yellow floating heart and eurasian watermilfoil in Lake Spokane, the normal, periodic winter drawdown combined with the placement of bottom barriers or chemical treatments at high use recreation sites appears to offer an effective way to achieve management goals. The control effectiveness of the combined treatments may last 3 to 4 years. Typically, normal operational drawdown to 6 feet or more will occur sometime during a 2-3 year period, which allows for effective combined treatments. When a normal operational drawdown of 6 feet or more occurs, the appropriate aquatic plant management group could implement additional accepted aquatic plant control measures. During years when drawdown of less than 6 feet occur, other control methods not requiring low water levels could be applied.
- Coordinate with and assist the Stevens and Spokane County Noxious Weed Boards in the biological control program for purple loosestrife. The cost for this element will be \$12,000 over two years.
- A public education program to inform the local residents of activities ongoing under the IAPMP, locate volunteers to assist with various control activities, and educate landowners on what activities they can do themselves. In addition, the public awareness program can explore the feasibility and future structure of a long-term management entity, such as a lake management district or as part of another existing agency like the conservation district. The public education program will cost approximately \$2,500.
- A monitoring program to gather data on the relative effectiveness of the management activities implemented. The treatment areas will be observed for relative plant density before management activity in July and the following July after treatment to determine the effectiveness of the treatment activity relative to the plant densities observed in untreated areas. In addition, divers will determine the upstream extent of the Eurasian watermilfoil coverage. The cost of the monitoring would be approximately \$11,000 annually. Documentation of the program activities and results will be prepared in a technical memo to the committee, prepared annually.



**Table 4. IAPMP Action Plan Schedule and Cost Summary**

Strategy	Treatment Element	Cost	
		1 <sup>st</sup> year	2 <sup>nd</sup> year
Drawdown w/physical, chemical and biological	Drawdown	\$0	\$0
	Bottom Barriers	\$31,600	\$0
	Hand-Digging	\$0	\$0
	Chemical Treatment of Yellow Floating Heart	\$7,600	\$0
	Biological Control of Purple Loosestrife	\$5,000	\$5,000
	Monitoring	\$11,000	\$11,000
	Permitting & Administration	\$4,325	\$1,725
	Contingency	\$13,260	\$1,500
	Public Education	\$1,250	\$1,250
	<b>STRATEGY TOTALS</b>		<b>\$74,035</b>
			<b>\$94,510</b>



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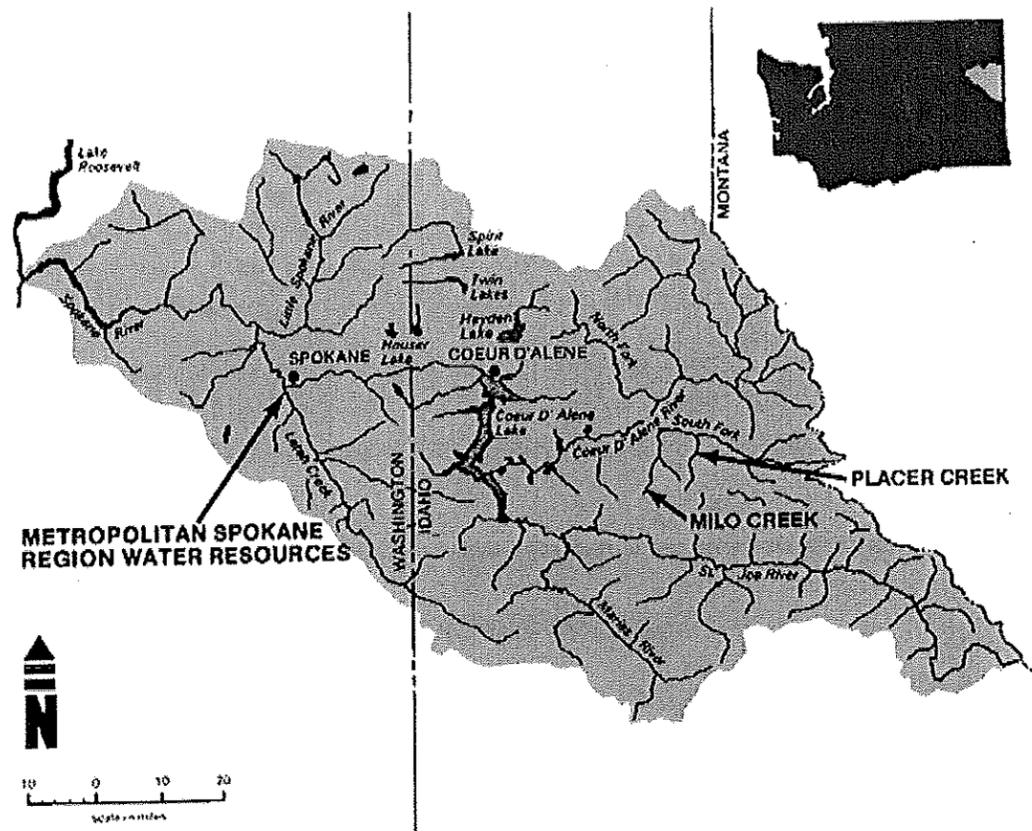
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**APPENDIX A**  
**Spokane River Basin Map**



### SPOKANE RIVER BASIN



The Spokane River Basin covers 6,640 square miles in northern Idaho and northeastern Washington. Principal tributaries are the St. Joe and Coeur d'Alene Rivers, which flow into Coeur d'Alene Lake. The Spokane River, the lake's outlet, flows westerly for 100 miles and empties into Franklin D. Roosevelt Lake behind Grand Coulee Dam. Above Coeur d'Alene Lake, the basin is mountainous and heavily forested. Below the lake, the Spokane River flows through a deep valley along the edge of a rolling plateau with little forest cover. The major portion of the flood plain is agricultural land.



**APPENDIX B**  
**Spokane River Watershed Aquatic and Wetland Species**

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## Spokane River Watershed Aquatic and Wetland Species

### Insects

Juniper hairstreak, *Mitoura grynea barryi*  
 Columbia River tiger beetle, *Cicindela columbica*

### Invertebrates

California floater, *Anodonta californiensis*  
 Giant Columbia River limpet, *Fisherola nuttalli*  
 Great Columbia River spire snail, *Fluminicola columbiana*  
 Shepard's Parnassian, *Parnassius clodius shepardii*  
 Silver-bordered fritillary, *Boloria selene atrocotalis*

### Fish

White sturgeon, *Acipenser transmontanus*  
 Lake chub, *Couesius plumbeus*  
 Leopard dace, *Rhinichthys falcatus*  
 Umatilla dace, *Rhinichthys Umatilla*  
 Mountain sucker, *Catostomus platyrhynchus*  
 Channel catfish, *Ictalurus punctatus*  
 Bull trout/Dolly Varden, *Salvelinus confluentis/S. malma*  
 Chinook salmon, *Oncorhynchus tshawytscha*  
 Kokanee, *Oncorhynchus nerka*  
 Pygmy whitefish, *Prosopium coulteri*  
 Rainbow trout/Steelhead, *Oncorhynchus mykiss*  
 Sockeye salmon, *Oncorhynchus nerka*  
 Westslope cutthroat, *Oncorhynchus clarki lewisi*  
 Margined sculpin, *Cottus marginatus*  
 Largemouth bass, *Micropterus salmoides*  
 Smallmouth bass, *Micropterus dolomieu*  
 Walleye, *Stizostedion vitreum*

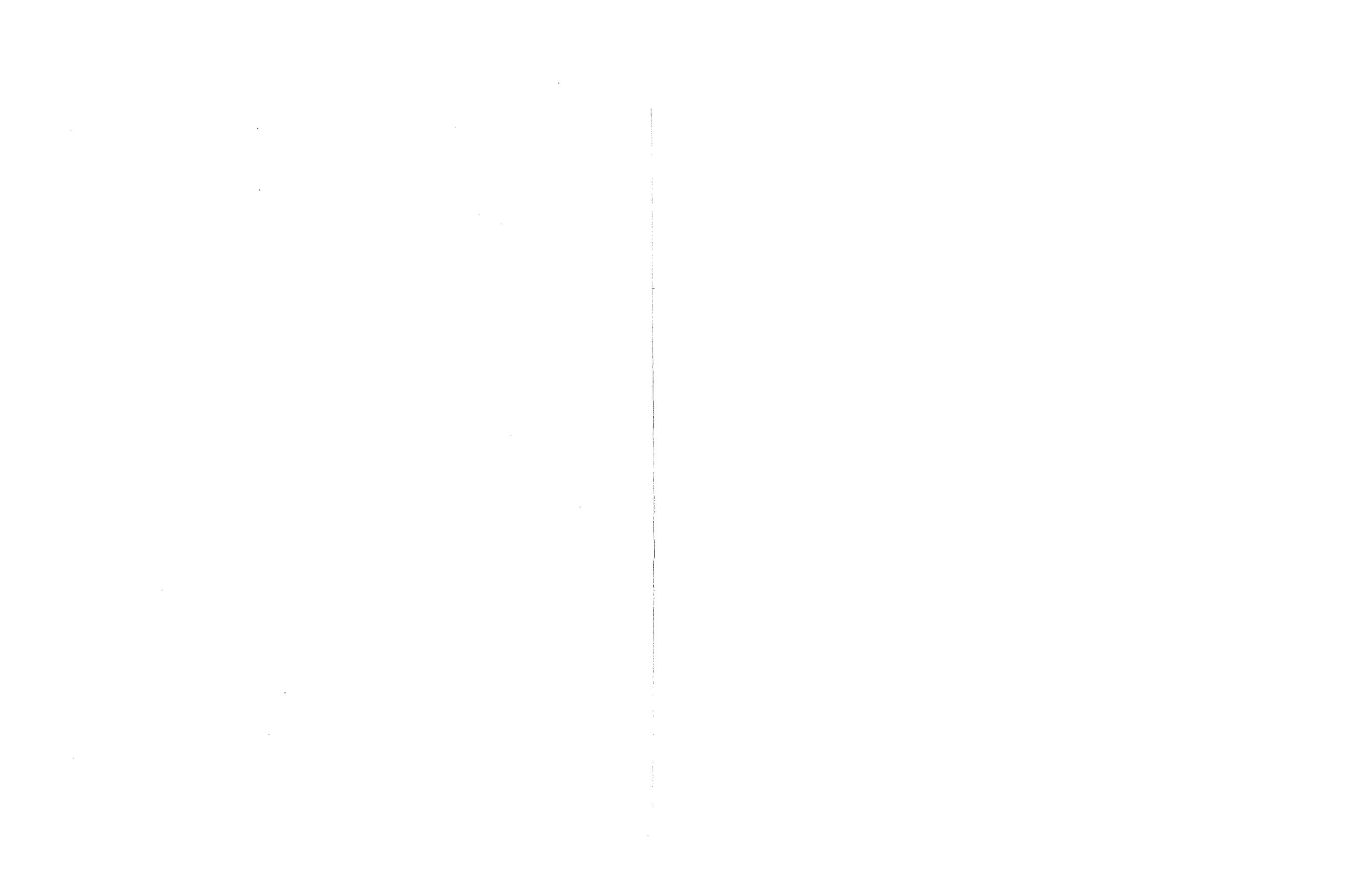
### Amphibians

Columbia spotted frog, *Rana pretiosa* (spp. B)  
 Northern leopard frog, *Rana pipiens*  
 Western toad, *Bufo boreas* (spp. A)

### Birds

Common loon, <i>Gavia immer</i>	
American white pelican, <i>Pelecanus erythrorhynchos</i>	
Grebes (Podicipedidae)	Breeding areas
Cormorants (Phalacrocoracidae)	Breeding areas
Terns (Laridae)	Breeding areas
Black-crowned night heron, <i>Nycticorax nycticorax</i>	Breeding areas
Great blue heron, <i>Ardea herodias</i>	Breeding areas

Wood duck, *Aix sponsa* Game Breeding areas  
 Barrow's goldeneye, *Bucephala islandica* Game Breeding areas  
 Common goldeneye, *Bucephala clangula* Game Breeding areas  
 Bufflehead, *Bucephala albeola* Game Breeding areas  
 Hooded merganser, *Lophodytes cucullatus* Game Breeding areas  
 Harlequin duck, *Histrionicus histrionicus*, Game Breeding areas, regular and regular



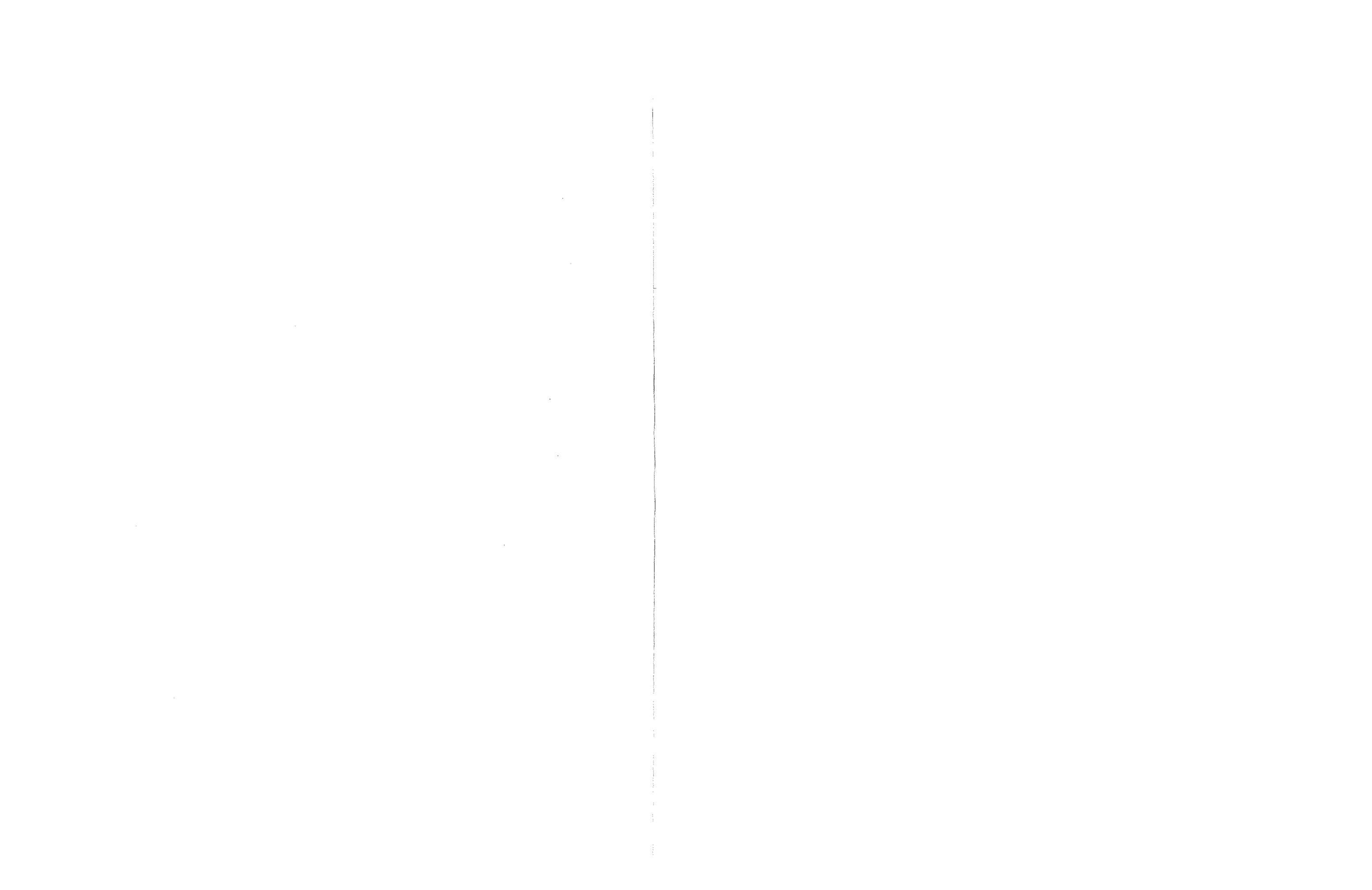
large concentrations in saltwater  
Snow goose, *Chen caerulescens*, Game Regular large concentrations  
Trumpeter swan, *Cygnus buccinator* Game Regular and regular large concentrations  
Tundra swan, *Cygnus columbianus* Game Regular and regular large concentrations  
Waterfowl concentrations Game  
Significant breeding areas and regular large concentrations in winter  
(Anatidae excluding Canada geese in urban areas)  
Bald eagle, *Haliaeetus leucocephalus* Breeding areas, communal roosts, regular and  
regular large concentrations, regularly-used perch trees in breeding areas  
Ferruginous hawk, *Buteo regalis*, Breeding areas, including alternate nest sites. If  
breeding area is not known, approximate with a 7.0 km<sup>2</sup> (4.35 mi<sup>2</sup>) area around  
known nest sites, foraging areas  
Golden eagle, *Aquila chrysaetos*, Breeding and foraging areas  
Merlin, *Falco columbarius*, Breeding sites  
Northern goshawk, *Accipiter gentiles*, Breeding areas, including alternate nest sites, post-  
fledging foraging areas  
Peregrine falcon, *Falco peregrinus*, Breeding areas, regular occurrences, hack sites  
Prairie falcon, *Falco mexicanus*, Breeding areas  
Sandhill crane, *Grus canadensis*, Breeding areas, regular large concentrations, migration  
staging areas  
Upland sandpiper, *Bartramia longicauda*, Any occurrence  
Phalaropes (Phalaropodidae) Eastern Washington breeding occurrences Breeding areas  
Stilts and avocets (Recurvirostridae) Eastern Washington breeding occurrences Breeding  
areas



## **APPENDIX C**

### **Public Involvement**

- Schedule of Meetings and Workshops
  - Related Newspaper Articles and Announcements
  - Fact Sheets
-



**Public Involvement Schedule**

<b>Date</b>	<b>Meeting</b>
April 26, 2000	Executive Meeting LSPA
June 1, 2000	Lake Spokane Milfoil Steering Committee
June 1, 2000	Public Meeting
August 31, 2000	Lake Spokane Milfoil Steering Committee
September 13, 2000	Public Meeting at Nine Mile Falls School
October 18, 2000	Educational Workshop on Aquatic Weeds
January 8, 2001	Lake Spokane Milfoil Steering Committee
February 12, 2001	Lake Spokane Milfoil Steering Committee



## Long Lake Watermilfoil Grant

Stevens County Conservation District, as lead agency, received a grant from the Washington Dept. of Ecology for Managing Watermilfoil in Long Lake (*Lake Spokane*) in January. Eurasian watermilfoil, a noxious aquatic weed, was discovered for the first time in Long Lake in 1999, and is a concern for lake residents and the Avista Corporation. This grant will provide money for Phase 1 during year 2000 to survey the extent of the infestation of the watermilfoil and plan for its control.

Eurasian watermilfoil (*Myriophyllum spicatum*) is aggressive and has the potential to spread rapidly in the lake. It is believed that more than three acres is infested with this invasive, non-native aquatic weed.

Watermilfoil diminishes the lake in its ability to provide good habitat for fish, waterfowl, and other wildlife. Infestation of this weed can alter pH of the water, decrease oxygen levels, and increase water temperature. It poses threats to swimming, boating, fishing and water skiing.

Long Lake is a 23-mile long reservoir created by Long Lake Dam, which is owned and operated by the Avista Corporation. The lake has a surface area of over 5,025 acres. Uncontrolled, Eurasian watermilfoil threatens 53 miles of shoreline and may impact power generation as well as recreation. Movement of boats from Long Lake to other nearby lakes without infestations creates another huge concern.

