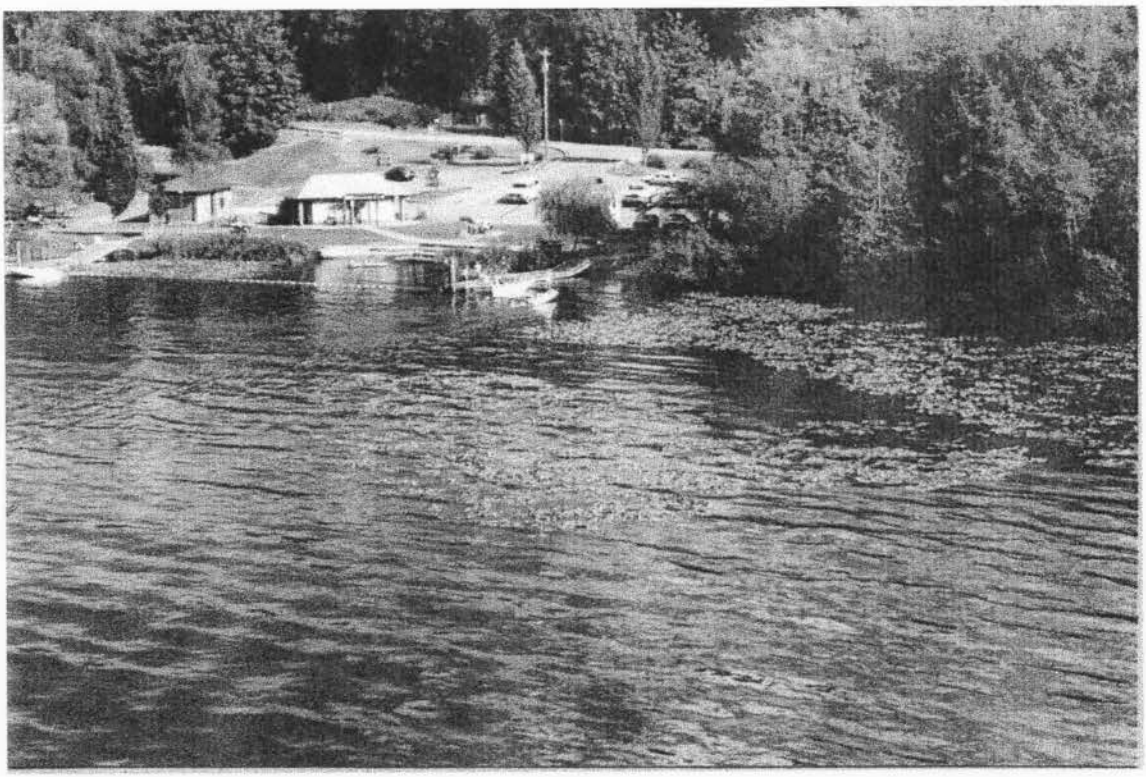
Draft II

Kitsap Lake
Integrated Aquatic Plant Management Plan

June 1999

Bremerton Parks and Recreation Department



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"Committed to Enriching Life in Bremerton"

Acknowledgements

The Bremerton Parks and Recreation Department wishes to acknowledge the support of members of the steering committee for assisting with the development of the Kitsap Lake Aquatic Plant Management Plan. Members include:

Horace Burks
John Carlson
John Cattell
Roger Hudson
Ruth Kuhlman
John McKay
John Mitchell
Jeff Pfost
Ben Zlateff

Additional input was received from Jack Lefcoski and Scott Sandin, representatives for Citizens for the Preservation of Kitsap County Lakes. Dale Thoemke conducted the two underwater lake filmings, providing a visual look at the weed issues.

Kathy Hamel, Aquatic Plant Specialist with the Department of Ecology was most helpful in plant identification.

Staff support from Jim Spencer, Interim Parks & Recreation Director and Tom Cressman, Maintenance Foreman, was greatly appreciated and invaluable to the completion of this manual.