Through the Aquatic Weed Management Fund grant, a long-term plan to manage and control watermilfoil will be developed by citizens and landowners who have an interest in the lake. The planning process will be facilitated by Lake Spokane Protection Association, Wash. State Departments of Fish and Wildlife and Natural Resources, Stevens County and Spokane County Noxious Weed Control Boards, Spokane Tribe of Indians, and Avista Corporation. A signed contract is in place and an initial meeting is planned for 4pm, Feb. 29 - Lakeside Library, to establish members of the Watershed Management Committee. A steering committee will be selected from interested parties to develop and award a contract for the survey of Eurasian watermilfoil to develop a strategy to control this invasive, noxious weed. Info? call Bob McBlair - 509-685-0937 x 113

# Vote 1

Spokane

Spokane

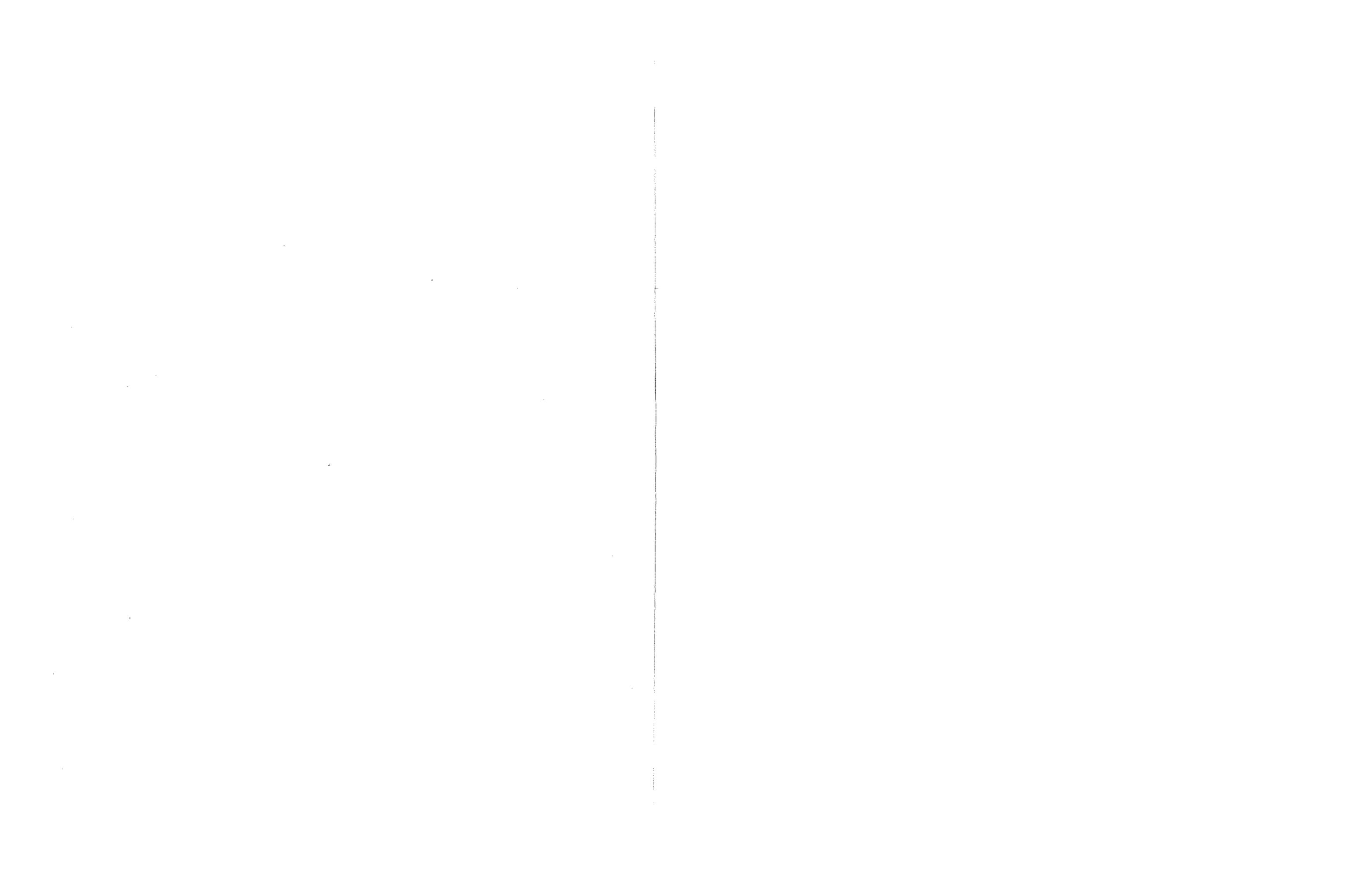
Spokane

Spokane

Bulk US Postage Permit # 8  
Carrier Route: 5978 Hwy 291  
Nine Mile Falls, WA 99026  
Postal Patron, Local  
February 25, 2000

A Community Needs Communication to Develop Community!  
Committed to Quality Education, Quality Community, Quality Government  
An Educated Child is Our Country's Greatest Treasure

Jean Payne - Editor  
Family First  
(509) 466-3320  
Suncrest Outpost #3  
Volume 10- Issue 9



## SCCD is lead agency for Long Lake grant

Stevens County Conservation District, as lead agency, has received a grant from the Washington Department of Ecology for Managing Watermilfoil in Long Lake (Lake Spokane) in January.

Eurasian watermilfoil, a noxious aquatic weed, was discovered for the first time in Long Lake in 1999, and is a concern for lake residents and the Avista Corporation.

This grant will provide money for Phase I during year 2000 to survey the extent of the infestation of the watermilfoil and plan for its control, according to Bob McBlair of the Stevens County Conservation District.

"Eurasian watermilfoil (*Myriophyllum spicatum*) is aggressive and has the potential to spread rapidly in the lake," McBlair said. "It is believed that more than three acres is infested with this invasive, non-

native aquatic weed."

Watermilfoil diminishes the lake in its ability to provide good habitat for fish, waterfowl, and other wildlife, he added. Infestation of this weed can alter pH of the water, decrease oxygen levels, and increase water temperature. It poses threats to swimming, boating, fishing, and water skiing.

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"Uncontrolled Eurasian watermilfoil threatens 53 miles of shoreline and may impact power generation as well as recreation," McBlair said. "Movement of boats from Long Lake to other nearby lakes without infestation creates another huge concern."

"Through the Aquatic Weed Management Fund grant, a long-term plan to manage and control watermilfoil will be developed by citizens and landowners who have an interest in the lake," the district's Conservation Educator explained.

"The planning process will be facilitated by Stevens County Conservation District in conjunction with Stevens County Noxious Weed Control Board, Spokane County Noxious Weed Control Board, and Avista Corporation.

A signed contract is in place and an initial meeting is planned for 4 p.m., Feb. 22 at the Lakeside Library to establish members of the Watershed Management Committee. A steering committee will be selected from interested parties that will develop and award a contract for the survey of Eurasian watermilfoil.

"The planning process will begin to develop a strategy to control this invasive, noxious weed," he said.

For more information call McBlair, Conservation Educator, Stevens County Conservation District, at 685-0937 ext. 113.



## Stevens Co. Conservation Dist., lead agency for Long Lake Watermilfoil Grant

Stevens County Conservation District, as lead agency, received a grant from the Washington Department of Ecology for Managing Watermilfoil in Long Lake (Lake Spokane) in January. Eurasian watermilfoil, a noxious aquatic weed, was discovered for the first time in Long Lake in 1999, and is a concern for lake residents and the Avista Corporation. This grant will provide money for Phase 1 during year 2000 to survey the extent of the infestation of the watermilfoil and plan for its control.

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A signed contract is in place and an initial meeting is planned for 4:00 p.m., February 22 at the Lakeside Library, to establish members of the Watershed Management Committee. A steering committee will be selected from interested parties that will develop and award a contract for the survey of Eurasian watermilfoil. The planning process will begin to develop a strategy to control this invasive, noxious weed.

For more information call Bob McBlair, Conservation Educator, Stevens Conservation District, at 685-0937, extension 113.



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Watermilfoil diminishes the lake in its ability to provide good habitat for fish, waterfowl, and other wildlife, he added. Infestation of this weed can alter pH of the water, decrease oxygen levels, and increase water temperature.



March 8, 2000 Statesman-Examiner Colville, WA 27 98

**Request for Proposals**

Stevens County Conservation District (DISTRICT), 232 Williams Lake Road, Colville, Washington, 99114, will receive Proposals for the underwater and surface survey of Eurasia Watermilfoil in Long Lake and development of an Integrated Aquatic Plant Management Plan (IAPMP). Proposals must be received before 4:00 p.m. Friday, March 24, 2000. Proposals received after that time will not be considered. Request for Proposals may be obtained between 8:00 a.m. and 4:30 p.m. after March 6, 2000, at the above address or by telephoning (509)685-0937. The DISTRICT reserves the right to reject any and all proposals or to accept the proposal deemed best by the DISTRICT. By order of the Stevens County Conservation District, Tom McKern, Chairman.  
March 1, 8, 2000.



## Lake milfoil project award

Small infestations of Eurasian Watermilfoil, a noxious weed infesting the lakes of Northeast Washington, were discovered in Lake Spokane.

Milfoil is an extremely prolific reproducer that inhibits wildlife, recreation, and boating use of lakes.

"It is extremely dangerous to swimmers who can become entangled in it and drown," commented Bob McBlair of the Stevens County Conservation District. "Lake Spokane residents and landowners have the jump on this culprit and wish to keep this pesky plant under control."

With the discovery of the milfoil infestation, the Lake Spokane Protection Association contacted Stevens County Conservation District for assistance. The District received a Department of Ecology grant to survey and map watermilfoil and other aquatic weed infestations in Long Lake.

Methods for control of watermilfoil will be investigated and discussed in public meetings later this summer. Lake Spokane residents and landowners are encouraged to be part of a steering committee that will assist in gathering background information and in recommending control measures.

The Seattle office of Tetra Tech, Inc. has been awarded a contract by Stevens County Conservation District to conduct the survey, mapping, and plan development portions of the project.

The final product of the project will be an Integrated Aquatic Plant Management Plan to control the aquatic weeds without damaging the Lake Spokane ecosystem.

For more information on this project, contact Dr. Harry Gibbons, Tetra Tech, Inc. at 206-728-9655, or Bob McBlair, Stevens County Conservation District, 685-0937, ext. 113.



# Lake Spokane News Forum



Stevens County  
232 Williams Lake Road  
Colville, WA 99114

*An Educated Child Is Our Country's Greatest Treasure!~  
A Community Needs Communication to Develop Community!  
Committed to Quality Education, Quality Community, Quality Government  
Our Care For Others Is the Measure of Our Greatness*

Jean Payne, Editor/Publisher  
Family First  
(509) 466-3320  
Suncrest Outpost #3  
Volume 10 Issue 17

## Eurasian Water-Milfoil Survey Project

One June 15, 2000 the Lake Spokane Protection Association (LSPA) assisted Dr. Harry Gibbons of Tetratex in conducting his initial survey of the Eurasian Water-Milfoil in Lake Spokane. Ron and Steve Schollosser were kind enough to provide their boat for the hour survey. Tetratex is the contractor selected under the Department of Ecology grant bid process to conduct the aquatic weeds in Lake Spokane.

We were on the lake a little after 10:00 am; it was sunny, breezy, and a bright beautiful day (*As are normal on Lake Spokane!*). The survey was conducted by motoring slow, close inshore and stopping when an area of interest came up. The survey started at the dam and proceeded upstream examining both shorelines as far as Nine Mile Resort.

Milfoil was found floating in two areas. It was found just off the bulkhead at the DNR campground, and in an area approximately a mile upstream in the rocks. No rooted patches were found.

The survey served as an introduction to the Lake for Dr. Gibbons. He was able to orient himself to the Lake's physical features as well as the distributions of the aquatic plants. In addition to the millfoil we observed populations of Yellow Floating Heart (*known locally as "Dollar Plant"*), Pondweed, and the yellow iris. No purple loosestrife was observed on this survey.

The aquatic weed main survey will commence July 17, 2000. LSPA needs your help. We will need boats with drivers during this survey. Additionally, volunteers are needed to take water quality data this season. If you would like to help out, please call Rodger Hauge at 467-2499.

There will be another public meeting to discuss findings and recommendations. This will be held in September after the start of school. Please address written questions on aquatic weeds and millfoil management to: LSPA % Rodger Hauge, W. 13302 Shore Road  
\*\*\*\*\*



**Watermillfoil Meeting Announced**  
*September 13, Nine Mile Elementary*  
**Eurasian Watermillfoil Survey Project**  
**Lake Spokane Protection Association**

On July 17-20, 2000 the Lake Spokane Protection Association (LSPA) provided the boats drivers to implement the Lake Spokane watermillfoil survey conducted by Dr. Harry Gibbons of Tetra Teck, Inc. Tetra Teck is the Seattle based firm contracted to conduct the survey. The survey is paid by a grant from the Washington Department of Ecology. Avista donated \$5,000 towards the survey, and LSPA provides the in-kind help to provide local assistance and public education. The grant is coordinated by the Stevens County Conservation District.

The following people graciously contributed their time, boats, and gas to make this survey work: Dick Astelford, Bill Demaris, Vince Reagor, Pat Konecy, Warren Wheeler, Don Bond, Bob Powell, Tim Vore, Mary Sirchuck, Josh Olsen, Patty Barnard, and Mike Fowler. The survey took two boats each day; one to haul the divers about, and one to conduct the surface survey.

The divers were used to find the beds of millfoil and determine their extent and depths. Sharon Nobel of Tetra Teck did the surface survey. She was plotting such plants as yellow floating heart (dollar plant), purple loose-strife, and other invasive emergent aquatic plants.

The informal results available after the survey are a bit worse than anyone expected. Eurasian watermillfoil was found from Sportsman's Paradise down to the Long Lake Dam at depths of between 14 and 18 feet. Down near the dam the depth at which the millfoil was found got down to 22 feet due to the greater water clarity of the downstream part of the reservoir. Most plants encountered were about 4 years old. Some in the vicinity of Willow Bay were at least 10 years old.

A public meeting will be held on September 13, 2000 at 7:00 pm at the Nine Mile Elementary School to discuss options for handling this lake wide problem. We strongly urge you to attend.

Again, the community gives its thanks to the volunteers who gave their time and effort to make this survey a reality. If you have any questions or need additional information, please contact either Clem Crowston at 466-9581 or Rodger Hauge at 467-2499.

Jean Payne, Editor/Publisher  
 Family First  
 (509) 466-3320  
 Succrest Outpost #3  
 Volume 10 Issue 20

*An Educated Child Is Our Country's Greatest Treasure!*  
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 Our Care For Others Is the Measure of Our Greatness

Stevens County  
 232 Williams Lake Road  
 Colville, WA 99114

**Lake Spokane News Bulletin**

8/24/00





## Lake Spokane Protection Association Needs Support From Community

The Lake Spokane Protection Association is a "Watch Dog" group that keeps an eye on the water quality of the lake and what is going on around it.

It is really a reaction group in that it seems to have functioned best in the past when there seems to be a problem. They reacted when the City of Spokane dumped raw sewage into the lake a number of years ago. They reacted too to the use of phosphates in detergents that were causing algae to bloom in the lake. *(They were in the forefront of the phosphate ban that is in place today.)*

We now have a new problem in the lake and that is the infestation of the Eurasian Milfoil. This is an invasive aquatic weed that will eventually choke out other aquatic weeds and take over the lake. In so doing it will decrease the fish habitat and invade recreation and the swimming areas.

The LSPA and the Stevens County Conservation District received a grant to survey the lake to see the extent of Milfoil infestation. This was done and we find that it is entrenched in about 2/3 of the lower part of the lake. It covers about 235 acres and spreading.

The Association is having a meeting on October 18, 2000 at the Nine Mile Elementary School in Nine Mile to help people to identify the noxious weed that grow in the lake.

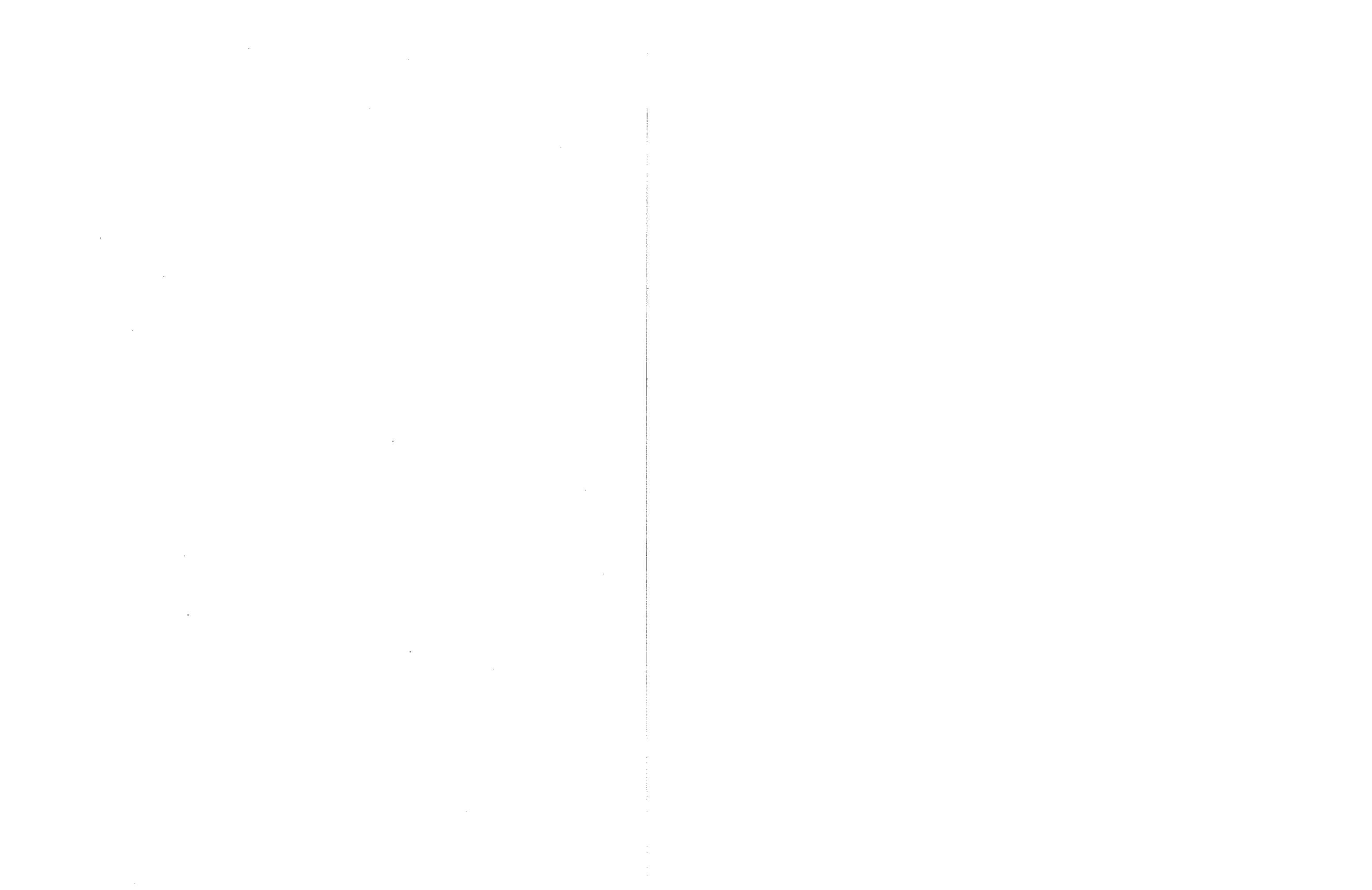
The speakers will for the evening will be Ms Sue Winterowd of the Stevens County Noxious Weed Board and Dr. Harry Gibbons of Tetra Tech Inc. They will discuss not only identification but how we can manage the weed problem in the lake. This will include treatment methods that individuals may use.

Part of the Grant that the Association entered into has an "In Kind Contribution where by we must work and do activities that lend themselves towards the education of the residents and/or direct work on the lake project. Attendance at the meeting on Oct. 18, '00 will assist in this "In Kind Contribution."

The Association is in need of new leadership. The same individuals have been working for many years to keep the Association going and keep on top of the problems that have come up. There is an urgent need for help and hands-on participation from the community in order for the LSPA to continue and monitor and protect the quality of the lake we all enjoy. We need members to take on the duties of operating the organization and keep it running smoothly into 2001. This is a satisfying and rewarding endeavor.

**We look forward to  
your participation.**

H.L. "Clem" Crowston  
Pres. LSPA



LAKE SPOKANE PROTECTION ASSOCIATION MEETING NOV. 20, 2000

**AGENDA**

1. LONG LAKE WATERMILFIOL PROJECT & INTEGRATED AQUATIC PLANT  
MANAGEMENT PLAN (IAPMP).  
Comments of Kathy Hamel - Water Quality Program- Dept of Ecology
2. BLANKET HYDROLICS PERMIT - STATUS OF  
Reply of Doug Robison - Wash. St. Dept of Fish and Wildlife  
Comment from Nancy Weller Dept. of Ecology
  - A. Identify areas for test plots.
3. WHAT IS THE WILL OF THE GROUP FOR LEADERSHIP ???  
Who , when, where.  
HOW DO WE GET THE WORD OUT OT THE COMMUNITY?



# Lake Spokane Integrated Aquatic Plant Management Plan

## Fact Sheet #1

Stevens County Conservation District  
509-685-0937  
[www.homepage.plix.com/sccd/](http://www.homepage.plix.com/sccd/)



### Project Overview

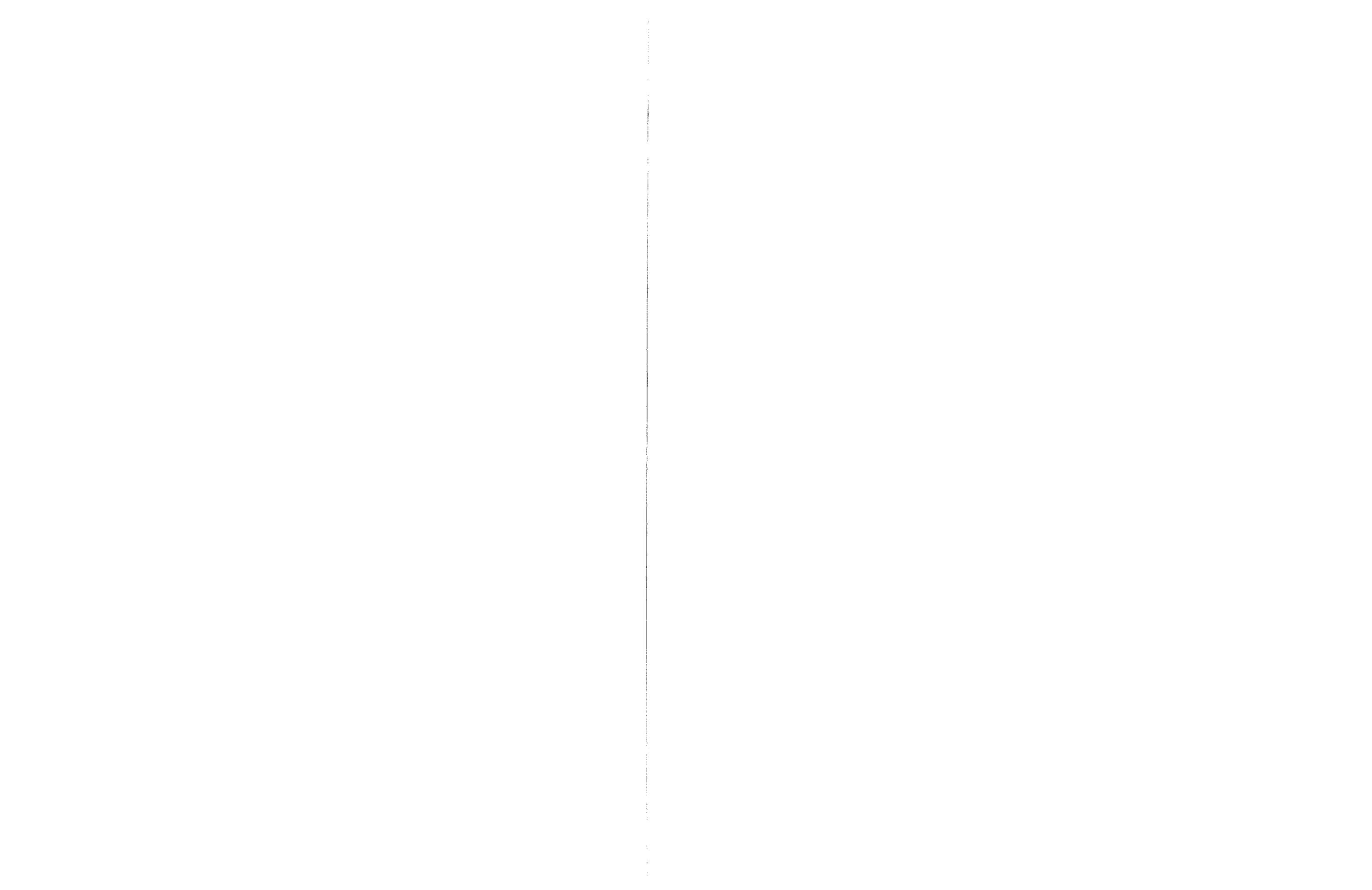
Lake Spokane, located in the northeastern part of Washington State, was created by and is the operating reservoir for Avista Utilities' Long Lake Hydroelectric Facility. Lake Spokane has both native and non-native invasive aquatic plants. Residents along the lake have lived with these aquatic plants for years and with the recent discovery of Eurasian watermilfoil, have become increasingly worried about the problems they may cause. Native "pondweeds" and other plants have surrounded private and public docks and boat launches and make travel along the shallow shoreline difficult. Swimming is also made difficult in some areas. The non-native, invasive species have also begun to take over the lower depths of the littoral region and parts of the shoreline. Residents and county officials are concerned that these plants will continue to expand and cause increased impairment to the beneficial uses of the lake.

The Lake Spokane Integrated Aquatic Plant Management Plan (IAPMP) provides guidance for the management and control of non-native, aquatic plants in Lake Spokane. The Stevens County Conservation District, with support of Avista Utilities, Lake Spokane Protection Association (LSPA), Stevens County Noxious Weed Board, Spokane County Noxious Weed Board, Willow

Bay Resort and Spokane Tribe, and with technical assistance from Tetra Tech, Inc., have developed the IAPMP. Principal funding for this plan comes from an aquatic plant management grant from the Washington Department of Ecology with local in-kind services provided by the above organizations.

When aquatic plants grow too densely, they can have adverse impacts on lakes. Plantbeds can affect recreational activity, such as boating and swimming. While native aquatic plants provide food and habitat for waterfowl and fish, under certain environmental conditions they can cause nuisance conditions, making it difficult to boat and swim without becoming entangled in plants. Those conditions occur when there are ample supplies of nutrients and light available for the plants to grow. Non-native, invasive plants cause significant problems in lakes around the world. Non-native, invasive plants typically provide little if any benefit for the ecosystem and have a tendency to out-compete the native, more beneficial plants. In most cases, non-native plants are introduced to a body of water by human action, often via boats and boat trailers transporting plant fragments to one water body from another.

Eurasian watermilfoil (EWM) is a non-native, invasive aquatic plant that has become established in Lake Spokane within the last decade. This invasion of



EWM has severely affected the ecology and the public use of the lake. EWM has displaced native plant communities in the littoral zone of the lower reservoir, thus decreasing its aquatic habitat value. The expanding nature of EWM causes additional concern that Lake Spokane could be the source from which EWM could spread to other lakes or water bodies in the surrounding area.

### Aquatic Plant Survey

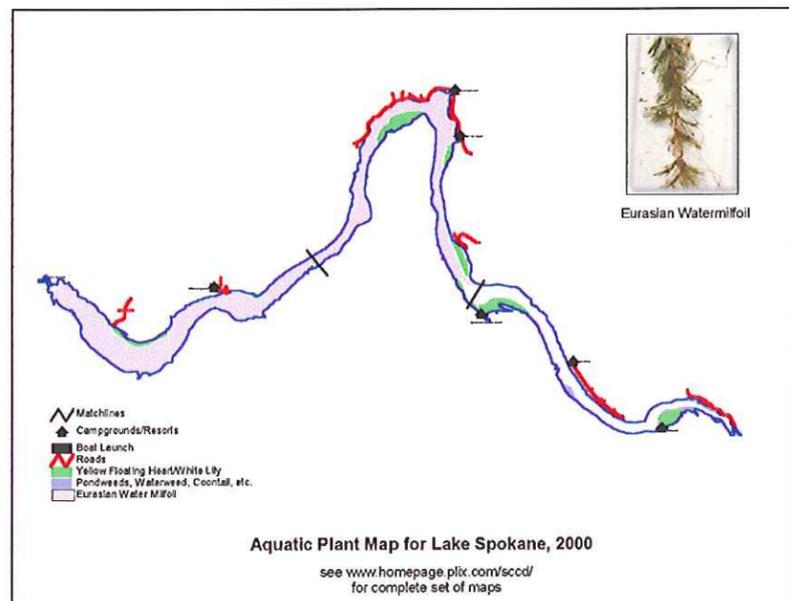
With the aid of Avista Utilities and several concerned citizens, and coordinated by LSPA, approximately 106 miles of shoreline and 23 miles of water were carefully scanned for non-native and native aquatic plant species. Boats were driven along the shoreline to help surveyors scout out Purple loosestrife, Yellow floating heart (dollar pads) and submerged weeds visible from the boat. Volunteer drivers included Dick Astleford, Bill Demaris, Vince Rieger, Pat Courtney, Dan Bond, Bob Powell, Tim Vore and Mary Sirchuk. Divers surveyed the deeper portions of

the lake's littoral region and identified those submerged plants not visible from the water surface, primarily Eurasian Water Milfoil. After the aquatic plant survey was complete, a total of 11 different plant species were accounted for, covering over 1000 acres of the lake.

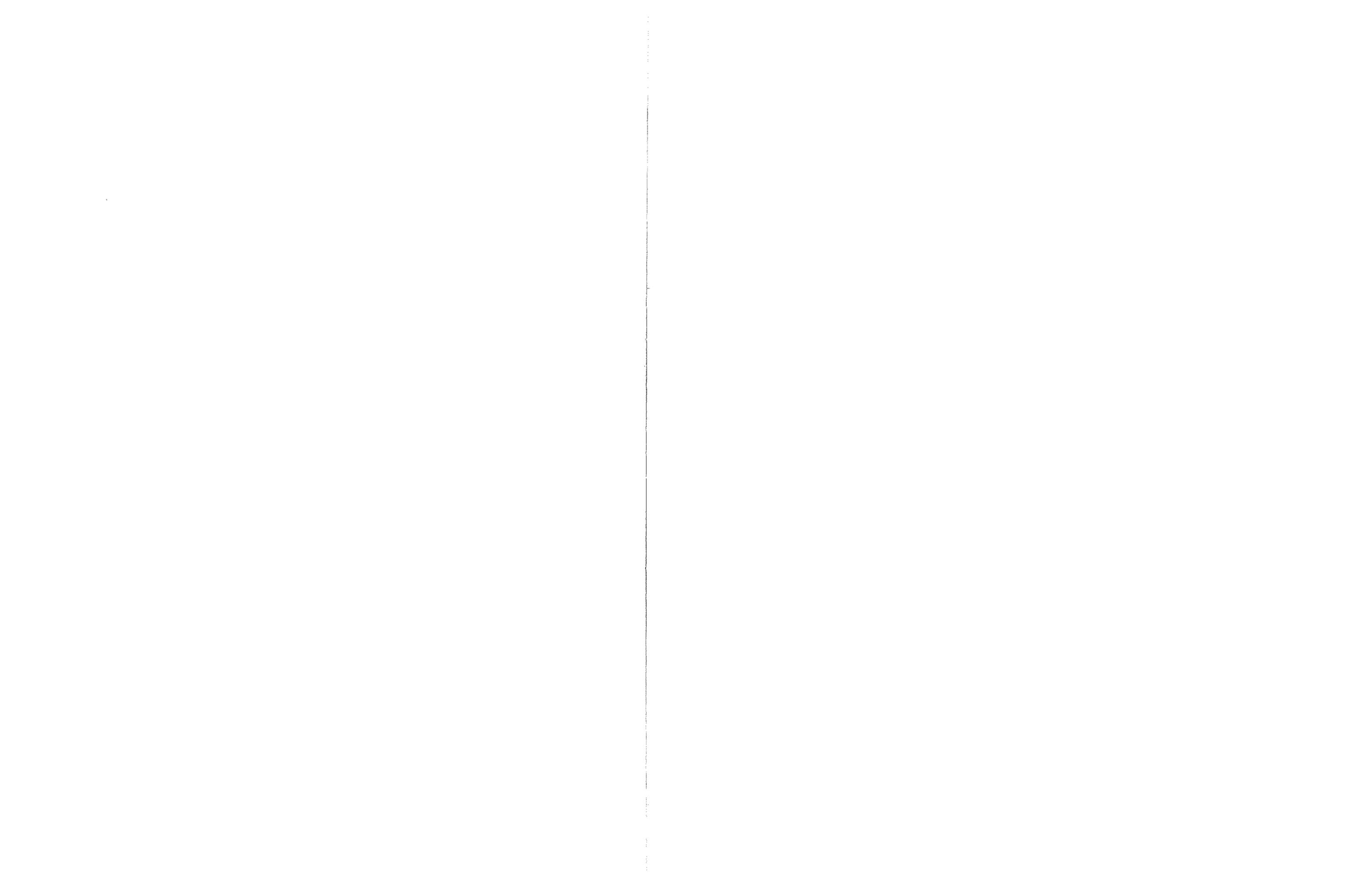
Approximate plant acreage identified in the survey is as follows (Non-native species appear in bold type):

- ◆ **Eurasian Water Milfoil**  
234 acres
- ◆ **Yellow Floating Heart/White Lily**  
467 acres
- ◆ White Lily  
15 acres
- ◆ Pondweeds, Waterweed, Coontail,  
388 acres
- ◆ **Purple Loosestrife**  
80 plants

The approximate coverage of yellow iris was not determined in the aquatic plant survey.



The figure to the left summarizes the aquatic plant distribution in the lake. Note that the scale of the map has been changed to fit on the page. For graphical purposes, EWM plant beds are shown across the width of the lake when in fact EWM was found in water no deeper than 22 feet.



# Lake Spokane Integrated Aquatic Plant Management Plan *Fact Sheet #2*

Stevens County Conservation District  
509-685-0937  
[www.homepage.plix.com/sccd/](http://www.homepage.plix.com/sccd/)



An Integrated Aquatic Plant Management Plan (IAPMP) has been developed by Stevens County Conservation District in cooperation with Lake Spokane Protection Association, Avista Utilities, Stevens County Noxious Weed Board, Spokane County Noxious Weed Board, Willow Bay Resort and Spokane Tribe, with technical support from Tetra Tech, Inc. Washington Department of Ecology Principal funding for this plan comes from an aquatic plant management grant from the Washington Department of Ecology with local in-kind services provided by the above organizations.

## **IAPMP Goals**

The Lake Spokane IAPMP was created to provide guidance for the management of non-native, invasive plants in Lake Spokane. The broad goal is to manage invasive non-native aquatic plants in Lake Spokane in order to limit their effect on recreational and other beneficial uses of the lake. Implementation of the plan will produce an integrated multi-year aquatic plant management program that is adaptive (dynamic flexibility with annual evaluation of plan elements). When implemented, the IAPMP will enhance and maintain littoral (shallow area) benefits (habitat and water quality) provided by aquatic plants but still maintain and maximize the recreational benefits associated with that region of

the lake. The plan provides guidance to a long-term management organization to manage activities, seek funding, and implement plan strategy. The plan outlines and implements a public education program on non-native, invasive aquatic plant species. The IAPMP describes small area control alternatives and techniques that individual shoreline landowners can use to locally control nuisance plants. The IAPMP also reduces the risk that problem aquatic plants will colonize new areas in the lake and nearby water bodies.

## **Control Intensity**

The level of control needed to maintain or restore beneficial uses in Lake Spokane is plant species and community dependent. In general, the aquatic plant management program will be one of control rather than eradication.



**Eurasian Watermilfoil (EWM)**-- Given the relatively established presence of EWM, total eradication is not likely. The ultimate goal is to limit EWM

expansion and reduce the coverage of EWM in the lake. Priority should be given to high use recreational areas or



high value habitat areas. Control efforts would take place in areas where EWM reduction or elimination will potentially increase the current beneficial uses or restore lost uses (e.g., native plant communities).

**Yellow Iris**—Limited control of yellow iris can be obtained by providing education on removal methods for individual landowners to use along their shoreline properties.



**Yellow Floating Heart**—The control of yellow floating heart in high uses areas where recreational access is adversely impacted is recommended. Total removal however, might have an adverse impact on the aquatic habitat of the lake (i.e., fish cover). Control efforts should be limited and focused.



**Purple Loosestrife**—

These invasive plants can be controlled with the education of individual property owners on the need for control and on

the methods for removal from their property. Coordination with the Stevens and Spokane County Weed Control Boards will also aid in the control of the Purple loosestrife population. Stevens County Noxious Weed Board and Avista Utilities have engaged both biological and chemical control of purple loosestrife.

**Management Activities**

The aquatic plant management program includes activities that will be done to help decrease the non-native aquatic plant population in Lake Spokane. Some of these activities include coordinating with Avista Utilities on the opportunity to conduct winter drawdowns of the reservoir pool. During this drawdown bottom barriers will be applied in high use areas and citizens will have the opportunity to apply barriers in these areas as well. Designated Yellow floating heart plant beds in high-use recreational zones will be treated with a herbicide to control growth of the plant bed. This application will determine the effectiveness of herbicide treatment on Yellow floating heart and whether or not it should be used throughout the lake. Purple loosestrife will be controlled biologically with in the introduction of the golden purple loosestrife beetle and the Galerucella beetle. Hand pulling individual plants may also offer some control.



**APPENDIX D**  
**Purple Loosestrife on Long Lake-History of Control Effects**

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# **STEVENS COUNTY NOXIOUS WEED CONTROL BOARD**

**230 WILLIAMS LAKE ROAD, COLVILLE, WA 99114**

**(509) 684-7590/FAX (509) 684-1982**

**EMAIL-weedboard@co.stevens.wa.us WEBSITE-co.stevens.wa.us/weedboard**

## **Purple Loosestrife on Long Lake-History of Control Efforts**

*By Sue Winterowd, Coordinator, SCNWCB*

*September 25, 2000 and Updated February 5, 2001*

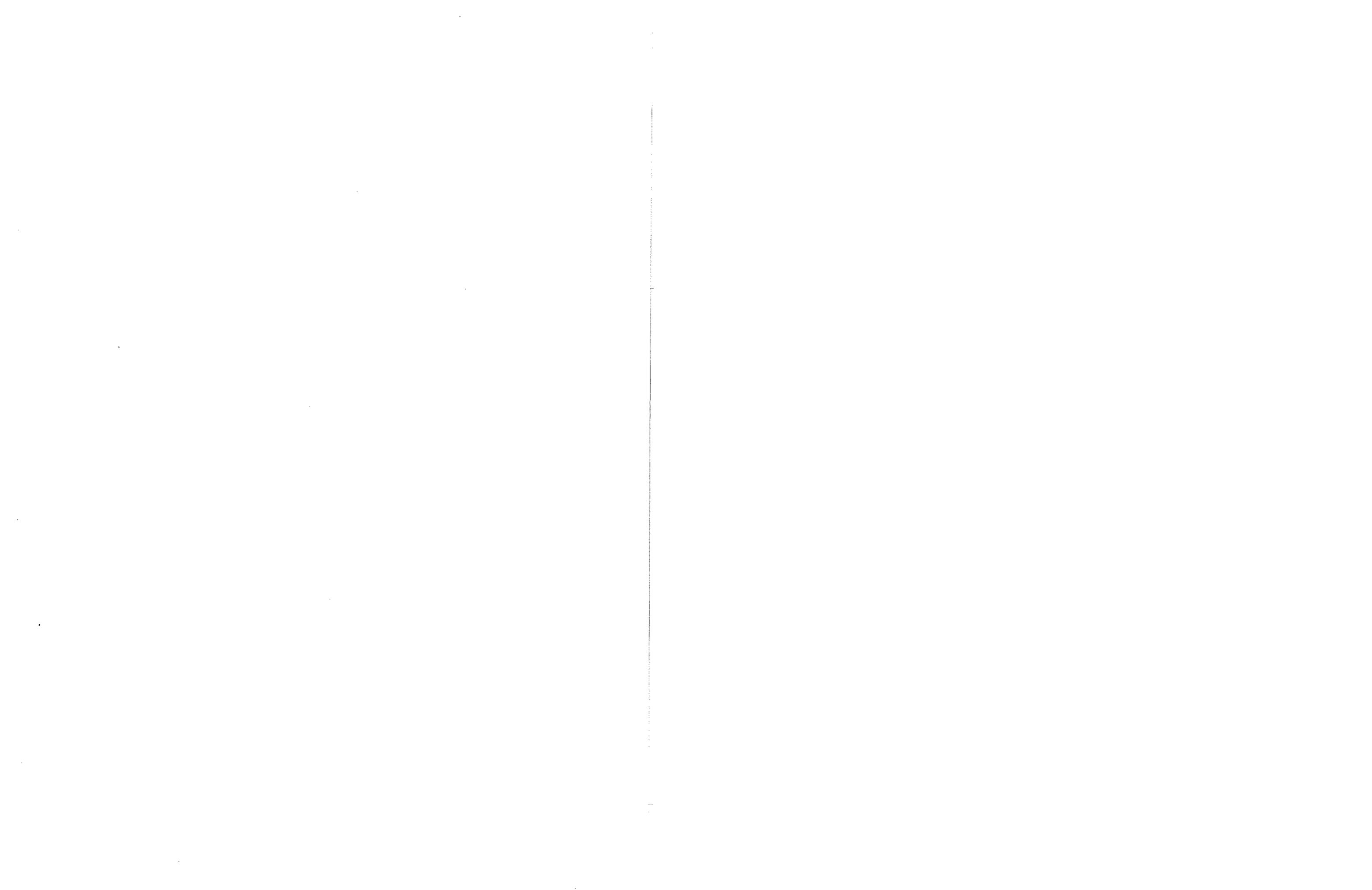
Purple loosestrife is a class B-designate weed in Region 4 (where Long Lake is located) meaning control of seed production is required. This contrasts with a class A designation in that eradication of plants is the requirement for class A weeds.

Purple loosestrife along the shores of Long Lake was targeted for control by then Washington Water Power, Spokane County NWCB and Stevens County NWCB beginning in 1992. WWP contracted with a herbicide applicator (AGRISERV, Gary Angell) to treat shoreline areas of loosestrife from 1992 through 1997. During this time, treatment costs were borne solely by WWP in 92-94 and then augmented by both weed boards from 1995 on.

In his season summary reports on file in my office, Gary Angell writes that the population of mature loosestrife plants was reduced by about 75% through 1996 with the majority of surviving plants being seedlings. He told me that from 1992 through 1994 he was able to spray the main infestations but when the funding ran out for each season, he had to quit spraying. This trend stopped in 1995 when he was able to complete spraying the entire shoreline within the budget allotted, attesting to the reduction of plants. Project costs ran about \$9,500-10,000 per year through 1996. 1997 herbicide treatment costs are not in my notes, but WWP should have this information. I do know that we had discussed a \$7,000 ceiling in 1997 with both weed boards contributing \$1,000 as we had the past two years.

In 1997, WWP, Spokane Co NWCB, Stevens Co NWCB and Gary Angell met to discuss the diminishing funds that would be available through WWP and the necessity/benefits of involving more folks in the control program. We talked about bringing in DNR, WA State Parks (Riverside State Park), various resorts on the lake, and lake users in general through Lake Spokane Protection Association. To put it bluntly, we (as a group) did not have much success in our efforts, admittedly weak, to recruit more help. We had hoped to have more groups funding the 1997 effort, but in the end, WWP and both weed boards went ahead and funded the project in full once again.