Dana Zlateff provided consulting services, specifically related to water quality and plant identification and remediation recommendations.

This project was funded in part by the Community Development Block Grant, with supervision by Debbie Peavler-Stewart. In-kind services were provided by the City of Bremerton, Parks and Recreation Department and Becky Lorber, Recreation Programmer.

PROJECT OVERVIEW

Kitsap Lake is located in the City of Bremerton in Kitsap County. The lake encompasses 238 surface acres with the deepest point measuring 29.9', with an average depth of approximately 11 feet. There is one unnamed tributary stream at the south end that feeds into the lake year-round, with numerous smaller streams contributing on a seasonal basis. Particularly noteworthy is the overflow from Carter's Pond entering into the lake's northern end. Groundwater and stormwater runoff from the watershed are additional sources of incoming water. The surface water leaves the lake via Kitsap Creek to the northwest. The lake has a State Fish and Wildlife boat launch on the southwest shore, Camp McKean, a US Navy recreation facility, residential dwellings, as well as Kitsap Lake Park run by Bremerton Parks and Recreation Department. The park has a public boat launch, swimming area, fishing pier, and picnic and restroom facilities.

Presently the water quality in Kitsap Lake is characterized as good and is rated as mesotrophic in terms of biological productivity and trophic state. However the lake has a high phosphorus level possibly resulting from stormwater runoff. Citizen input via a survey on weed issues and concerns led to the Bremerton Parks and Recreation Department successfully submitting a CDBG planning grant request to determine the extent and treatment for long-term control of aquatic plants in Kitsap Lake. The Steering Committee was formed from responders to the survey, and first met in March 1998.

Only native plants were identified in the actual plant surveys, with the heaviest concentration found in the southern end of Kitsap Lake. To date, no recorded herbicide applications have been used to control aquatic plants in the lake. This report provides a description of the aquatic plant control plan developed for Kitsap Lake. The basic recommendations selected are:

- Use of Rodeo for surface plants and Aquathol (Endothal®) for submerged plants for controlling "weed creep" in the southern end of the lake while expanding recreational opportunities.
- Installation of a bottom barrier fabric (such as Texel®), for the long-term control of native submerged plants in the swimming area at Kitsap Lake Park.
- Establish an Aquatic Plant Advisory Committee for Kitsap Lake, within twelve months of the adoption of this plan, whose function is to make decisions annually about controls needed, and review aquatic plant management goals.
- Implement an education and prevention program as a means to control potential increased aquatic plant concerns and problems throughout the lake and provide informational material for lake residents interested in applying for individual permits.
- Ensure that determination of acceptable lake levels incorporate concerns about the impact it has on weed growth and retention.
- Ensure that Kitsap Lake is included in all Stormwater Mangement Plans for potential future funds for weed control efforts.

PUBLIC INVOLVEMENT

Public involvement for this project has included steering committee meetings, and public meetings. Each element is described below.

The Kitsap Lake Steering Committee was organized in March 1998, to guide the development of an Integrated Aquatic Plant Management Plan for this lake. They met a total of ten times between March 1998-June 1999. During this time the steering committee completed Chapters 3-7 of the DOE Integrated Aquatic Plant Manual, including conducting the public meetings and reviewed material from Chapters 8-13.

Two public meetings were sponsored by the Kitsap Lake Steering Committee and the Bremerton Parks and Recreation Department. The first was held on May 18, 1998 for the purpose of providing background information on the lake, presenting the problem and statement and management goals drafted by the steering committee, and seeking comments and questions from the public. The second public meeting was held June 14, 1999 to receive public comment on the draft plan. Apendix D contains a summary of the response to comments received during the meetings and through other means.

LAKE AND WATERSHED CHARACTERISTICS

Kitsap Lake is located on the Westside of Bremerton, South of Kitsap Way and accessed by NW Kitsap Lake Road, NW Price Road, and Harlow Drive. Receding glaciers naturally formed Kitsap Lake. It is a total of 238 surface acres, the deepest point of the lake measures 29.9' deep, with an average depth of approximately 11'. It is approximately 2,600' from east to west across the lake at the widest point, 4,000' from north to south across the lake, and the 14,300' of shoreline makes it primarily oval shaped. There are two main streams impacting the lake, Kitsap Creek flows out of the lake, which contains a weir installed by Department of Fish and Wildlife in the 1950's to control the migration of fish, and an unnamed tributary providing a major influx of water, at the South end.

A watershed is a system of land area from which water, sediment, and dissolved materials drain to a common water location. The immediate watershed servicing Kitsap Lake is identified by the dark line on Figure 1. It encompasses approximately 1700 acres, and is bordered predominately by residential on the east, forested area on the west, residential and commercial to the north, and rock quarries, forests, and private property to the south.

Kitsap Lake, is the only freshwater lake in the City of Bremerton, and has long served the Kitsap County region and its residents. There are no other lakes within this watershed, but there is evidence of other streamlets draining into Kitsap Lake. At the south end of the lake is 32 acre Kitsap Lake Park. Approximately 1.7 acres have been developed for public use and includes a boat launch, swimming area, fishing pier, and picnic facilities. The remainder of the park is undeveloped wetlands. The master plan for this area is to provide walking trails through this sensitive area via a boardwalk.

The Kitsap Lake Watershed has many low rolling hills with some cliff ridges. The highest point is approximately 600' and the low point is at lake level at 156'. This area was carved out by several glaciations over many years, creating a complex mixture of unconsolidated sediments which blanket irregular bedrock surface. There are twelve identified soil types with Kitsap Lake's watershed, broken into four different categories. However the majority of soils fall within two types:

- Category C—soils having a slow infiltration rate when thoroughly wet (45%)
- Category A—soils having a high infiltration rate when thoroughly wet (32%)

Category C soils abound within the basin boundary and are found adjacent to the western, northern, and eastern shores of Kitsap Lake. Water enters Kitsap Lake via year-round and seasonal streams, groundwater seeps, direct precipitation onto the lake, or stormwater runoff from the surrounding watershed.

Land use within the watershed is constantly evolving and changing. The population within the watershed is experiencing rapid single-residence home growth (approximately 15% over the past decade). Agriculture is limited in the watershed and primarily includes private wood lots and some commercial forestry. Other land uses include miscellaneous commercial development, quarries, military recreation land, parks, and trails.