In 1998 the weed boards elected to switch gears from herbicide to the very promising biological control agents, Galerucella beetles. We collected thousands of beetles in Winchester Wasteway (near Moses Lake) to release on the lake and we also received some agents from Dr. Gary Piper at WSU and through WA Department of

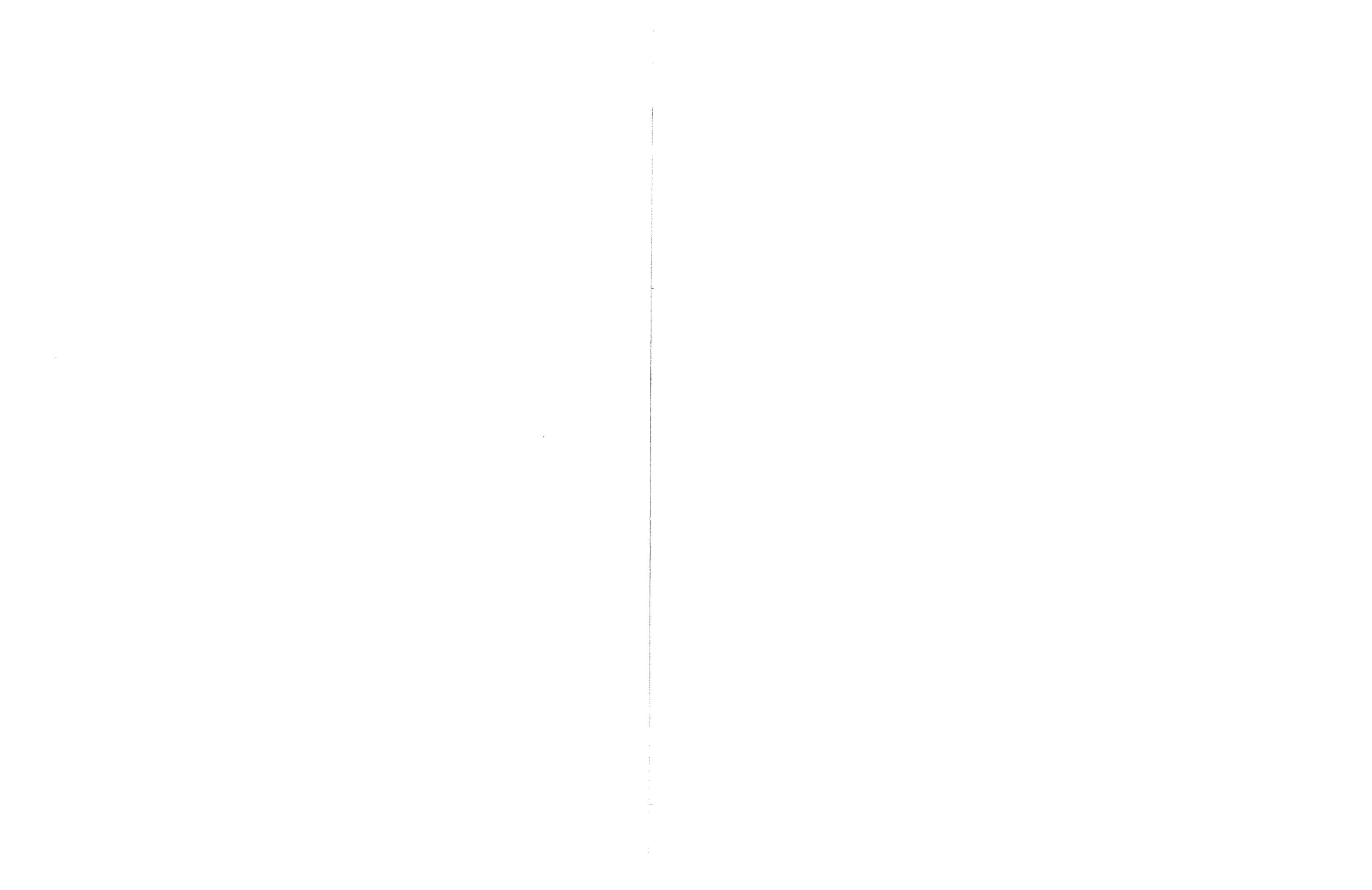


Fish and Wildlife. I think there have been at least 10,000 agents released the past three years (more likely several thousand more) by both weed boards. I do not know if WWP, now AVISTA, has hired Gary Angell to do any herbicide treatment since the last one we helped pay for in 1997.

We have not seen the very rapid and dramatic impact on the loosestrife population at Long Lake that we saw from our release on another lake in Stevens County at the same time. However, the impact is sure to come and we will continue to release bios every year to keep the population up. Gallerucella beetles were released along both Stevens and Spokane County Long Lake shorelines in 1998, 1999 and 2000. In 1998, Stevens Co NWCB also did one small release on Long Lake of another loosestrife biocontrol, the Hylobius beetle. We don't know if this release (inoculation of the plant stems with tiny eggs) was successful or not. Dr. Piper is continuing his research with yet another promising agent, Nanophyes as well as the Hylobius beetle to augment the impact of the Gallerucella beetles and we will do our best to procure more of these agents to release on Long Lake as they become more widely available.

To date, we have not "enforced" loosestrife control on Long Lake by private property or public property owners as the law allows. Both weed boards and AVISTA have worked hard to reduce the amount of the weed along the shores to a level that can more easily be controlled by individual property owners. It would be most beneficial to all parties concerned to continue to work on the loosestrife through concerted efforts rather than on a piecemeal basis.

If the IAPMP being produced for Long Lake can encourage involvement by private and public landowners in a coordinated weed control program for purple loosestrife to include cutting, digging and possibly herbicide treatment where possible to supplement the biological control efforts, it would be a great boost to a program that has had a lot of time, effort and money poured into it.



**APPENDIX E**  
**Aquatic Pest Management Permit Application**

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# AQUATIC PEST MANAGEMENT PERMIT APPLICATION

(for Aquatic Weed/Algae Treatment)

For short-term modification to state water quality standards  
Under WAC 173-201A

For Departmental Use Only

WRIA \_\_\_\_\_

Basin \_\_\_\_\_

### Instructions:

- ◆ Read the attached instruction sheet before completing this form.
- ◆ Incomplete and/or inaccurate applications will be returned for corrections.
- ◆ If more space is needed to answer any questions, please attach a separate sheet and number the answers.
- ◆ Press Tab to step through the shaded entry fields

Complete all of the items in this application and return to:

### WATERBODY NAME:

### SPONSOR/APPLICATOR:

1. a. Name of Project Sponsor:  
Organization:

Address:

Email Address:

Phone No.:

Fax No.:

b. Additional Project Sponsor(s):

Address:

Email Address:

Phone No.:

Fax No.:

- Use additional pages if needed.

2. Name of Applicator:

Organization :

Address:

Email Address:

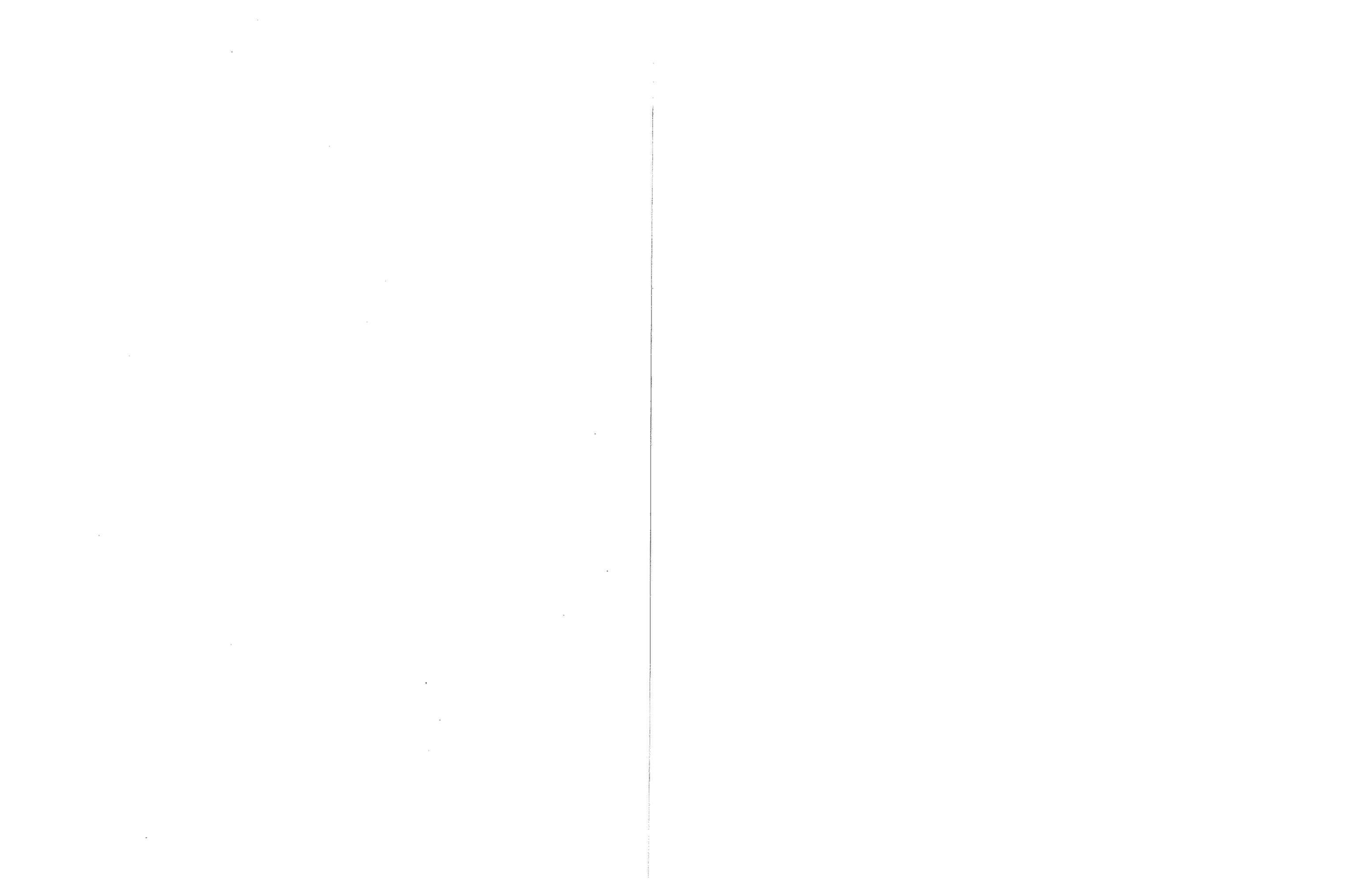
Phone No.:

Fax No.:

Washington State Pesticide License No.:

Pesticide License Expiration Date:

Does the Applicator Have an Aquatic Endorsement? Yes  No



**WATERBODY INFORMATION:**

3. Is there an aquatic plant management plan for this waterbody? Yes  No

a. If yes, please give the date and title of the plan.

b. If yes, is this proposal consistent with the plan? Yes  No

4. Check the category that applies:

- |   |   |
|---|---|
| <input type="checkbox"/> Drainage Ditch   | <input type="checkbox"/> Estuary            |
| <input type="checkbox"/> Golf Course Pond | <input type="checkbox"/> Irrigation Canal   |
| <input type="checkbox"/> Lake             | <input type="checkbox"/> Pond under 5 Acres |
| <input type="checkbox"/> Reservoir        | <input type="checkbox"/> River              |
| <input type="checkbox"/> Stormwater Pond  | <input type="checkbox"/> Stream             |
| <input type="checkbox"/> Wetlands         | <input type="checkbox"/> Other _____        |

5. Please attach a legible detailed and accurate map of the waterbody that provides the following labeled information:

**Map Checklist**

- Indicate locations, names and descriptions of inlet(s) and outlet(s) to the waterbody.
- Indicate flow direction.
- Show the locations of any domestic, potable, or irrigation withdrawals.
- Show the location(s) of treatment area(s) with each sponsor's name and corresponding property lines that extend into the water.
- Specify locations of properties where requesters have asked that no treatment occur.
- Specify the herbicide to be used in each proposed treatment area.
- Mark and identify all public and private boat launches, swimming areas, and/or neighborhood access areas to the waterbody within 1.5 miles of the treatment area(s).
- Mark and label the locations of adjacent and downstream wetlands.

6. Location of proposed treatment:

a. City: \_\_\_\_\_ Within city limits? Yes  No

b. County: \_\_\_\_\_

c. Section(s) \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_

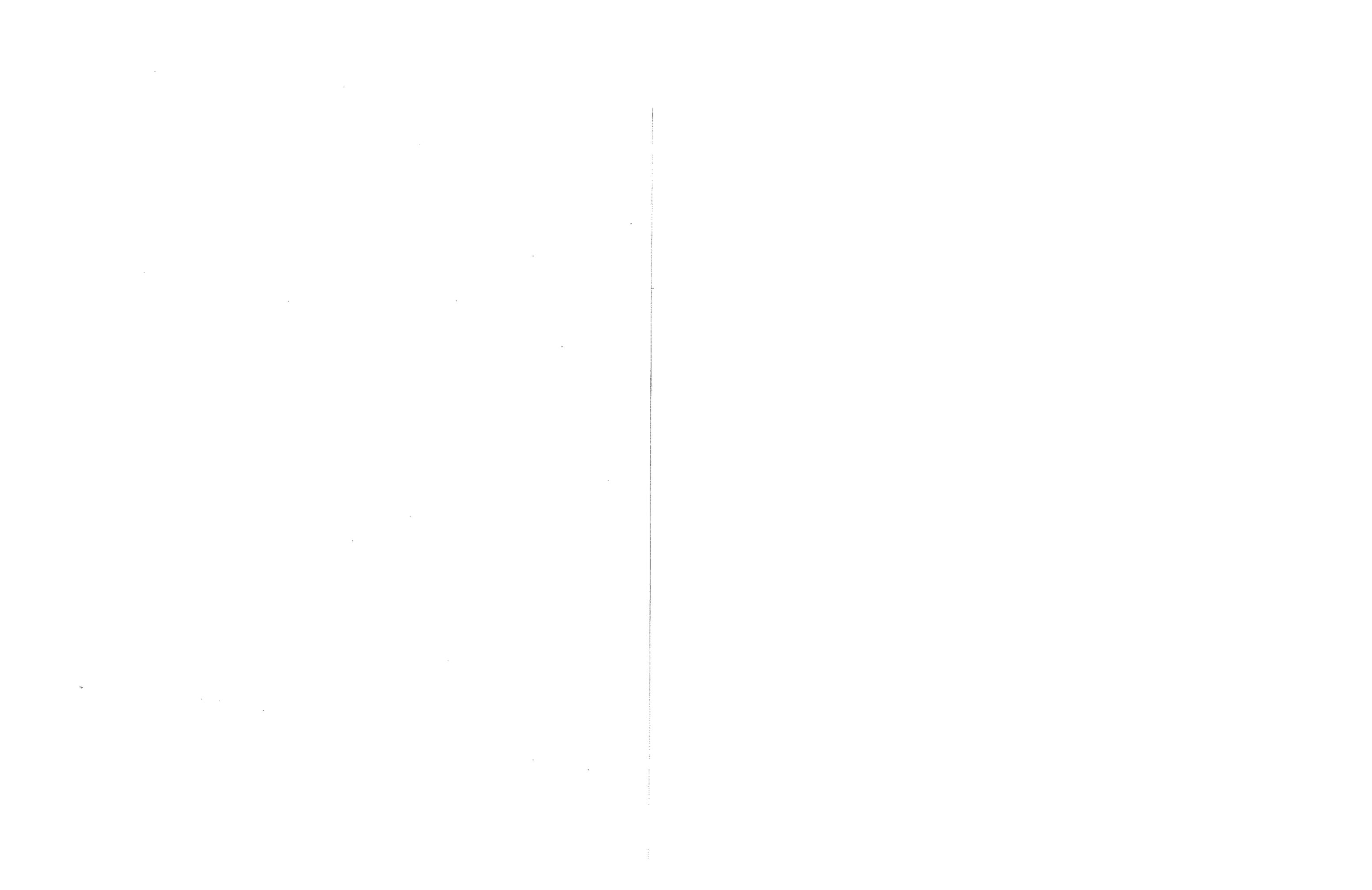
d. Water Resource Inventory Area (WRIA): \_\_\_\_\_ (see WRIA map attached to instructions)

7. Is the treatment area of the waterbody managed by a local jurisdiction? Yes  No

a. If yes, please identify: \_\_\_\_\_

b. Does this jurisdiction restrict the use of aquatic pesticides through a local ordinance?  
Yes  No

8. Is there a Lake Management District or a special district responsible for the management of the



waterbody named in this application? Yes  No

If yes, please include name and address of district, a contact, and telephone number.

Name:

Address of District:

Contact:

Telephone No.:

9. Waterbody description:

- a. What is the size of the waterbody in acres?
- b. What is the mean depth?
- c. What is the maximum depth?
- d. Describe all recreational uses of the waterbody such as motorized water sports, fishing, and swimming on both public and private properties.
- e. Are there any domestic, potable, or irrigation withdrawals from the water body? Yes  No   
 (If you do not know, contact the Ecology regional Water Resources Program and/or local government with jurisdiction for information.)
- f. List the names and addresses of the water right holders that correspond to all the domestic, potable or irrigation withdrawals indicated on the map.

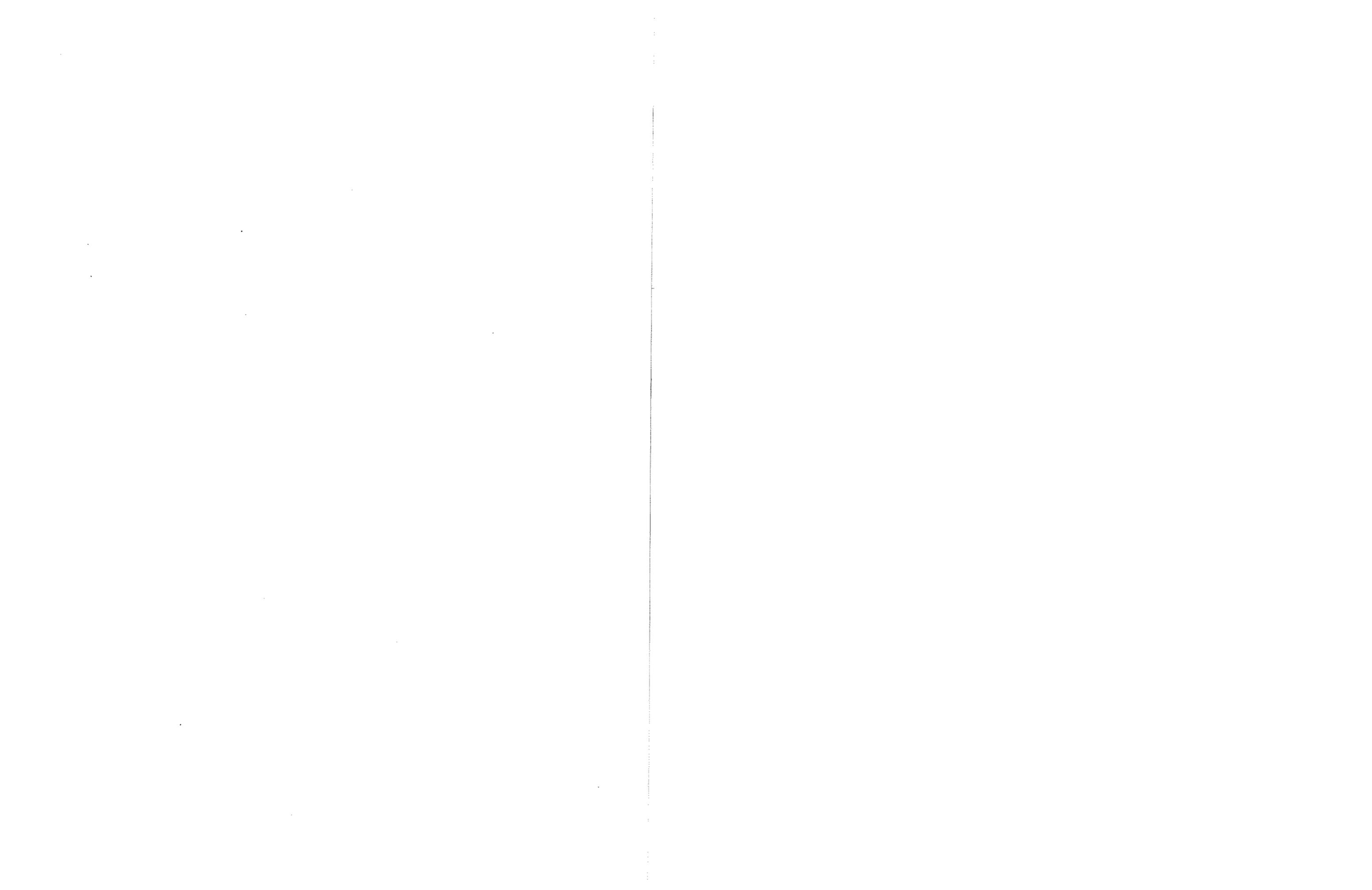
10. Treatment area description:

- a. Do you intend to treat more than 50 percent of the littoral zone\* of the waterbody? Yes   
No
- b. How many separate areas are proposed for treatment on this waterbody?
- c. Please list the sponsors and sizes of all treatment areas in acres. For shoreline applications, state the front footage and how far (in feet) out into the waterbody from the shoreline you intend to treat.
- d. Please list by scientific and common name frequently found aquatic plants in and adjacent to the proposed treatment area(s). A list of commonly found aquatic plants can be found in the attached Instruction Sheet.