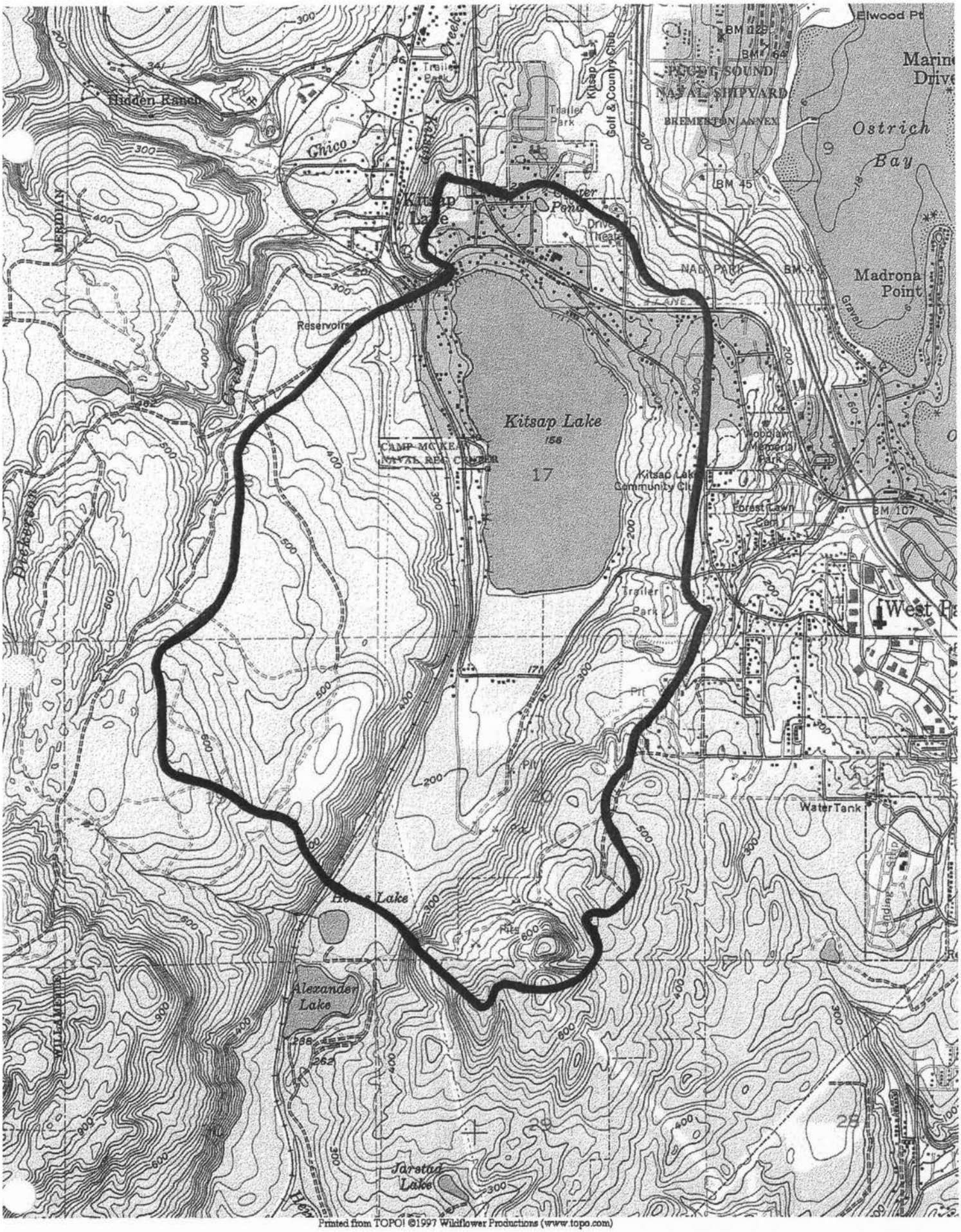

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Figure 1.

At the south end of the lake is Kitsap Bog, or Kitsap Lake Wetlands. Most of the wetlands are within the 32 acres of the Parks and Recreation Department's land. The soil is 'semiahmoo muck' which does not have good drainage and is quite deep.
Public access is available at Kitsap Lake Park and the Washington State Department of Fish and Wildlife (WDFW) boat launch.

Water Quality

Lake water quality testing can be used to determine the age or level of enrichment of a lake, and the degree to which it has been affected by development. Water quality data may be used in a long-term or short-term data-monitoring program, assessments, or to implement restorative measures. The water quality samples taken during 1998 occurred during the months of May-October.

Water quality concerns arise with non-point sources of pollution. These sources are directly related to population growth, that brings construction of homes, roads, commercial developments and other infrastructures. Identified nonpoint pollution sources include stormwater runoff, septic drainfield effluent and disposal of homeowner wastes. These factors encroach upon forested areas and internal stream sites. Erosion and runoff factors can seriously impact stream and lake water quality, and the fish and wildlife. Subsurface water can harbor pollutants threatening the natural water habitat and lake lifespan.

Since 1971 Kitsap Lake has been described as either mesotrophic or eutrophic in trophic status, depending on the water quality findings in any given timeframe. This status is based on data from nutrients, chlorophyll and Secchi disk depth. When looking at water quality, it is also very important to look at other variables such as temperature, pH, dissolved oxygen, conductivity, and alkalinity. It is important to note that everything is interrelated in water quality…if you affect one parameter it affects the other. Classifying a lake based on its trophic state is a useful way to describe changes in a lake's water quality over time and assess the potential sensitivity of a specific lake to additional nutrient loading.