*Note: \*The littoral zone is the nearshore and shallow areas where sunlight penetrates the water to the lake bottom. Here, sediments receive enough light that rooted plants can grow. Contiguous areas covering a minimum twenty-five (25) to forty (40) percent of the vegetation must be left intact in the littoral area. When treating large areas, leave random strips or patches of aquatic vegetation untreated for fish use. In many instances, at least twenty-five (25) to forty (40) percent of the submerged vegetative cover shall be retained for optimum cover and forage for fish and wildlife.*

11. Mitigating undesirable impacts:

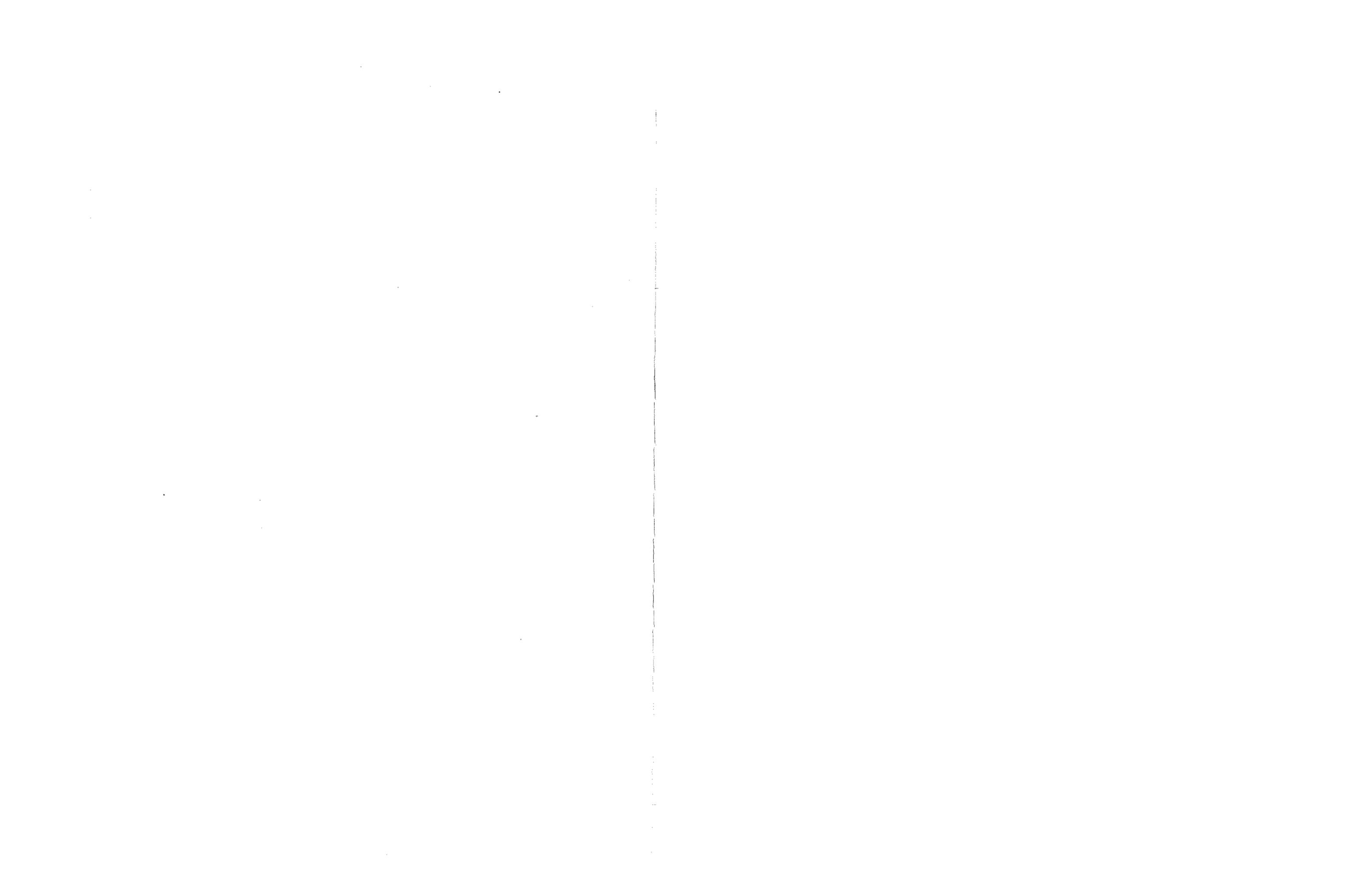
- a. What are the expected flow levels of the inlets and outlets (approximate cubic feet per second) during treatment(s) and 30 days after treatment(s)?



- b. Can the outlet be blocked? Yes  No
  - c. If no, describe the downstream impacts and how they will be dealt with.
  - d. Are there restrictions on the herbicide label(s) for recreational water use or potable or irrigation withdrawals from the waterbody? Yes  No
  - e. If yes, please describe how you will address or mitigate for the restrictions.
  - f. What precautions will you take to not impact aquatic plants on adjacent properties?
12. Is there potential for inadvertent damage to wetlands adjacent to or downstream from the treatment area? Yes  No   
 If yes, what precautions will you take to protect the wetlands? (Please identify the wetlands on the map.)
13. Are you aware if anyone, this year or in previous years, who has requested that no treatments occur on this waterbody? Yes  No
- a. If yes, do they live on or near the lake? Yes  No
  - b. Do they use the lake? Yes  No
  - c. Describe how you will address or mitigate for this request.
14. Is the water body on the EPA 303d Listing for any pollutant or parameter? Yes  No  (See 303(d) listing attached to instructions). If yes, Please list the parameter(s):
15. Is the waterbody a part of a designated critical habitat of a species listed under the Endangered Species Act or is the waterbody in an Evolutionary Significant Unit (ESU) of a species listed under the Endangered Species Act? Yes  No
- a. If yes, what species?
  - b. Name the ESU: (see attached list)
  - c. How will you mitigate for impacts, if any?

**TREATMENT HISTORY AND PROPOSED PLAN FOR AQUATIC PLANT CONTROL:**

16. Give a brief history for each treatment site of how plant or pest problems have interfered with necessary activities and public interests (i.e., The plants are on the state noxious weed list or are interfering with a beneficial use or list other reasons that may apply.)
17. Previous treatments:
- a. What non-chemical methods have been used at this site to control the pest(s) (i.e., handpulling, harvesting, divers, bottom screening, diver dredge, etc.
  - b. What were the conclusions or results?



c. Has this water body previously been treated with herbicides(s)/pesticides(s)?

Once? Yes  No  Date \_\_\_\_\_  
Annually? Yes  No  Date Started \_\_\_\_\_  
Somewhat regularly Yes  No  Schedule \_\_\_\_\_  
Number of times treated in past 5 years \_\_\_\_\_  
Name of weeds/pest treated \_\_\_\_\_  
Pesticide(s) used \_\_\_\_\_  
More than 50 percent of the lake? Yes  No   
Spot treatment Yes  No

d. What were the conclusions or results?

e. Is there a maintenance plan?

**CURRENT TREATMENT PROPOSAL:**

18. When (approximate dates) do you propose to treat?

a. Is the proposed treatment based on an integrated pest management plan?

Yes  No

If yes, please enclose a copy of the plan with this application. *Note: If you are treating 50 percent or more of the littoral zone of the lake, a plan must be developed.*

b. If you plan to treat the same area more than one time per season, please provide justification for the additional treatments and approximate dates.

c. What follow-up control methods or monitoring will be used to ensure the effectiveness of this treatment?

This Season:

Next season:

Two years after this treatment:

d. Do you have a plan to remove any floating mats or tubers or rhizomes that may result from this proposed treatment? Yes  No  If yes, explain:



19. What chemical(s) are you proposing to use? Indicate below, include the amount and concentration, the plant(s) targeted, the EPA ID Number, and the adjuvant if one is necessary.

<i>Chemical</i>	<i>Adjuvant</i>	<i>Concentration (PPM)</i>	<i>Amount in gallons or lbs.</i>	<i>Acres to be treated</i>	<i>Application method</i>	<i>Targeted Plant Name (Refer to list)</i>
Glyphosate (Rodeo®)						
Endothall (Aquathol®)						
Fluridone (Sonar®)						
Fluridone (Sonar®) Pelleted						
Copper compounds						
2,4-D						
Endothall (Hydrothol 191®)						
Other						



20. List any other governmental approvals or permits that will be needed for your proposal.

a. Washington State Department of Fish and Wildlife:

- Hydraulic Project Approval
- Fish Planting Permit

b. Local government (city or county permit):

- Substantial Development Permit (Shorelines Management Act) in certain locales

c. Federal:

- Section 404 Permit from the Army Corps of Engineers

I certify that I have personally examined and am familiar with the information contained herein and I believe this information is true, accurate, and complete. *(If there are multiple sponsors, all must sign and date the application.)*

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Sponsor Signature	Affiliation	Date
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Sponsor Signature	Affiliation	Date
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Sponsor Signature	Affiliation	Date
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Applicator Signature	Affiliation	Date
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November 1, 2000

**INSTRUCTION SHEET**  
**AQUATIC PEST MANAGEMENT PERMIT APPLICATION**  
**FOR**  
**CHEMICAL TREATMENT OF**  
**AQUATIC WEEDS and ALGAE**

**Addresses of regional Ecology personnel to which the applications are to be submitted:**

**Southwest Regional Office**

Ecology Contact

Margaret Hill     All Resource Management  
                         Inc. applications  
Kerry Carroll     All Allied Aquatics  
                         applications  
Janet Boyd        All other applications

Ecology Contact Name  
Washington State Department of Ecology  
Water Quality Program  
Southwest Regional Office  
P.O. Box 47775  
Olympia, WA 98504-7775

Margaret Hill  
(360) 407-0246  
[mhil461@ecy.wa.gov](mailto:mhil461@ecy.wa.gov)

Kerry Carroll  
(360) 407-6294  
[kstr461@ecy.wa.gov](mailto:kstr461@ecy.wa.gov)

Janet Boyd  
(360) 407-0245  
[jboy461@ecy.wa.gov](mailto:jboy461@ecy.wa.gov)

**Central Regional Office**

Ray Latham  
Washington State Department of Ecology  
15 West Yakima Ave. Suite 200  
Yakima, WA 98902-3401

[rlat461@ecy.wa.gov](mailto:rlat461@ecy.wa.gov)  
(509) 575-2807

**Eastern Regional Office**

Nancy Weller  
Washington State Department of Ecology  
N. 4601 Monroe, Suite 100  
Spokane, WA 99205-1295

[nwel461@ecy.wa.gov](mailto:nwel461@ecy.wa.gov)  
(509) 625-5194

**Northwest Regional Office**

Rod Thompson  
Washington State Department of Ecology  
3190 - 160<sup>th</sup> Ave. S.E  
Bellevue, WA 98008-5452

[rtho461@ecy.wa.gov](mailto:rtho461@ecy.wa.gov)  
(425) 649-7133

**INCORRECT OR INCOMPLETE APPLICATIONS WILL BE RETURNED FOR  
CORRECTIONS. A PERMIT WILL NOT BE ISSUED UNTIL CORRECTIONS AND/OR  
ADDITIONS ARE RECEIVED BY ECOLOGY IN WRITING.**

Sponsors submitting applications for multiple waterbodies may be required to submit separate applications for each waterbody. Consult with the Ecology regional contact for clarification on a case-by-case basis.



In WAC 197-11-060(3)(c), SEPA allows agencies to analyze "similar actions" in a single environmental document. Proposals are similar if, when viewed with other reasonably foreseeable actions, they have common aspects that provide a basis for evaluating their environmental consequences together, such as common timing, types of impacts, alternatives, or geography. See <http://www.wa.gov/ecology/cp/1724home.html>

### **Application Instructions**

**Waterbody Name:** Generally, only one waterbody may be proposed for treatment in this application. Consult with the Ecology regional contact for clarification. Provide the common name of the waterbody if it has one, or enter "unnamed", and check the category that applies.

**Question 1: Project Sponsor** - The project sponsor is the individual who owns property on the target waterbody; OR an organization associated with the target waterbody; OR an individual, organization or government agency who is responsible for managing aquatic plants for the waterbody. There may be more than one project sponsor. Each site identified for treatment in this application must have a project sponsor. **Each project sponsor must be named and must sign the application before a permit will be issued.**

**Question 2: Applicator** – The person who will be applying the pesticide. If you do not have this information when submitting the application, the application will be processed. **HOWEVER**, the applicator's name and Washington State Aquatic Pesticide License number and recertification date **MUST** be provided to the Ecology contact person at least 21 days before the treatment is scheduled to begin.

**Question 3.a-b:** Integrated aquatic plant management planning is being implemented with some success. At least a dozen plans have been written to address various nuisance or noxious weed problems in lakes around Washington. Ecology recommends that lake groups that chemically treat their lakes regularly to develop an integrated aquatic plant management plan before they apply for future chemical/aquatic plant control permits. Planning guidance is available upon request from the Ecology contact listed above.

**Question 4:** Self-explanatory.

**Question 5:** Provide a good, clear map that provides the information required.

**Question 6.a-d:** Fill in the requested information. The WRIA number is on the attached WRIA map. Also see [http://www.ecy.wa.gov/programs/wq/303d/by\\_wrias.html](http://www.ecy.wa.gov/programs/wq/303d/by_wrias.html) for a general map and very detailed individual WRIA maps.

**Question 7:** A local jurisdiction such as a special use district, lake management district, city or county may have ordinances that place special restrictions on the use of aquatic plant management tools. If there are restrictions, please identify them. Ecology either will not issue a permit if chemical treatments are not allowed, or the permit will be conditioned with the requirements of the local jurisdiction.

**Question 8:** Self-explanatory.

**Question 9a-c:** Provide the information required

**Question 9.d:** List all recreational uses of the treatment area. Indicate if there are any prohibited recreational uses.



**Question 9.e-f:** Determine if there are any withdrawals from the waterbody, and show the locations on the map. This includes all legal/registered and unregistered withdrawals. Also, this does not excuse sponsor(s)/applicator(s) of not notifying all other users of domestic, potable and irrigation water. If there are label restrictions relevant to water use or withdrawals and there are water uses or withdrawals of the water body, you will not be issued a permit until you provide a plan to address or mitigate the restrictions. The plan must be acceptable to Ecology, Washington State Departments of Agriculture and Health and the water users.

**Question 10.a:** By definition, a project or combination of projects treating over 50 percent of the littoral zone (where the aquatic plants grow) is a whole-lake treatment.

**Question 10.b:** Note that except for whole-lake, noxious aquatic weed control, at least 25 percent of the native vegetation must be left in place.

**Question 10.c:** List on the application form and mark on the map (see question 5) all treatment sites and their corresponding sponsors.

**Question 10.d:** Please refer to the attached sheet entitled **Commonly Found Freshwater Aquatic Plants in Washington State**.

**Question 11.a:** Provide the requested information if applicable, and indicate on the map the location of the inlets and outlet(s).

**Question 11.b:** If the outlet cannot be blocked, and there will be outflow during treatment, indicate if there would be downstream impacts and how you would deal with them.

**Question 11.c:** See question 9.e.

**Question 11.d-f:** If yes, please describe the precautions you will take to prevent or reduce inadvertent impacts to aquatic plants on areas not included in the treatment area(s).

**Question 12:** If there are wetlands that could be inadvertently impacted by your proposed treatment, please describe what precautions you will take to prevent this. Mark these wetlands on the map.

**Question 13.a-c:** Please provide the names and addresses of persons who have requested that no chemical treatment occur on or near their property - mark the locations of these properties on the map. Please explain how you will honor this request. The mitigation must be acceptable to the requestors.

**Question 14:** The 303(d) List identifies waterbodies that do not meet water quality criteria for one or more parameters. Please check the attached list to see if your target waterbody is listed for any parameters, including copper, phosphorous and/or pesticides. You can also find this list on the Internet at [http://www.ecy.wa.gov/programs/wq/303d/by\\_wrias.html](http://www.ecy.wa.gov/programs/wq/303d/by_wrias.html). If your proposed treatment will increase the level of any parameter, you may have to use an alternative treatment or provide mitigation. In certain cases, Ecology may not be able to issue a permit.

**Question 15:** Information about ESA listings can be found in the attached list or on the Internet at <http://www.governor.wa.gov/esa/regions.htm> and <http://www.wa.gov/wdfw/wlm/diversty/soc/etsc9907.pdf>.

If your proposed treatment will have an adverse impact on a listed species, you may have to use an alternative or restricted treatment. In certain cases, Ecology may not be able to issue a permit.



**Question 16:** Describe how this proposal protects each of the listed resources. Different aquatic plants, macro-algae and algae occupy different areas of the water body (near bottom, mid-depth, bottom to surface, emergent and floating.) What are the reasons for removing these different types of plants?

Requirements for control of noxious plants are region-specific and based on the economic and environmental feasibility for effective control along with the seriousness of problems presented by the noxious species. The fact that control is required and enforced should be considered an indication of the feasibility of control in addition to the seriousness of the problem presented by a noxious weed. Noxious plant species that have been identified are on the State Noxious Weed List (Chapter 16-750 WAC and can be found at ([http://www.wa.gov/agr/weedboard/weed\\_laws/wac.html](http://www.wa.gov/agr/weedboard/weed_laws/wac.html)).

*Ecology recommends that Integrated Aquatic Plant Management Plans (IAPMPs) be developed and adopted especially for waterbodies that undergo repeated chemical treatments. A copy of "A Citizens Guide for Developing Integrated Aquatic Vegetation Management Plans" can be obtained from Ecology call the Publications office at (360) 407-7472 or is available on the Internet at <http://www.ecy.wa.gov/programs/wq/plants/management/manual/index.html>. For other guidance materials, please contact your regional Ecology contact listed on the first page of this instruction sheet.*

**Question 17.a-d:** If you do not know if the water body has been chemically and/or non-chemically treated in the past, please check with the Ecology contact person.

**Question 18.a-c:** List your proposed treatment dates and the number of treatments planned. The permit cannot be issued for longer than a one-year time period unless there is a long-term plan such as an IAPMP for the waterbody - see WAC 173-201A(110)(1)(c). The plan must be consistent with the Administrative Procedure Act (chapter 34.05 RCW) and be in compliance with SEPA, chapter 43.21 RCW in which case a permit may be issued for the duration of the plan, or for five years, whichever is less.

**Question 18.d:** This is referring to floating mats of water lily roots and rhizomes that float to the surface sometimes several months after being killed with an herbicide. This may or may not be coming from the specific treatment area. However, offended homeowners and/or recreators tend to blame those responsible for the chemical treatment. This information and a telephone number could be listed in the public and posted notices.

**Question 19:** Provide the requested information for each product you are planning to use for this treatment. Call the contact person if you have any questions.

**Question 17:** Self-explanatory

**Signatures:** The applicator and the project sponsor must sign the application or it will be returned as incomplete. If there is more than one project sponsor, each listed sponsor must sign the application.

Date of application form: November 29, 2000



**APPENDIX F**  
**EPA label for Glyphosate (Rodeo®)**



This sample label is current as of 1/13/99. The product descriptions and recommendations provided in this sample label are for background information only. Always refer to the label on the product before using Monsanto or any other agrichemical product.

21061Y6-1/CG



## Complete Directions for Use in Aquatic and Other Noncrop Sites.

EPA Reg. No. 524-343

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION IS LIKELY TO RESULT.

Rodeo is a registered trademark of Monsanto Company.

2000-1

Read the entire label before using this product.

Use only according to label instructions.

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

Not all products recommended on this label are registered for use in California. Check the registration status of each product in California before using.

Read the "LIMIT OF WARRANTY AND LIABILITY" statement at the end of the label before buying or using. If terms are not acceptable, return at once unopened.

THIS IS AN END-USE PRODUCT. MONSANTO DOES NOT INTEND AND HAS NOT REGISTERED IT FOR REFORMULATION OR REPACKAGING. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

## 1.0 INGREDIENTS

### ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine, in the form of its isopropylamine salt	53.8%
OTHER INGREDIENTS:	46.2%
	100.0%

\*Contains 648 grams per litre or 5.4 pounds per U.S. gallon of the active ingredient, glyphosate, in the form of its isopropylamine salt. Equivalent to 480 grams per litre or 4 pounds per U.S. gallon of the acid, glyphosate.

This product is protected by U.S. Patent No. 4,405,531. Other patents pending. No license granted under any non-U.S. patent(s).

## 2.0 IMPORTANT PHONE NUMBERS

1. FOR PRODUCT INFORMATION OR ASSISTANCE IN USING THIS PRODUCT, CALL TOLL-FREE,

1-800-332-3111

2. IN CASE OF AN EMERGENCY INVOLVING THIS PRODUCT, OR FOR MEDICAL ASSISTANCE, CALL COLLECT, DAY OR NIGHT,

(314)-694-4000

## 3.0 PRECAUTIONARY STATEMENTS

### 3.1 Hazards to Humans and Domestic Animals

Keep out of reach of children.

#### CAUTION!

Remove contaminated clothing and wash clothing before reuse.

Wash thoroughly with soap and water after handling.

### 3.2 Environmental Hazards

Do not contaminate water when disposing of equipment washwaters. Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

In case of: SPILL or LEAK, soak up and remove to a landfill.

### 3.3 Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

## DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulations.

## 4.0 STORAGE AND DISPOSAL

Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

**STORAGE:** STORE ABOVE 10°F (-12°C) TO KEEP PRODUCT FROM CRYSTALLIZING. Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68°F (20°C) for several days to redissolve and roll or shake container or recirculate in mini-bulk containers to mix well before using.

#### DISPOSAL:

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state, or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed.



**FOR REFILLABLE PORTABLE CONTAINERS:** Do not reuse this container except for refill in accordance with a valid Monsanto Repackaging or Toll Repackaging Agreement. If not refilled or returned to the authorized repackaging facility, triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

**FOR METAL CONTAINERS (non-aerosol):** Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

**FOR BULK CONTAINERS:** Triple rinse emptied bulk container. Then offer for recycling or reconditioning, or dispose of in a manner approved by state and local authorities.

**FOR PLASTIC 1-WAY CONTAINERS & BOTTLES:** Do not reuse container. Triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

**FOR DRUMS:** Do not reuse container. Return container per the Monsanto container return program. If not returned, triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

## 5.0 GENERAL INFORMATION

This product, a water-soluble liquid, mixes readily with water and nonionic surfactant to be applied as a foliar spray for the control or destruction of many herbaceous and woody plants.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days but on most perennial brush species may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow the activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above-ground growth and deterioration of underground plant parts.

Unless otherwise directed on this label, delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "WEEDS CONTROLLED" section of this label.

Unemerged plants arising from unattached underground rhizomes or root stocks of perennials or brush will not be affected by the spray and will continue to grow. For this reason best control of most perennial weeds or brush is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when vegetation is heavy or dense.

Do not treat weeds or brush under poor growing conditions such as drought stress, disease or insect damage, as reduced control may result. Reduced results may also occur when treating weeds or brush heavily covered with dust.

Reduced control may result when applications are made to any weed or brush species that have been mowed, grazed or cut, and have not been allowed to regrow to the recommended stage for treatment.

Rainfall or irrigation occurring within 6 hours after application may reduce effectiveness. Heavy rainfall or irrigation within 2 hours after application may wash the product off the foliage and a repeat treatment may be required.

When this product comes in contact with soil (on the soil surface or as suspended soil or sediment in water) it is bound to soil particles. Under recommended use situations, once this product is bound to soil particles, it is not available for plant uptake and will not harm off-site vegetation where roots grow into the treatment area or if the soil is transported off-site. Under recommended use conditions, the strong affinity of this product to soil particles prevents this product from leaching out of the soil profile and entering ground water. The affinity between this product and soil particles remains until this product is degraded, which is primarily a biological degradation process carried out under both aerobic and anaerobic conditions by soil microflora.

This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product or other materials that are not expressly recommended in this label. Mixing this product with herbicides or other materials not recommended in this label may result in reduced performance.

### ATTENTION

**AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.**

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended. The likelihood of plant or crop injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. **AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.**

**NOTE:** Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. When not in use, keep container closed to prevent spills and contamination.

## 6.0 MIXING

Clean sprayer parts immediately after using this product by thoroughly flushing with water.

**NOTE:** REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, SUCH AS VISIBLY MUDDY WATER OR WATER FROM PONDS AND DITCHES THAT IS NOT CLEAR.

### 6.1 Mixing with Water and Surfactant

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the recommended amount of this product and the required surfactant near the end of the filling process and mix well. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by state or local regulations. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation may be required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near the bottom of the tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh.

When using this product, mix 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution. Use a nonionic surfactant labeled for use with herbicides. The surfactant must contain 50 percent or more active ingredient.

These surfactants should not be used in excess of 1 quart per acre when making broadcast applications.

Always read and follow the manufacturer's surfactant label recommendations for best results. Carefully observe all cautionary statements and other information appearing in the surfactant label.

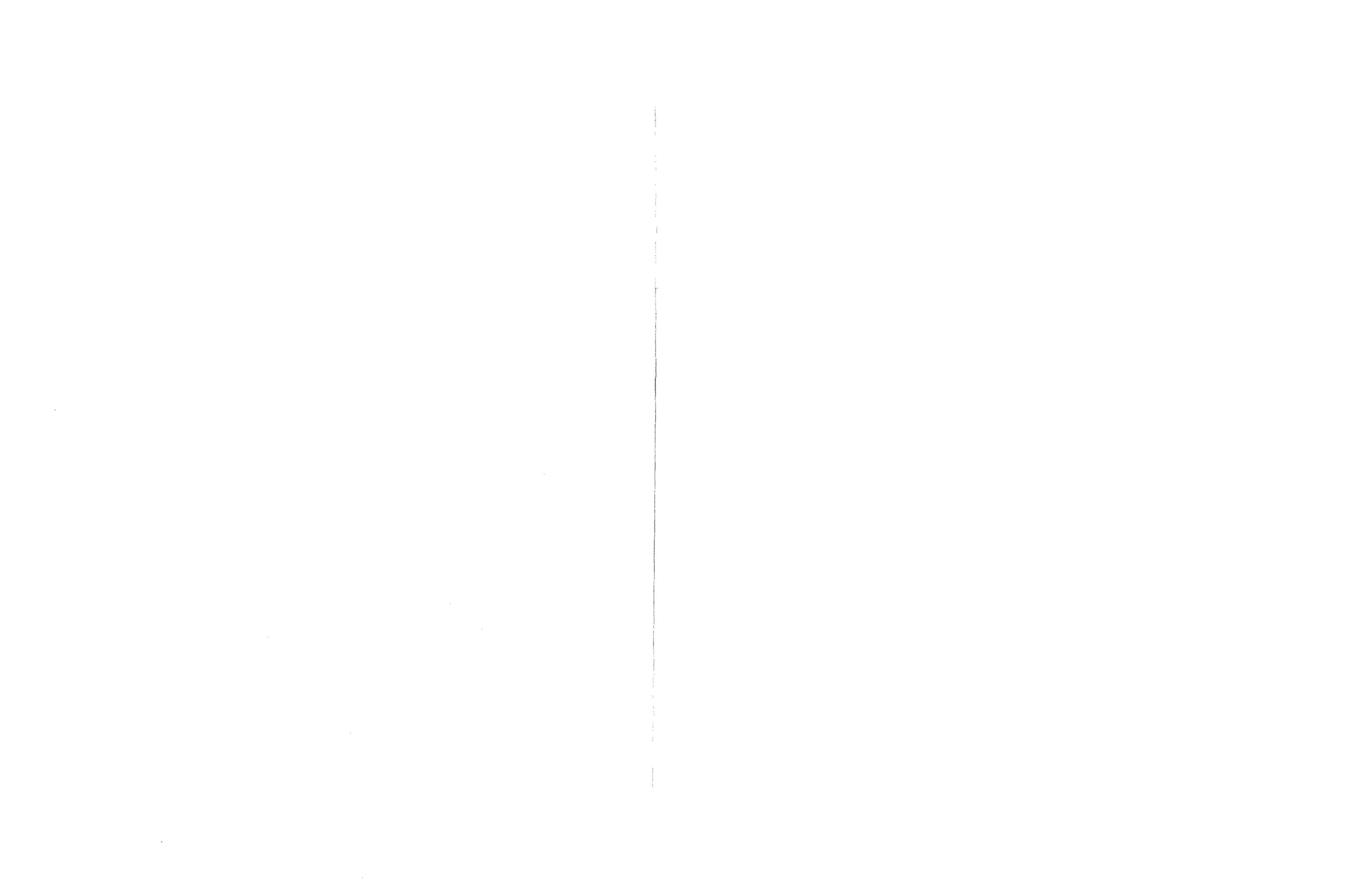
### 6.2 Mixing for Hand-held Sprayers

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

#### Spray Solution

Desired Volume	Amount of Rodeo®					
	3/4%	1%	1 1/4%	1 1/2%	5%	8%
1 Gal	1 oz	1 1/3 oz	1 2/3 oz	2 oz	6 oz	10 1/4 oz
25 Gal	1 1/2 pt	1 qt	1 1/4 qt	1 1/2 qt	5 qt	2 gal
100 Gal	3 qt	1 gal	1 1/4 gal	1 1/2 gal	5 gal	8 gal

2 tablespoons = 1 fluid ounce



For use in backpack, knapsack or pump-up sprayers, it is suggested that the recommended amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution and add the correct amount of surfactant.

## 6.3 Colorants or Dyes

Agriculturally-approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilution. Use colorants or dyes according to the manufacturer's recommendations.

## 7.0 APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES.

### SPRAY DRIFT MANAGEMENT

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended.

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

### AERIAL SPRAY DRIFT MANAGEMENT

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications or to public health uses.

1. The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees. Where states have more stringent regulations, they should be observed.

### Importance of Droplet Size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see the "Wind", "Temperature and Humidity", and "Temperature Inversion" sections of this label).

### Controlling Droplet Size

- **Volume:** Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with the higher rated flows produce larger droplets.
- **Pressure:** Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy protection. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles:** Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation:** Orienting nozzles so that the spray is released backwards, parallel to the airstream, will produce larger droplets than other orientations. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type:** Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce larger droplets than other nozzle types.
- **Boom Length:** For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

- **Application Height:** Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces the exposure of the droplets to evaporation and wind.

### Swath Adjustment

When applications are made with a crosswind, the swath will be displaced downward. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller droplets, etc.).

### Wind

Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

### Temperature and Humidity

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

### Temperature Inversions

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

### Sensitive Areas

The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

## 7.1 Aerial Equipment

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL.

FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO THE FEDERAL SUPPLEMENTAL LABEL FOR AERIAL APPLICATIONS IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS.

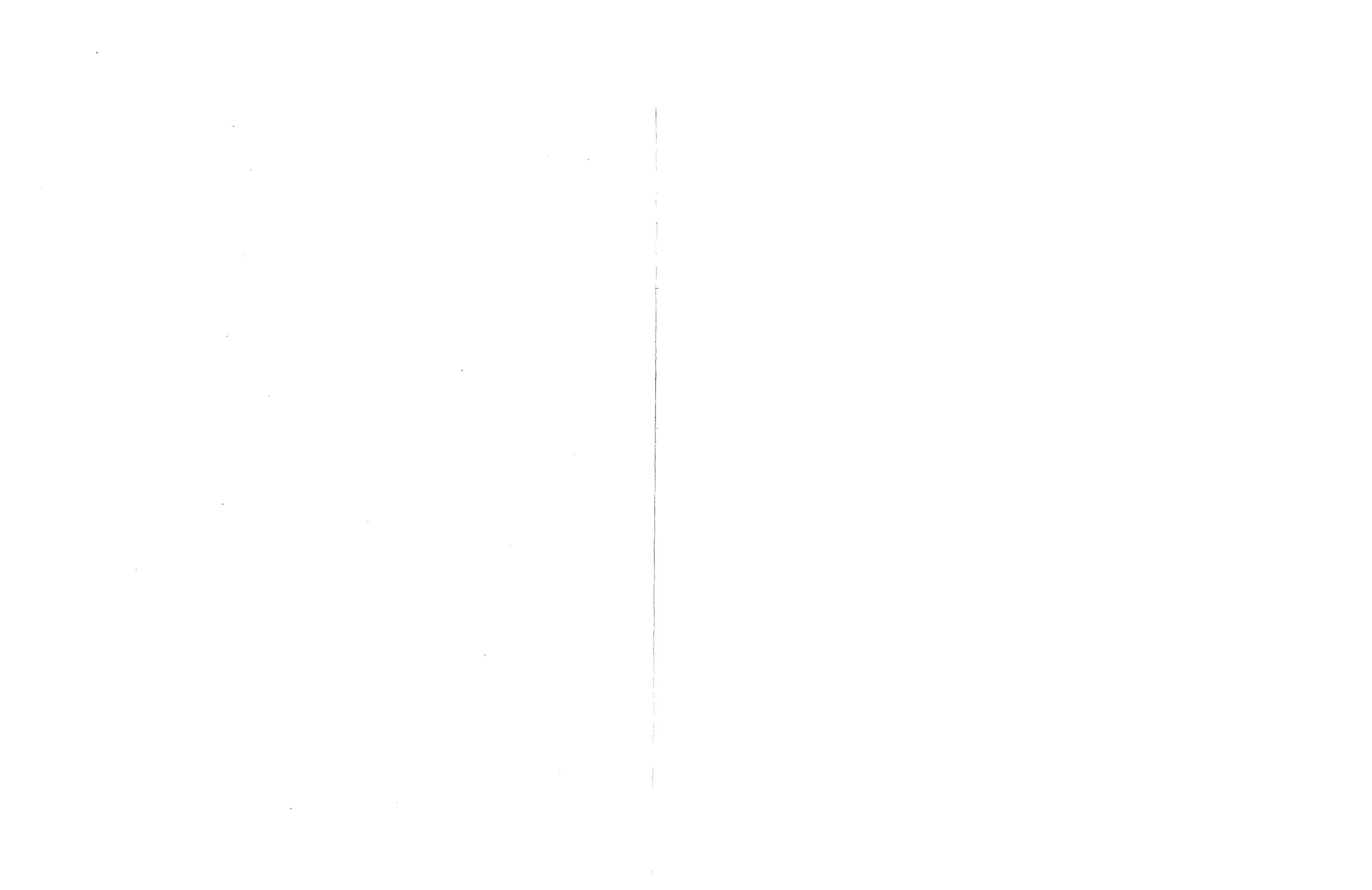
AVOID DRIFT—DO NOT APPLY DURING LOW-LEVEL INVERSION CONDITIONS, WHEN WINDS ARE GUSTY OR UNDER ANY OTHER CONDITION WHICH FAVORS DRIFT. DRIFT IS LIKELY TO CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Use the recommended rates of this product and surfactant in 3 to 20 gallons of water per acre as a broadcast spray, unless otherwise specified.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure.

Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application—To avoid streaked, uneven or overlapped application, use appropriate marking devices.



PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion. To prevent corrosion of exposed parts, thoroughly wash aircraft after each day of spraying to remove residues of this product accumulated during spraying or from spills. Landing gear are most susceptible.

## 7.2 Ground Broadcast Equipment

Use the recommended rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified. See the "WEEDS CONTROLLED" section of this label for specific rates. As density of weeds increases, spray volume should be increased within the recommended range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

## 7.3 Hand-Held and High-Volume Equipment

### Use Coarse Sprays Only

For control of weeds listed in this label using backpack or knapsack sprayers or high-volume spraying equipment utilizing handguns or other suitable nozzle arrangements. Prepare a 3/4 to 2 percent solution of this product in water, add a nonionic surfactant and apply to foliage of vegetation to be controlled. For specific rates of application and instructions for control of various annual and perennial weeds, see the "WEEDS CONTROLLED" section in this label.

Applications should be made on a spray-to-wet basis. Spray coverage should be uniform and complete. Do not spray to point of runoff.

This product may be used as a 5 to 8 percent solution for low-volume directed sprays for spot treatment of trees and brush. It is most effective in areas where there is a low density of undesirable trees or brush. If a straight stream nozzle is used, start the application at the top of the targeted vegetation and spray from top to bottom in a lateral zig-zag motion. Ensure that at least 50 percent of the leaves are contacted by the spray solution. For flat fan and cone nozzles and with hand-directed mist blowers, mist the application over the foliage of the targeted vegetation. Small, open-branched trees need only be treated from one side. If the foliage is thick or there are multiple root sprouts, applications must be made from several sides to ensure adequate spray coverage.

## 7.4 Selective Equipment (Wiper Applications)

A wiper or sponge applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

Wiper applications can be used to control or suppress annual and perennial weeds listed on this label. In heavy weed stands, a double application in opposite directions may improve results. See the "WEEDS CONTROLLED" section in this label for recommended timing, growth stage and other instructions for achieving optimum results.

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION AS SERIOUS INJURY OR DEATH IS LIKELY TO OCCUR.

For wick or wiper applications, mix 2 1/2 gallons of this product plus 1 quart of a nonionic surfactant with 7 1/4 gallons of clean water to prepare a 25 percent solution.

Mix only the amount of solution to be used during a 1-day period, as reduced activity may result from use of leftover solutions. Clean wiper parts immediately after using this product by thoroughly flushing with water.

## 8.0 SITE AND USE RECOMMENDATIONS

Detailed instructions follow alphabetically, by site.

Unless otherwise specified, applications may be made to control any weeds listed in the annual, perennial and woody brush tables. Refer also to the "SELECTIVE EQUIPMENT" section.

## 8.1 Aquatic and Other Noncrop Sites

When applied as directed and under the conditions described in the "WEEDS CONTROLLED" section in this label, this product will control or partially control the labeled weeds growing in the following industrial, recreational and public areas or other similar aquatic and terrestrial sites.

### Aquatic Sites

This product may be applied to emerged weeds in all bodies of fresh and brackish water which may be flowing, nonflowing or transient. This includes lakes, rivers, streams, ponds, estuaries, rice levees, seeps, irrigation and drainage ditches, canals, reservoirs, wastewater treatment facilities, wildlife habitat restoration and management areas, and similar sites.

If aquatic sites are present in the noncrop area and are part of the intended treatment, read and observe the following directions:

**This product does not control plants which are completely submerged or have a majority of their foliage under water.**

There is no restriction on the use of treated water for irrigation, recreation or domestic purposes.

Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

**NOTE:** Do not apply this product directly to water within 1/2 mile up-stream of an active potable water intake in flowing water (i.e., river, stream, etc.) or within 1/2 mile of an active potable water intake in a standing body of water such as lake, pond or reservoir. To make aquatic applications around and within 1/2 mile of active potable water intakes, the water intake must be turned off for a minimum period of 48 hours after the application. The water intake may be turned on prior to 48 hours if the glyphosate level in the intake water is below 0.7 part per million as determined by laboratory analysis. These aquatic applications may be made ONLY in those cases where there are alternative water sources or holding ponds which would permit the turning off of an active potable water intake for a minimum period of 48 hours after the applications. This restriction does NOT apply to intermittent inadvertent overspray of water in terrestrial use sites.

For treatments after drawdown of water or in dry ditches, allow 7 or more days after treatment before reintroduction of water to achieve maximum weed control. Apply this product within 1 day after drawdown to ensure application to actively growing weeds.

Floating mats of vegetation may require retreatment. Avoid wash-off of sprayed foliage by spray boat or recreational boat backwash or by rainfall within 6 hours of application. Do not re-treat within 24 hours following the initial treatment.

Applications made to moving bodies of water must be made while traveling upstream to prevent concentration of this herbicide in water. When making any bankside applications, do not overlap more than 1 foot into open water. Do not spray in bodies of water where weeds do not exist. The maximum application rate of 7 1/2 pints per acre must not be exceeded in any single broadcast application that is being made over water.

When emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill.

**Other Noncrop-Type Sites**—This product may be used to control the listed weeds in terrestrial noncrop sites and/or in aquatic sites within these areas.

Airports	Petroleum Tank Farms
Golf Courses	Pipeline, Power, Telephone & Utility Rights-of-Way
Habitat Restoration & Management Areas	Pumping Installations
Highways	Railroads
Industrial Plant Sites	Roadsides
Lumberyards	Schools
Natural Areas	Storage Areas
Parking Areas	Similar Industrial and Non-crop Sites
Parks	



## 8.2 Cut Stump Application

Cut stump treatments may be made on any site listed on this label. This product will control many types of woody brush and tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or sprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly-cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion.

When used according to directions for cut stump application, this product will CONTROL, PARTIALLY CONTROL or SUPPRESS most woody brush and tree species, some of which are listed below:

<b>Alder</b> <i>Alnus spp.</i>	<b>Poplar*</b> <i>Populus spp.</i>
<b>Coyote brush*</b> <i>Baccharis consanguinea</i>	<b>Reed, giant</b> <i>Arundo donax</i>
<b>Dogwood*</b> <i>Cornus spp.</i>	<b>Salt cedar</b> <i>Tamarix spp.</i>
<b>Eucalyptus</b> <i>Eucalyptus spp.</i>	<b>Sweet gum*</b> <i>Liquidambar styraciflua</i>
<b>Hickory*</b> <i>Carya spp.</i>	<b>Sycamore*</b> <i>Platanus occidentalis</i>
<b>Madrone</b> <i>Arbutus menziesii</i>	<b>Tan oak</b> <i>Lithocarpus densiflorus</i>
<b>Maple*</b> <i>Acer spp.</i>	<b>Willow</b> <i>Salix spp.</i>
<b>Oak</b> <i>Quercus spp.</i>	

\*This product is not approved for this use on these species in the State of California.

DO NOT MAKE CUT STUMP APPLICATIONS WHEN THE ROOTS OF DESIRABLE WOODY BRUSH OR TREES MAY BE GRAFTED TO THE ROOTS OF THE CUT STUMP. INJURY RESULTING FROM ROOT GRAFTING IS LIKELY TO OCCUR IN ADJACENT WOODY BRUSH OR TREES.

## 8.3 Habitat Restoration and Management

This product is recommended for the restoration and/or maintenance of native habitat and in wildlife management areas.

### Habitat Restoration and Management

This product may be used to control exotic, alien and other undesirable vegetation in habitat management and natural areas, including riparian and estuarine areas, and wildlife refuges. Applications can be made to allow recovery of native plant species, prior to planting desirable native species, and for similar broad spectrum vegetation control requirements. Spot treatments can be made to selectively remove unwanted plants for habitat management and enhancement.

### Wildlife Food Plots

This product may be used as a site preparation treatment prior to planting wildlife food plots. Any wildlife food species, including natives, may be planted after applying this product, or native species may be allowed to repopulate the area. If tillage is needed to prepare a seedbed, wait 7 days after application before tillage to allow translocation into underground plant parts.

## 8.4 Injection and Frill Applications

Woody vegetation may be controlled by injection or frill application of this product. Apply this product using suitable equipment which must penetrate into living tissue. Apply the equivalent of 1 ml of this product per 2 to 3 inches of trunk diameter. This is best achieved by applying 25 to 100 percent concentration of this product either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying dilute material to a continuous frill or more closely spaced cuttings. Avoid application techniques that allow runoff to occur from frill or cut areas in species that exude sap freely after frills or cutting. In species such as these, make frill or cut at an oblique angle so as to produce a cupping effect and use undiluted material. For best results, applications should be made during periods of active growth and full leaf expansion.

This treatment WILL CONTROL the following woody species:

<b>Oak</b> <i>Quercus spp.</i>	<b>Sweet gum</b> <i>Liquidambar styraciflua</i>
<b>Poplar</b> <i>Populus spp.</i>	<b>Sycamore</b> <i>Platanus occidentalis</i>

This treatment WILL SUPPRESS the following woody species:

<b>Black gum*</b> <i>Nyssa sylvatica</i>	<b>Hickory</b> <i>Carya spp.</i>
<b>Dogwood</b> <i>Cornus spp.</i>	<b>Maple, red</b> <i>Acer rubrum</i>

\*This product is not approved for this use on this species in the State of California.

DO NOT MAKE INJECTION OR FRILL APPLICATIONS WHEN THE ROOTS OF DESIRABLE WOODY BRUSH OR TREES MAY BE GRAFTED TO THE ROOTS OF THE TREATED TREES. INJURY RESULTING FROM ROOT GRAFTING IS LIKELY TO OCCUR IN ADJACENT WOODY BRUSH OR TREES.

## 8.5 Roadsides

**RELEASE OF DORMANT BERMUDAGRASS AND BAHIAGRASS**  
When applied as directed, this product will provide control or suppression of many winter annual weeds and tall fescue for effective release of dormant bermudagrass or bahiagrass. Make applications to dormant bermudagrass or bahiagrass.