The trends observed over the years at Kitsap Lake have been stable in some areas and profound in others. Nutrients have remained relatively stable over the years, along with slight differences in silica, pH, and dissolved oxygen. Data that varied significantly were temperature, secchi depth and alkalinity. Increasing temperature values over time increase the rate of biological activity and threaten cold-water fisheries, such as trout. Lower secchi values in the past few years indicate greater productivity and increased suspended solids. Also, the trends in alkalinity have almost doubled since 1982, giving the indication of greater plant productivity associated with nutrient inputs and lake shore development. There is speculation that the rock and sand quarry operations within the watershed may be significantly impacting this rise in alkalinity, but definitive research on this topic was outside the scope of this project. Overall, lake water quality has remained

mesotrophic since the first data was collected in 1971. However, methods must be taken to preserve the trophic status and prevent further degradation.

Temperature

Water temperature is an important measurement in lakes. Temperature is used to determine whether a lake "thermally stratifies". As water warms, it becomes less dense and floats to the top of colder water. If this difference is great and last long enough, three distinct zones will form. The upper warmer water is called the epilimnion; the middle portion is the metalimnion; and the deepest portion is the hypolimnion (Horne and Goldman, 1994). Once formed, these layers are very stable with little mixing between them, and as a result, they develop different biological, physical, and chemical conditions. Readings for this report were taken twice a month, in mid-morning, from July through October. The test locations are identified on maps in Appendix B.

Thermal stratification was not observed in Kitsap Lake during the sampling taken during the summer of 1998. This is not uncommon in shallow lakes, mixing often occurs continually in the summer aided by wind and motor boat activity. The average lake temperature during the sampling period was 22.4°C (72.3°F), with a high of 25.5°C (77.9°F), and a low of 14.7°C (58.5°F). A significant temperature difference (95% of the time), was observed between the inlet and the lake. The inlet ranged from 12.3°C (54.1°F), to 13.3°C (55.9°F), with an average of 12.8°C (55°F).

Secchi Depth

Secchi depth measurements provide information on the transparency of the water and the depth of light penetration. The clarity of any lake varies with the season due to algae blooms or suspended sediment and these changes are demonstrated by the Secchi depth (Horne and Goldman, 1994). According to the Trophic State Index (TSI), summertime Secchi readings greater than 4 meters (13.1 feet), indicate oligotrophic conditions, while readings less than 2 meters (6.6 feet), indicate eutrophic conditions (Carlson, 1977). However, transparency is also affected by lake color, which is not accounted for in the TSI.

The Secchi disk depth of Kitsap Lake during the summer ranged from 1.75 to 5.0 meters (5.7 to 16.4 feet), with an average of 3.31meters (10.9 feet). During the summer, the Southeast station consistently had lower Secchi values than the Northwest station. Secchi values also steadily decreased throughout the summer. The decrease in Secchi disk depths throughout the study period was the result of suspended solids from runoff, along with an increase in phytoplankton biovolume in the epilimnion.

Total Suspended Solids

Suspended matter consists of clay, silt, fine particles of organic and inorganic matter, soluble organic compounds, plankton, and other microorganisms (Chapman, 1992). Total suspended solids (TSS) can vary seasonally according to biological activity and surface runoff carrying soil particles.

The TSS range in the lake during the summer of 1998 was <1.0 mg/L to 18.0 mg/L with an average of 2.6 mg/L. The inlet of Kitsap Lake ranged 1.7 mg/L to 4.6 mg/L with an average TSS of 2.6 mg/L, and no significant difference was found between the three sampling stations and the inlet. There was, however, a significant difference observed from the first half of the summer and the second half of the summer. This summer difference was due to the increase in precipitation and algae biovolume during the second half of the summer.

Chemical Characteristics

Dissolved Oxygen

Determining the dissolved oxygen concentration is a fundamental part of water quality assessment since oxygen is involved in, or influences, chemical and biological reactions within waterbodies (Chapman, 1992). If oxygen levels decrease near the bottom sediments, anoxic conditions occur, affecting the amount of nutrients released from the sediments. The oxygen content in natural waters varies with many factors such as temperature, salinity, turbulence, photosynthetic activity of algae and plants, and atmospheric pressure. Dissolved oxygen levels also vary diurnally. During the day, algae and macrophytes produce oxygen as a by-product of photosynthesis, while night-time respiration can reduce oxygen levels.

Dissolved oxygen in Kitsap Lake ranged from 6.8 mg/L to 11.7 mg/L during the day. During the month of September, dissolved oxygen concentrations increased to approximately 11.5 mg/L and 140% saturation. This level of percent oxygen saturation is likely caused by the increase in photosynthetic activity of algae and higher plants and indicates the high productivity within the lake at this time. In late September, dissolved oxygen concentrations decreased resulting from senesce and decomposition of aquatic plants. It is very important to acknowledge that oxygen depletion was not observed during the study period, therefore, its role in internal nutrient cycling was limited.

Alkalinity/pH

Alkalinity is a measure of the buffering capacity of the water, which is the ability to neutralize the effects of additional naturally occurring acids or bases within the lake and cause fluctuations in pH (Mellanby, 1986). Alkalinity is important for fish and other aquatic life because it buffers the pH changes that occur naturally as the result of photosynthetic activity. Waters of low alkalinity (<24 mg/L Ca CO3) have low buffering capacity and can be susceptible to alterations in pH (Chapman, 1992).

The alkalinity during the summer season averaged 47 mg/L and the range was 43 mg/L to 65 mg/L. The inlet had significantly higher values than the other sampling locations with an average alkalinity of 61 mg/L and range between 46 mg/L to 114 mg/L.

Generally, alkalinitiy values are low in Western Washington Lakes, due to the lack of sedimentary carbonate (Carrol and Pelletier, 1991), however, Kitsap Lake values have increased and are exceedingly higher than other area lakes. According to Abella, development may increase alkalinity through the leaching of cations from greater areas of concrete and through the disturbance of the soil horizon. The rock quarry activity in the

watershed is likely the cause of higher alkalinity values in the inlet and lake over the years. Changes observed in alkalinity may also reflect long term changes in water quality, meaning high alkalinity may indicate greater plant productivity and nutrient input.

The pH is an important variable in water quality assessments because it influences many biological and chemical processes. The levels of pH often directly affect the reproductive success of aquatic organisms. The pH is a measure of the acid balance of a solution and is defined as the negative logarithm to the base 10 of the hydrogen ion concentration. pH is principally controlled by the balance between carbon dioxide, carbonate and bicarbonate ions (Chapman, 1992) and the pH that occurs in most natural systems is between 6.0-8.5.

Kitsap Lake had a summer pH average of 7.4 units and a range of 6.9 to 7.9 units. Summer pH values also displayed an increase during the second half of the summer due to the increased photosynthetic activity in the epilimnion. There was no significant difference in pH observed between the inlet and the lake.

Conductivity

Conductivity is the measure of the water's ability to conduct electrical current, and it is an indicator of the amount of dissolved ions in the water. Conductivity in most freshwater range from 10 to 1,000 umhos/cm (Chapman, 1992). The conductivity of a lake depends heavily on the type of soil and precipitation within the watershed.

The conductivity of Kitsap Lake ranged from 100 umhos/cm to 121 umhos/cm, with an average of 108 umhos/cm. The inlet had significantly higher concentrations averaging 145 umhos/cm and ranging from 130 umhos/cm to 161 umhos/cm. Conductivity has steadily increased since 1971 and follows similar trends as alkalinity.

Phosphorus

The two forms of phosphorus sampled in Kitsap Lake during the study period were total phosphorus and orthophosphorus. Total phosphorus includes organically combined phosphorus and all phosphates, while orthophosphorus is inorganic soluble phosphorus. Input of phosphorus is likely to come from weathering rock, decomposing organic matter, stormwater and fertilizer runoff. In natural surface waters phosphorus ranges from 0.005 to 0.020 mg/L (Chapman, 1992), and high concentrations can indicate the presence of pollution and be responsible for eutrophic conditions.