For best results on winter annuals, treat when weeds are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is in or beyond the 4- to 6-leaf stage.

### WEEDS CONTROLLED

Rate recommendations for control or suppression of winter annuals and tall fescue are listed below.

Apply the recommended rates of this product in 10 to 25 gallons of water per acre plus 2 quarts nonionic surfactant per 100 gallons of total spray volume.

### WEEDS CONTROLLED OR SUPPRESSED\*

NOTE: C = Control  
S = Suppression

WEED SPECIES	RODEO FLUID OZ/ACRE					
	6	9	12	18	24	48
<b>Barley, little</b> <i>Hordeum pusillum</i>	S	C	C	C	C	C
<b>Bedstraw, catchweed</b> <i>Galium aparine</i>	S	C	C	C	C	C
<b>Bluegrass, annual</b> <i>Poa annua</i>	S	C	C	C	C	C
<b>Chervil</b> <i>Chaerophyllum tainturieri</i>	S	C	C	C	C	C
<b>Chickweed, common</b> <i>Stellaria media</i>	S	C	C	C	C	C
<b>Clover, crimson</b> <i>Trifolium incarnatum</i>	•	S	S	C	C	C
<b>Clover, large hop</b> <i>Trifolium campestre</i>	•	S	S	C	C	C
<b>Speedwell, corn</b> <i>Veronica arvensis</i>	S	C	C	C	C	C
<b>Fescue, tall</b> <i>Festuca arundinacea</i>	•	•	•	•	S	S
<b>Geranium, Carolina</b> <i>Geranium carolinianum</i>	•	•	S	S	C	C
<b>Henbit</b> <i>Lamium amplexicaule</i>	•	S	C	C	C	C
<b>Ryegrass, Italian</b> <i>Lolium multiflorum</i>	•	•	S	C	C	C
<b>Vetch, common</b> <i>Vicia sativa</i>	•	•	S	C	C	C

\*These rates apply only to sites where an established competitive turf is present.

### RELEASE OF ACTIVELY GROWING BERMUDAGRASS

NOTE: USE ONLY ON SITES WHERE BAHIAGRASS OR BERMUDAGRASS ARE DESIRED FOR GROUND COVER AND SOME TEMPORARY INJURY OR YELLOWING OF THE GRASSES CAN BE TOLERATED.

When applied as directed, this product will aid in the release of bermudagrass by providing control of annual species listed in the "WEEDS CONTROLLED" section in this label, and suppression or partial control of certain perennial weeds.



For control or suppression of those annual species listed in this label, use 3/4 to 2 1/4 pints of this product as a broadcast spray in 10 to 25 gallons of spray solution per acre, plus 2 quarts of a nonionic surfactant per 100 gallons of total spray volume. Use the lower rate when treating annual weeds below 6 inches in height (or length of runner in annual vines). Use the higher rate as size of plants increases or as they approach flower or seedhead formation.

Use the higher rate for partial control or longer-term suppression of the following perennial species. Use lower rates for shorter-term suppression of growth.

Bahiagrass	Johnsongrass**
Dallisgrass	Trumpet creeper*
Fescue (tall)	Vaseygrass

\*Suppression at the higher rate only.

\*\*Johnsongrass is controlled at the higher rate.

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment but regrowth will occur under moist conditions. Repeat applications in the same season are not recommended, since severe injury may result.

#### BAHIAGRASS SEEDHEAD AND VEGETATIVE SUPPRESSION

When applied as directed in the "NONCROP SITES" section in this label, this product will provide significant inhibition of seedhead emergence and will suppress vegetative growth for a period of approximately 45 days with single applications and approximately 120 days with sequential applications.

Apply this product 1 to 2 weeks after full green-up of bahiagrass or after the bahiagrass has been mowed to a uniform height of 3 to 4 inches. Applications must be made prior to seedhead emergence. Apply 5 fluid ounces per acre of this product, plus 2 quarts of an approved nonionic surfactant per 100 gallons of total spray volume in 10 to 25 gallons of water per acre.

Sequential applications of this product plus nonionic surfactant may be made at approximately 45-day intervals to extend the period of seedhead and vegetative growth suppression. For continued vegetative growth suppression, sequential applications must be made prior to seedhead emergence.

Apply no more than 2 sequential applications per year. As a first sequential application, apply 3 fluid ounces of this product per acre plus nonionic surfactant. A second sequential application of 2 to 3 fluid ounces per acre plus nonionic surfactant may be made approximately 45 days after the last application.

#### ANNUAL GRASS GROWTH SUPPRESSION

For growth suppression of some annual grasses, such as annual ryegrass, wild barley and wild oats growing in coarse turf on roadsides or other industrial areas, apply 3 to 4 ounces of this product in 10 to 40 gallons of spray solution per acre. Mix 2 quarts of a nonionic surfactant per 100 gallons of spray solution. Applications should be made when annual grasses are actively growing and before the seedheads are in the boot stage of development. Treatments made after seedhead emergence may cause injury to the desired grasses.

## 9.0 WEEDS CONTROLLED

### 9.1 Annual Weeds

Apply to actively growing annual grasses and broadleaf weeds.

Allow at least 3 days after application before disturbing treated vegetation. After this period the weeds may be mowed, tilled or burned. See "DIRECTIONS FOR USE," "GENERAL INFORMATION" and "MIXING AND APPLICATION INSTRUCTIONS" for labeled uses and specific application instructions.

**Broadcast Application**—Use 1 1/2 pints of this product per acre plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution if weeds are less than 6 inches tall. If weeds are greater than 6 inches tall, use 2 1/2 pints of this product per acre plus 2 or more quarts of an approved nonionic surfactant per 100 gallons of spray solution.

**Hand-Held, High-Volume Application**—Use a 3/4 to 1 1/2 percent solution of this product in water plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution and apply to foliage of vegetation to be controlled. Use the higher rate for tough-to-control species or for weeds over 24 inches tall.

When applied as directed under the conditions described in this label, this product plus nonionic surfactant WILL CONTROL the following ANNUAL WEEDS:

<b>Balsamapple**</b> <i>Momordica charantia</i>	<b>Mustard, tansy</b> <i>Descurainia pinnata</i>
<b>Barley</b> <i>Hordeum vulgare</i>	<b>Mustard, tumble</b> <i>Sisymbrium altissimum</i>
<b>Barnyardgrass</b> <i>Echinochloa crus-galli</i>	<b>Mustard, wild</b> <i>Sinapis arvensis</i>
<b>Bassia, fivehook</b> <i>Bassia hyssopifolia</i>	<b>Oats, wild</b> <i>Avena fatua</i>
<b>Bluegrass, annual</b> <i>Poa annua</i>	<b>Panicum</b> <i>Panicum spp.</i>
<b>Bluegrass, bulbous</b> <i>Poa bulbosa</i>	<b>Pennycress, field</b> <i>Thlaspi arvense</i>
<b>Brome</b> <i>Bromus spp.</i>	<b>Pigweed, redroot</b> <i>Amaranthus retroflexus</i>
<b>Buttercup</b> <i>Ranunculus spp.</i>	<b>Pigweed, smooth</b> <i>Amaranthus hybridus</i>
<b>Cheat</b> <i>Bromus secalinus</i>	<b>Puncturevine</b> <i>Tribulus terrestris</i>
<b>Cheeseweed</b> <i>Malva parviflora</i>	<b>Ragweed, common</b> <i>Ambrosia artemisiifolia</i>
<b>Chickweed, mouseear</b> <i>Cerastium vulgatum</i>	<b>Ragweed, giant</b> <i>Ambrosia trifida</i>
<b>Cocklebur</b> <i>Xanthium strumarium</i>	<b>Rocket, London</b> <i>Sisymbrium irio</i>
<b>Corn, volunteer</b> <i>Zea mays</i>	<b>Rye</b> <i>Secale cereale</i>
<b>Crabgrass</b> <i>Digitaria spp.</i>	<b>Ryegrass, Italian*</b> <i>Lolium multiflorum</i>
<b>Dwarddandelion</b> <i>Krigia cespitosa</i>	<b>Sandbur, field</b> <i>Cenchrus spp.</i>
<b>Falsethax, smallseed</b> <i>Camelina microcarpa</i>	<b>Shattercane</b> <i>Sorghum bicolor</i>
<b>Fiddleneck</b> <i>Amsinckia spp.</i>	<b>Shepherd's-purse</b> <i>Capsella bursa-pastoris</i>
<b>Flaxleaf fleabane</b> <i>Conyza bonariensis</i>	<b>Signalgrass, broadleaf</b> <i>Brachiaria platyphylla</i>
<b>Fleabane</b> <i>Erigeron spp.</i>	<b>Smartweed, Pennsylvania</b> <i>Polygonum pennsylvanicum</i>
<b>Foxtail</b> <i>Setaria spp.</i>	<b>Sowthistle, annual</b> <i>Sonchus oleraceus</i>
<b>Foxtail, Carolina</b> <i>Alopecurus carolinianus</i>	<b>Spanishneedles*</b> <i>Bidens bipinnata</i>
<b>Groundsel, common</b> <i>Senecio vulgaris</i>	<b>Stinkgrass</b> <i>Eragrostis ciliaris</i>
<b>Horseweed/Marestail</b> <i>Conyza canadensis</i>	<b>Sunflower</b> <i>Helianthus annuus</i>
<b>Kochia</b> <i>Kochia scoparia</i>	<b>Thistle, Russian</b> <i>Salsola kali</i>
<b>Lambsquarters, common</b> <i>Chenopodium album</i>	<b>Spurry, umbrella</b> <i>Holosteum umbellatum</i>
<b>Lettuce, prickly</b> <i>Lactuca serriola</i>	<b>Velvetleaf</b> <i>Abutilon theophrasti</i>
<b>Morningglory</b> <i>Ipomoea spp.</i>	<b>Wheat</b> <i>Triticum aestivum</i>
<b>Mustard, blue</b> <i>Chorispora tenella</i>	<b>Witchgrass</b> <i>Panicum capillare</i>

\*Apply 3 pints of this product per acre.

\*\*Apply with hand-held equipment only.

Annual weeds will generally continue to germinate from seed throughout the growing season. Repeat treatments will be necessary to control later germinating weeds.



## 9.2 Perennial Weeds

Apply a 3/4 to 1 1/2 percent solution of this product to control or destroy most vigorously growing perennial weeds. Add 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution to the rates of this product given in this list. See the "GENERAL INFORMATION," "DIRECTIONS FOR USE" and "MIXING AND APPLICATION" sections in this label for specific uses and application instructions.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed spot treatments, apply a 5 to 8 percent solution of this product.

Unless otherwise directed, allow at least 7 days after application before disturbing vegetation. If weeds have been mowed or tilled, do not treat until regrowth has reached the recommended stages. Fall treatments must be applied before a killing frost.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed.

When applied as recommended under the conditions described, this product plus surfactant WILL CONTROL the following PERENNIAL WEEDS:

<b>Alfalfa</b> <i>Medicago sativa</i>	<b>Fescue, tall</b> <i>Festuca arundinacea</i>
<b>Alligatorweed*</b> <i>Alternanthera philoxeroides</i>	<b>Guineagrass</b> <i>Panicum maximum</i>
<b>Anise/Fennel</b> <i>Foeniculum vulgare</i>	<b>Hemlock, poison</b> <i>Conium maculatum</i>
<b>Artichoke, Jerusalem</b> <i>Helianthus tuberosus</i>	<b>Horsenettle</b> <i>Solanum carolinense</i>
<b>Bahlagrass</b> <i>Paspalum notatum</i>	<b>Horseradish</b> <i>Armoracia rusticana</i>
<b>Beachgrass, European</b> <i>Ammophila arenaria</i>	<b>Ice Plant</b> <i>Carpobrotus edulis</i>
<b>Bermudagrass</b> <i>Cynodon dactylon</i>	<b>Ivy, German, cape</b> <i>Senecio mikanoides</i> <i>Delairea odorata</i>
<b>Bindweed, field</b> <i>Convolvulus arvensis</i>	<b>Johnsongrass</b> <i>Sorghum halepense</i>
<b>Bluegrass, Kentucky</b> <i>Poa pratensis</i>	<b>Kikuyugrass</b> <i>Pennisetum clandestinum</i>
<b>Blueweed, Texas</b> <i>Helianthus ciliaris</i>	<b>Knapweed, Russian</b> <i>Centaurea repens</i>
<b>Brackenfern</b> <i>Pteridium spp.</i>	<b>Lantana</b> <i>Lantana camara</i>
<b>Bromegrass, smooth</b> <i>Bromus inermis</i>	<b>Lespedeza: common, serices</b> <i>Lespedeza striata</i> <i>Lespedeza cuneata</i>
<b>Canarygrass, reed</b> <i>Phalaris arundinacea</i>	<b>Loosestrife, purple</b> <i>Lythrum salicaria</i>
<b>Cattail</b> <i>Typha spp.</i>	<b>Lotus, American</b> <i>Nelumbo lutea</i>
<b>Clover, red</b> <i>Trifolium pratense</i>	<b>Maldenecane</b> <i>Panicum hematomon</i>
<b>Clover, white</b> <i>Trifolium repens</i>	<b>Milkweed</b> <i>Asclepias spp.</i>
<b>Cogongrass</b> <i>Imperata cylindrica</i>	<b>Muhly, wirestem</b> <i>Muhlenbergia frondosa</i>
<b>Cordgrass</b> <i>Spartina spp.</i>	<b>Mullein, common</b> <i>Verbascum thapsus</i>
<b>Culgrass, giant*</b> <i>Zizaniopsis miliacea</i>	<b>Napiergrass</b> <i>Pennisetum purpureum</i>
<b>Dallisgrass</b> <i>Paspalum dilatatum</i>	<b>Nightshade, silverleaf</b> <i>Solanum elaeagnifolium</i>
<b>Dandelion</b> <i>Taraxacum officinale</i>	<b>Nutsedge: purple</b> <i>Cyperus rotundus</i>
<b>Dock, curly</b> <i>Rumex crispus</i>	<b>yellow</b> <i>Cyperus esculentus</i>
<b>Dogbane, hemp</b> <i>Apocynum cannabinum</i>	<b>Orchardgrass</b> <i>Dactylis glomerata</i>
<b>Fescue</b> <i>Festuca spp.</i>	

**Pampasgrass**  
*Cortaderia jubata*

**Paragrass**  
*Brachiaria mutica*

**Pepperweed, perennial**  
*Lepidium latifolium*

**Phragmites\*\***  
*Phragmites spp.*

**Quackgrass**  
*Agropyron repens*

**Reed, giant**  
*Arundo donax*

**Ryegrass, perennial**  
*Lolium perenne*

**Smartweed, swamp**  
*Polygonum coccineum*

**Spatterdock**  
*Nuphar luteum*

**Starthistle, yellow**  
*Centaurea solstitialis*

**Sweet potato, wild\***  
*Ipomoea pandurata*

\*Partial control.

\*\*Partial control in southeastern states. See specific recommendations below.

**Alligatorweed**—Apply 6 pints of this product per acre as a broadcast spray or as a 1 1/4 percent solution with hand-held equipment to provide partial control of alligatorweed. Apply when most of the target plants are in bloom. Repeat applications will be required to maintain such control.

**Bermudagrass**—Apply 7 1/2 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment. Apply when target plants are actively growing and when seed heads appear.

**Bindweed, field / Silverleaf Nightshade / Texas Blueweed**—Apply 6 to 7 1/2 pints of this product per acre as a broadcast spray west of the Mississippi River and 4 1/2 to 6 pints of this product per acre east of the Mississippi River. With hand-held equipment, use a 1 1/2 percent solution. Apply when target plants are actively growing and are at or beyond full bloom. For silverleaf nightshade, best results can be obtained when application is made after berries are formed. Do not treat when weeds are under drought stress. New leaf development indicates active growth. For best results apply in late summer or fall.

**Brackenfern**—Apply 4 1/2 to 6 pints of this product per acre as a broadcast spray or as a 3/4 to 1 percent solution with hand-held equipment. Apply to fully expanded fronds which are at least 18 inches long.

**Cattail**—Apply 4 1/2 to 6 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Apply when target plants are actively growing and are at or beyond the early-to-full bloom stage of growth. Best results are achieved when application is made during the summer or fall months.

**Cogongrass**—Apply 4 1/2 to 7 1/2 pints of this product per acre as a broadcast spray. Apply when cogongrass is at least 18 inches tall and actively growing in late summer or fall. Allow 7 or more days after application before tillage or mowing. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.

**Cordgrass**—Apply 4 1/2 to 7 1/2 pints of this product per acre as a broadcast spray or as a 1 to 2 percent solution with hand-held equipment. Schedule applications in order to allow 6 hours before treated plants are covered by tidewater. The presence of debris and silt on the cordgrass plants will reduce performance. It may be necessary to wash targeted plants prior to application to improve uptake of this product into the plant.

**Cutgrass, giant**—Apply 6 pints of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment to provide partial control of giant cutgrass. Repeat applications will be required to maintain such control, especially where vegetation is partially submerged in water. Allow for substantial regrowth to the 7- to 10-leaf stage prior to retreatment.

**Thistle, artichoke**  
*Cynara cardunculus*

**Thistle, Canada**  
*Cirsium arvense*

**Timothy**  
*Phleum pratense*

**Torpedograss\***  
*Panicum repens*

**Tules, common**  
*Scirpus acutus*

**Vaseygrass**  
*Paspalum urvillei*

**Velvetgrass**  
*Holcus spp.*

**Waterhyacinth**  
*Eichornia crassipes*

**Waterlettuce**  
*Pistia stratiotes*

**Waterprimrose**  
*Ludwigia spp.*

**Wheatgrass, western**  
*Agropyron smithii*



**Dogbane, hemp / Knapweed / Horseradish**—Apply 6 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the late bud-to-flower stage of growth. For best results, apply in late summer or fall.

**Fescue, tall**—Apply 4 1/2 pints of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the boot-to-head stage of growth. When applied prior to the boot stage, less desirable control may be obtained.

**Guineagrass**—Apply 4 1/2 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Apply when target plants are actively growing and when most have reached at least the 7-leaf stage of growth.

**Johnsongrass / Bluegrass, Kentucky / Bromegrass, smooth / Canarygrass, reed / Orchardgrass / Ryegrass, perennial / Timothy / Wheatgrass, western**—Apply 3 to 4 1/2 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the boot-to-head stage of growth. When applied prior to the boot stage, less desirable control may be obtained. In the fall, apply before plants have turned brown.

**Lantana**—Apply this product as a 3/4 to 1 percent solution with hand-held equipment. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth.

**Loosestrife, purple**—Apply 4 pints of this product per acre as a broadcast spray or as a 1 to 1 1/2 percent solution using hand-held equipment. Treat when plants are actively growing at or beyond the bloom stage of growth. Best results are achieved when application is made during summer or fall months. Fall treatments must be applied before a killing frost.

**Lotus, American**—Apply 4 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Treat when plants are actively growing at or beyond the bloom stage of growth. Best results are achieved when application is made during summer or fall months. Fall treatments must be applied before a killing frost. Repeat treatment may be necessary to control regrowth from underground parts and seeds.

**Maldenecane / Paragrass**—Apply 6 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Repeat treatments will be required, especially to vegetation partially submerged in water. Under these conditions, allow for regrowth to the 7- to 10-leaf stage prior to retreatment.

**Milkweed, common**—Apply 4 1/2 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the late bud-to-flower stage of growth.

**Nutsedge: purple, yellow**—Apply 4 1/2 pints of this product per acre as a broadcast spray, or as a 3/4 percent solution with hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Apply when target plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control.

**Pampasgrass**—Apply a 1 1/2 percent solution of this product with hand-held equipment when plants are actively growing.

**Phragmites**—For partial control of phragmites in Florida and the counties of other states bordering the Gulf of Mexico, apply 7 1/2 pints per acre as a broadcast spray or apply a 1 1/2 percent solution with hand-held equipment. In other areas of the U.S., apply 4 to 6 pints per acre as a broadcast spray or apply a 3/4 percent solution with hand-held equipment for partial control. For best results, treat during late summer or fall months when plants are actively growing and in full bloom. Due to the dense nature of the vegetation, which may prevent good spray coverage and uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptoms will be slow to develop.

**Quackgrass / Kikuyugrass / Muhly, wirestem**—Apply 3 to 4 1/2 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment when most quackgrass or wirestem muhly is at least 8 inches in height (3- to 4-leaf stage of growth) and actively growing. Allow 3 or more days after application before tillage.

**Reed, giant / Ice Plant**—For control of giant reed and ice plant, apply a 1 1/2 percent solution of this product with hand-held equipment when plants are actively growing. For giant reed, best results are obtained when applications are made in late summer to fall.

**Spatterdock**—Apply 6 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Apply when most plants are in full bloom. For best results, apply during the summer or fall months.

**Sweet potato, wild**—Apply this product as a 1 1/2 percent solution using hand-held equipment. Apply to actively growing weeds that are at or beyond the bloom stage of growth. Repeat applications will be required. Allow the plant to reach the recommended stage of growth before retreatment.

**Thistle: Canada, artichoke**—Apply 3 to 4 1/2 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment for Canada thistle. To control artichoke thistle, apply a 2 percent solution as a spray-to-wet application. Apply when target plants are actively growing and are at or beyond the bud stage of growth.

**Torpedograss**—Apply 6 to 7 1/2 pints of this product per acre as a broadcast spray or as a 3/4 to 1 1/2 percent solution with hand-held equipment to provide partial control of torpedograss. Use the lower rates under terrestrial conditions, and the higher rates under partially submerged or a floating mat condition. Repeat treatments will be required to maintain such control.

**Tules, common**—Apply this product as a 1 1/2 percent solution with hand-held equipment. Apply to actively growing plants at or beyond the seedhead stage of growth. After application, visual symptoms will be slow to appear and may not occur for 3 or more weeks.

**Waterhyacinth**—Apply 5 to 6 pints of this product per acre as a broadcast spray or apply a 3/4 to 1 percent solution with hand-held equipment. Apply when target plants are actively growing and at or beyond the early bloom stage of growth. After application, visual symptoms may require 3 or more weeks to appear with complete necrosis and decomposition usually occurring within 60 to 90 days. Use the higher rates when more rapid visual effects are desired.

**Waterlettuce**—For control, apply a 3/4 to 1 percent solution of this product with hand-held equipment to actively growing plants. Use higher rates where infestations are heavy. Best results are obtained from mid-summer through winter applications. Spring applications may require retreatment.

**Waterprimrose**—Apply this product as a 3/4 percent solution using hand-held equipment. Apply to plants that are actively growing at or beyond the bloom stage of growth, but before fall color changes occur. Thorough coverage is necessary for best control.

**Other perennials listed on this label**—Apply 4 1/2 to 7 1/2 pints of this product per acre as a broadcast spray or as a 3/4 to 1 1/2 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached early head or early bud stage of growth.

## 9.3 Woody Brush and Trees

Apply a 1 to 2 percent solution of this product to control or partially control the woody brush and tree species listed below. Add 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution to the rates of this product given in this list. See the "GENERAL INFORMATION," "DIRECTIONS FOR USE" and "MIXING AND APPLICATION" sections in this label for specific uses and application instructions.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed spot treatments, apply a 5 to 8 percent solution of this product.



When applied as recommended under the conditions described, this product plus surfactant CONTROLS or PARTIALLY CONTROLS the following woody brush plants and trees:

<b>Alder</b> <i>Alnus spp.</i>	<b>Honeysuckle</b> <i>Lonicera spp.</i>
<b>Ash*</b> <i>Fraxinus spp.</i>	<b>Hornbeam, American</b> <i>Carpinus caroliniana</i>
<b>Aspen, quaking</b> <i>Populus tremuloides</i>	<b>Huckleberry</b> <i>Vaccinium spp.</i>
<b>Bearclover, Bearmat</b> <i>Chamaebatia foliolosa</i>	<b>Kudzu</b> <i>Pueraria lobata</i>
<b>Birch</b> <i>Betula spp.</i>	<b>Locust, black*</b> <i>Robinia pseudoacacia</i>
<b>Blackberry</b> <i>Rubus spp.</i>	<b>Magnolia, sweetbay</b> <i>Magnolia virginiana</i>
<b>Broom:</b>	<b>Manzanita</b>
<b>French</b> <i>Cytisus monspessulanus</i>	<i>Arctostaphylos spp.</i>
<b>Scotch</b> <i>Cytisus scoparius</i>	<b>Maple:</b>
<b>Buckwheat, California*</b> <i>Eriogonum fasciculatum</i>	<b>Red**</b>
<b>Cascara*</b> <i>Rhamnus purshiana</i>	<i>Acer rubrum</i>
<b>Castorbean</b> <i>Ricinus communis</i>	<b>Sugar</b> <i>Acer saccharum</i>
<b>Catsclaw*</b> <i>Acacia greggi</i>	<b>Vine*</b> <i>Acer circinatum</i>
<b>Ceanothus</b> <i>Ceanothus spp.</i>	<b>Monkey Flower*</b> <i>Mimulus guttatus</i>
<b>Chamise</b> <i>Adenostoma fasciculatum</i>	<b>Oak:</b>
<b>Cherry:</b>	<b>Black*</b> <i>Quercus velutina</i>
<b>Biller</b> <i>Prunus emarginata</i>	<b>Northern pine</b> <i>Quercus palustris</i>
<b>Black</b> <i>Prunus serotina</i>	<b>Post</b> <i>Quercus stellata</i>
<b>Pin</b> <i>Prunus pensylvanica</i>	<b>Red</b> <i>Quercus rubra</i>
<b>Cottonwood, eastern</b> <i>Populus deltoides</i>	<b>Southern red</b> <i>Quercus falcata</i>
<b>Coyote brush</b> <i>Baccharis consanguinea</i>	<b>White*</b> <i>Quercus alba</i>
<b>Creepers, Virginia*</b> <i>Parthenocissus quinquefolia</i>	<b>Orange, Osage</b> <i>Maclura pomifera</i>
<b>Cypress, swamp, bald</b> <i>Taxodium distichum</i>	<b>Peppertree, Brazilian (Florida Holly)</b> <i>Schinus terebinthifolius</i>
<b>Deerweed</b> <i>Lotus scoparius</i>	<b>Persimmon*</b> <i>Diospyros spp.</i>
<b>Dewberry</b> <i>Rubus trivialis</i>	<b>Poison Ivy</b> <i>Rhus radicans</i>
<b>Dogwood</b> <i>Cornus spp.</i>	<b>Poison Oak</b> <i>Rhus toxicodendron</i>
<b>Elderberry</b> <i>Sambucus spp.</i>	<b>Poplar, yellow*</b> <i>Liriodendron tulipifera</i>
<b>Elm*</b> <i>Ulmus spp.</i>	<b>Prunus</b> <i>Prunus spp.</i>
<b>Eucalyptus, bluegum</b> <i>Eucalyptus globulus</i>	<b>Raspberry</b> <i>Rubus spp.</i>
<b>Gallberry</b> <i>Ilex glabra</i>	<b>Redbud, eastern</b> <i>Cercis canadensis</i>
<b>Hackberry, western</b> <i>Celtis occidentalis</i>	<b>Redcedar, eastern</b> <i>Juniperus virginiana</i>
<b>Hasardla*</b> <i>Haplopappus squamosus</i>	<b>Rose, multiflora</b> <i>Rosa multiflora</i>
<b>Hawthorn</b> <i>Crataegus spp.</i>	<b>Russian-olive</b> <i>Elaeagnus angustifolia</i>
<b>Hazel</b> <i>Corylus spp.</i>	<b>Sage, black, white</b> <i>Salvia spp.</i>
<b>Hickory</b> <i>Carya spp.</i>	<b>Sagebrush, California</b> <i>Artemisia californica</i>
	<b>Salmonberry</b> <i>Rubus spectabilis</i>
	<b>Saltcedar, tamarisk*</b> <i>Tamarix spp.</i>
	<b>Saltbush, Sea myrtle</b> <i>Baccharis halimifolia</i>

<b>Sassafras</b> <i>Sassafras albidum</i>	<b>Tallowtree, Chinese</b> <i>Sapium sebiferum</i>
<b>Sourwood*</b> <i>Oxydendrum arboreum</i>	<b>Thimbleberry</b> <i>Rubus parviflorus</i>
<b>Sumac:</b>	<b>Tobacco, tree*</b> <i>Nicotiana glauca</i>
<b>Laurel*</b> <i>Rhus toxicodendron</i>	<b>Toyon*</b> <i>Herteromeles arbutifolia</i>
<b>Poison*</b> <i>Rhus vernix</i>	<b>Trumpetcreeper</b> <i>Campsis radicans</i>
<b>Smooth*</b> <i>Rhus glabra</i>	<b>Waxmyrtle, southern*</b> <i>Myrica cerifera</i>
<b>Sugarbush*</b> <i>Rhus ovata</i>	<b>Willow</b> <i>Salix spp.</i>
<b>Winged*</b> <i>Rhus copallina</i>	<b>Yerbasenta, California</b> <i>Eriodictyon californicum</i>
<b>Sweet gum</b> <i>Liquidambar styraciflua</i>	
<b>Swordfern*</b> <i>Polystichum munitum</i>	

\*Partial control

\*\*See below for control or partial control instruction.

**NOTE:** If brush has been mowed or tilled or trees have been cut, do not treat until regrowth has reached the recommended stage of growth.

Apply the recommended rate of this product plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution when plants are actively growing and, unless otherwise directed, after full-leaf expansion. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when application is made in the spring or early summer when brush species are at high moisture content and are flowering. Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

See the "DIRECTIONS FOR USE" and "MIXING AND APPLICATION INSTRUCTIONS" sections in this label for labeled use and specific application instructions.

Applied as a 5 to 8 percent solution as a directed application as described in the "HAND-HELD AND HIGH-VOLUME EQUIPMENT" section, this product will control or partially control all species listed in this section of this label. Use the higher rate of application for dense stands and larger woody brush and trees.

Apply the product as follows to control or partially control the following woody brush and trees.

**Alder / Blackberry / Dewberry / Honeysuckle / Oak, Post / Raspberry**—For control, apply 4 1/2 to 6 pints per acre as a broadcast spray or as a 3/4 to 1 1/4 percent solution with hand-held equipment.

**Aspen, quaking / Hawthorn / Trumpetcreeper**—For control, apply 3 to 4 1/4 pints of this product per acre as a broadcast spray or as a 3/4 to 1 1/4 percent solution with hand-held equipment.

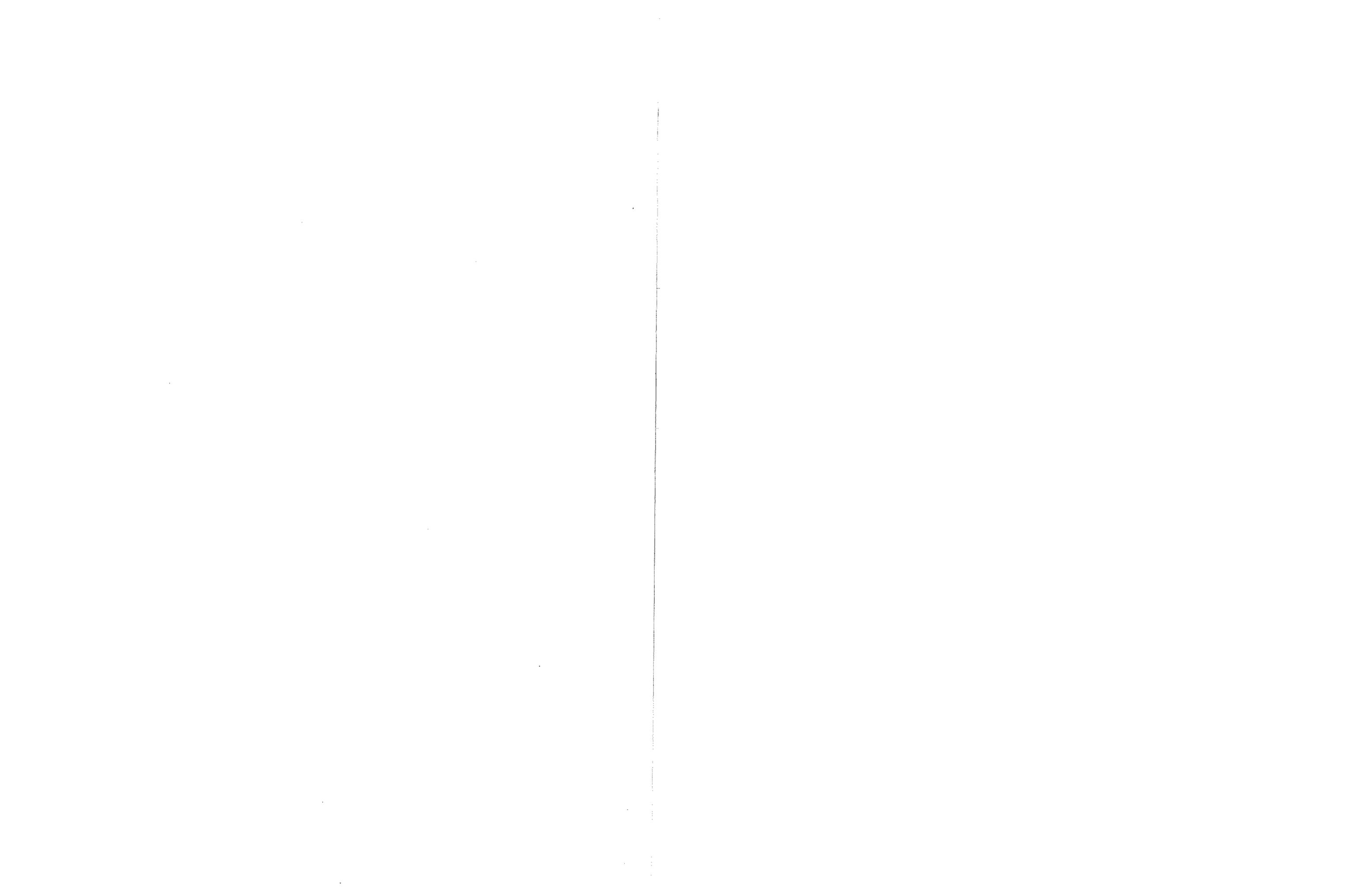
**Birch / Elderberry / Hazel / Salmonberry / Thimbleberry**—For control, apply 3 pints per acre of this product as a broadcast spray or as a 3/4 percent solution with hand-held equipment.

**Broom: French, Scotch**—For control, apply a 1 1/4 to 1 1/2 percent solution with hand-held equipment.

**Buckwheat, California / Hasardla / Monkey Flower / Tobacco, tree**—For partial control of these species, apply a 3/4 to 1 1/2 percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

**Castorbean**—For control, apply a 1 1/2 percent solution of this product with hand-held equipment.

**Catsclaw**—For partial control, apply a 1 1/4 to 1 1/2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.



**Cherry: Bitter, Black, Pin / Oak, Southern Red / Sweet gum / Prunus**—For control, apply 3 to 7 1/2 pints of this product per acre as a broadcast spray or as a 1 to 1 1/2 percent solution with hand-held equipment.

**Coyote brush**—For control, apply a 1 1/4 to 1 1/2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

**Dogwood / Hickory / Saltcedar, tamarisk**—For partial control, apply a 1 to 2 percent solution of this product with hand-held equipment or 6 to 7 1/2 pints per acre as a broadcast spray.

**Eucalyptus, bluegum**—For control of eucalyptus resprouts, apply a 1 1/2 percent solution of this product with hand-held equipment when resprouts are 6- to 12-feet tall. Ensure complete coverage. Apply when plants are actively growing. Avoid application to drought-stressed plants.

**Kudzu**—For control, apply 6 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment. Repeat applications will be required to maintain control.

**Maple, Red**—For control, apply as a 3/4 to 1 1/4 percent solution with hand-held equipment when leaves are fully developed. For partial control, apply 2 to 7 1/2 pints of this product per acre as a broadcast spray.

**Maple, Sugar / Oak: Northern Pin, Red**—For control, apply as a 3/4 to 1 1/4 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

**Peppertree, Brazilian (Holly, Florida) / Waxmyrtle, southern**—For partial control, apply this product as a 1 1/2 percent solution with hand-held equipment.

**Poison Ivy / Poison Oak**—For control, apply 6 to 7 1/2 pints of this product per acre as a broadcast spray or as a 1 1/2 percent solution with hand-held equipment. Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.

**Rose, multiflora**—For control, apply 3 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment. Treatments should be made prior to leaf deterioration by leaf-feeding insects.

**Sage, black / Sagebrush, California / Chamise / Tailortree, Chinese**—For control of these species, apply a 3/4 percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

**Sailbush, Sea myrtle**—For control, apply this product as a 1 percent solution with hand-held equipment.

**Willow**—For control, apply 4 1/2 pints of this product per acre as a broadcast spray or as a 3/4 percent solution with hand-held equipment.

**Other woody brush and trees listed in this label**—For partial control, apply 3 to 7 1/2 pints of this product per acre as a broadcast spray or as a 3/4 to 1 1/2 percent solution with hand-held equipment.

## 10.0 LIMIT OF WARRANTY AND LIABILITY

Monsanto Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

This Company does not warrant any product reformulated or repackaged from this product except in accordance with this Company's stewardship requirements and with express written permission of this Company.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

Upon opening and using this product, buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement. If terms are not acceptable, return at once unopened.

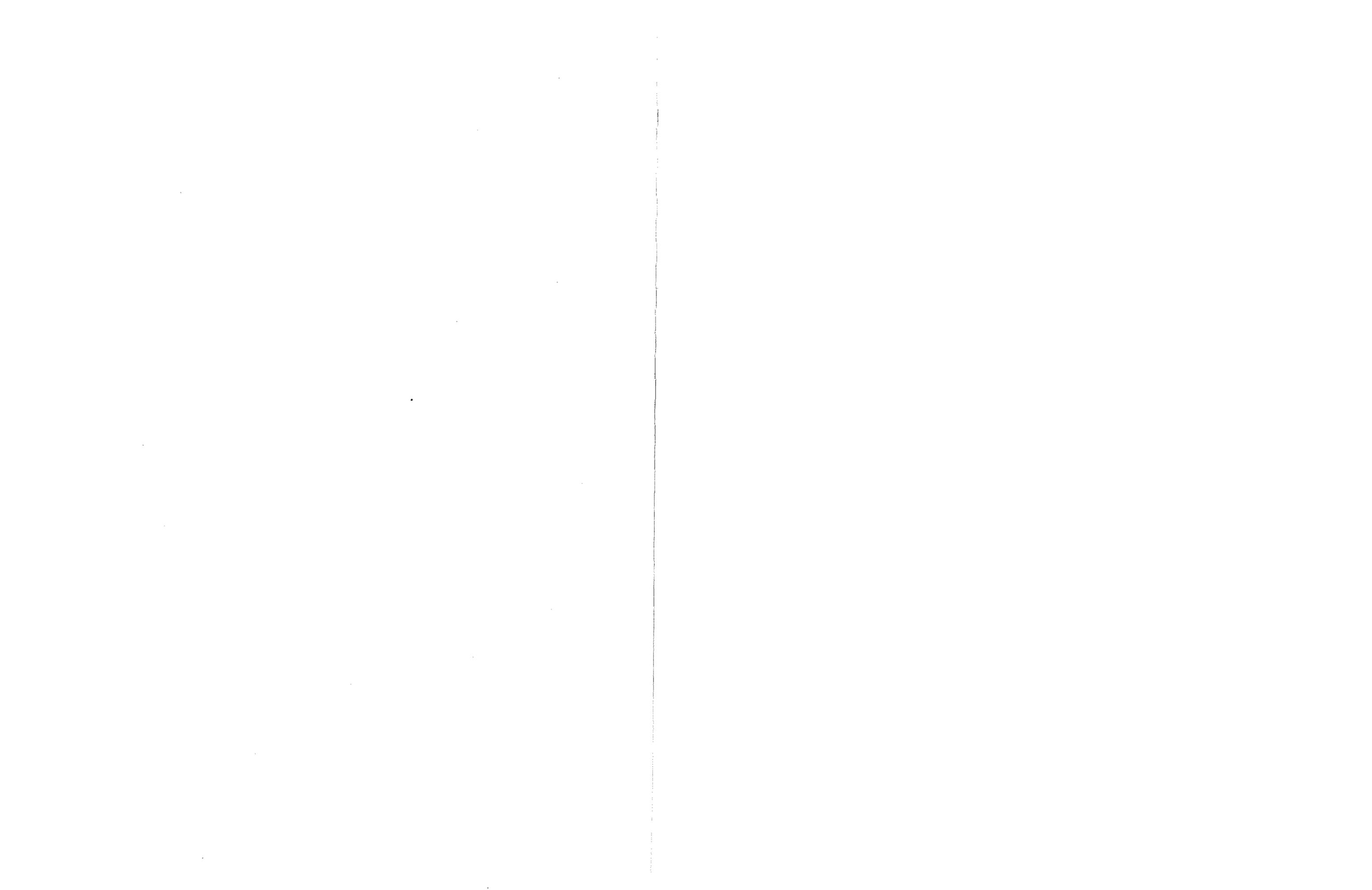
This product is protected by U.S. Patent No. 4,405,531.  
Other patents pending.  
No license granted under any non-U.S. patent(s)

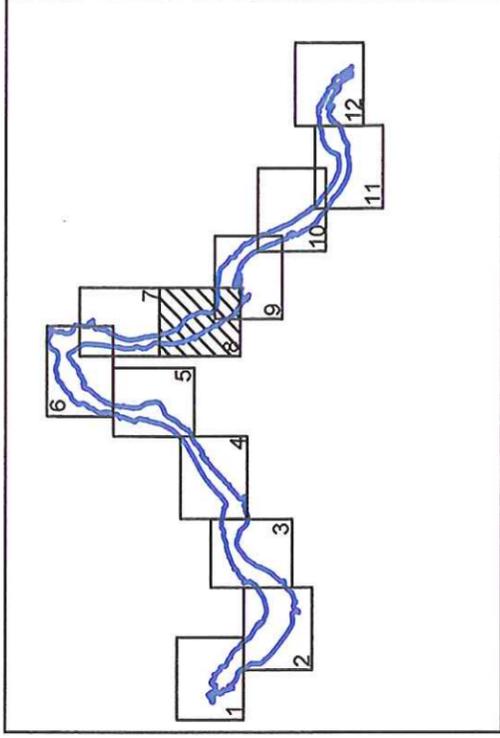
EPA Reg. No. 524-343

In case of an emergency involving this product,  
Call Collect, day or night, (314) 694-4000.

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Matchline Sheet 7

Felton Road

Matchline Sheet 9



### Legend

- Matchlines
- Campgrounds/Resorts
- Roads
- Boat Launch
- Lythrum salicaria (Purple loosestrife)
- Lake Shoreline
- Myriophyllum spicatum (Eurasian milfoil)
- Nymphaeoides peltata/Nymphaea odorata (Yellow Floating Heart/White Lily)
- Nymphaea odorata (White Lily)
- Potamogeton spp. (Pondweed), Elodea canadensis (Water weed), Ceratophyllum demersum (Coontail)
- Upstream Islands
- Long Lake Dam



Lake Spokane Aquatic Plant Survey  
Spokane, Washington

July 2000

FIGURE 12



Stevens County  
Conservation District