Total Phosphorus

The average total phosphorus level during the summer sampling period was .0204 mg/L, and ranged between .007 mg/L and .051mg/L. There was no significant difference observed between the sampling sites or between the sampling sites and the inlet (p-value=0.154). The inlet averaged .029 mg/L and ranged .013 mg/L to .063 mg/L. The highest concentration of .063 mg/L occurred August 1, 1998, along with elevated concentrations of orthophosphorus and nitrate. An elevated amount in all three nutrients may be the result of runoff or watershed practices such as rock quarry activities.

Comparing the first and second half of the summer, the second half had significantly higher concentrations (p-value=0.001). Total phosphorus levels were low in relation to the average from mid-July through mid-September and then increased in late-September. The September increase was due to the active death and decay of aquatic plants releasing phosphorus into the water column.

Even though anaerobic conditions were not observed during the summer of 1998 sampling period, it is possible that anoxia occurred at night or early morning. If this phenomenon occurred, the microzone would have been removed and phosphorus would be released from the sediment to the open water, resulting in elevated phosphorus levels. There was no significant difference displayed in the yearly trends of total phosphorus.

Orthophosphorus

The summer average orthophosphorus level was .00513 mg/L and ranged from a high of .013 mg/L to a low of < .001 mg/L. There were no significant differences observed between the three sampling stations. The inlet values, however, were much greater, having an average concentration of .016 mg/L and ranged .008-. 045 mg/L. There was a distinct pattern in concentrations observed. The values of orthophosphorus during the summer months of July and August were low due to the active uptake by algae and plants. When orthophosphorus peaked at .013 mg/L in September and early October due to nutrient releases from senescing aquatic plants, a summer algae bloom resulted.

Nitrogen

The concentration of most nitrogen compounds tends to follow regular seasonal patterns. In many lakes, biological uptake tends to lower soluble concentrations during the spring and summer. Fall and winter concentrations in a variety of lakes tend to increase from releases from the sediment, inflows from the watershed, precipitation and hypolimnion replenishment.

Nitrate

Natural sources of nitrate to surface water include igneous rock, land drainage, alder trees and plant debris, along with non-natural sources such as human or animal waste or fertilizer runoff. Normal levels of nitrate seldom exceed 0.1 mg/L, but if nitrate is influenced by human activities the level may exceed 5 mg/L (Chapman, 1992).

Nitrate is the most common form of combined nitrogen, and the most used by phytoplankton in their major growth event (Horne and Goldman, 1994). The average summer nitrate level was .067 mg/L with a range of .03-.41 mg/L. The inlet ranged from a low of .04 to a high of .068 mg/L, and had a summer average of .0248 mg/L. Also, the first half of the summer had higher nitrate values then the second half of the summer. The sampling date of July 4, 1998 was the event that made the first half of the summer average values higher. Because nitrate moves easily through the soil, the higher nitrate values at this time may be due to runoff. The lower values in the summer are likely due to the active uptake by plants, a greater rate of uptake than the rate of inflow, is common during the summer months.

Ammonia

Ammonia occurs naturally in lakes arising from the breakdown of nitrogenous organic and inorganic matter, excretion by biota, the reduction of nitrogen gas and gas exchange with the atmosphere (Chapman, 1992). Ammonia is also a very energy-efficient source of nitrogen, and is readily taken up by aquatic plants and algae. The amount of ammonia found in most lakes is generally well below 0.1 mg/L.

The concentrations of ammonia in Kitsap Lake averaged .037 mg/L and ranged from <. 001 to .27 mg/L. Ammonia concentrations were greatest during the September 6, 1998 sampling date when the SE sampling station had levels of .24 mg/L. This is most likely the result of decomposition of organic matter due to the senescence of aquatic plants. The lowest concentration was observed in October, due to the uptake by large biovolumes of phytoplankton. Inlet concentrations of ammonia averaged .06 mg/L and ranged .01 to .12 mg/L.

Silica

The major source of silica into lakes is through inflows from the watershed (Horne and Goldman, 1994). The normal silica content in lakes varies between 1-30 mg/L. In lakes, silica accounts for the success of diatoms, and can become a limiting nutrient for diatom growth.

Silica in Kitsap Lake ranged from 0.60 to 22.8 mg/L and averaged 10.2 mg/L. There were no significant differences in silica concentrations between the three sampling stations. Comparing the first half and second half of the summer, the second half had significantly higher silica concentrations. This may be a result of the spring diatom bloom depleting silican concentrations.

Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) has monitored Kitsap Lake since the early 50's, when a weir was located in the Northwest corner of lake, for the purpose of fisheries management. The lake is stocked annually by the State with catchable size Rainbow trout. Accurate records are not available on fish catches, but it is the opinion of the steering committee that there has been a notable decline in the fish population.

Wildlife species known to exist in and around Kitsap Lake include, but may not be limited to:

Fish: Largemouth bass, Blue Gills, Rainbow trout, Cutthroat trout, Sculpin, Pumpkinseed Sun Fish, Brown bullhead, and Chum Salmon

Birds: Crow, Flickers, Chickadee, Ducks, Coots, Eagles, Canadian Geese, Osprey, Kingfishers, Swallows, Starlings, Bandtail Pidgeons, Blue Heron, Widgeon, Teal, Loons, Seagulls, Blue Jays, Redhead Mergansses, Cormorants, Wood Duck, Red-winged Blackbirds, and Marsh Wren

Others: Blacktailed Deer, River Otters, Muskrats, Racoons, Snails, Clams and Beaver

Aquatic Plant Community

Plant Survey

Plant samples were taken from Kitsap Lake in 1996 and 1998, and mailed to the Department of Ecology (DOE) for identification, and one set in 1998 was sent to the Civil Engineering lab at Washington State University. A Restoration Analysis and Watershed Management Plan was completed in May 1983 by Parametrix, and FishPro did a document in 1994 on weed issues in Kitsap Lake. The findings from each of these four sources were compared against each other for type, general location and density.

The plant species listed below were identified during these surveys (Table 1). Stands of floating-leaf water lilies and watershield dominated the surface coverage. Interspersed among them were submerged macrophytes, most dominated by the pondweeds (*Potamogetons* spp.). Plant growth colonized most of the lake where the depth was less than four meters (13.1 feet), but species such as *Nitella Agargh* and *Potamogton zosteriformis* extended to the depth of six meters (19.7 feet). The majority of macrophyte species were found at the South survey site where shallow depths allow plants to thrive. The dominant species for the entire lake were the floating plants, *Nymphaea odorata* and *Brasenia schreberi* and the submerged species *Potamogeton zosteriformis, Elodea canadensis* and *Nitella.* The average dry weight biomass of the nine macrophytes sampled between 1 and 6 meters (3.3-19.7 feet) was 65 g/m2 (September 6, 1998).

Aquatic plants are a major concern for the residents and users of Kitsap Lake. The greatest densities are found at a depth of 2 to 3 meters (6.6 to 9.8 feet), with much lower densities outside of this range. This shallow depth, in conjunction with good water clarity, enables high densities of plant growth (194/g/m2) in some areas. Appendix A has detailed information on each specific plant. Appendix B is maps showing approximate plant location in Kitsap Lake.

Table 1.

Scientifc Name	Common Name
Submerged	
Elodea canadensis	Canadian waterweed
Potamogeton zosteriformis	Flatstemmed pondweed
Potamogeton amplifolius	Largeleaf pondweed
Ceratophyllum demersum	Coontail, hornwort
Filamentous algae	Spirogyra, water silk
Potamogeton crispus	Curly leaf pondweed
Potamogeton Praelongus	White stemmed pondweed
Nitella agargh	
Floating	
Brasenia schreberi	Watershield
Nymphaea odorata	Fragrant waterlily
Emergents	
Iris Pseudacorus	Yellow Flag
Scirpus acutus	Hardstem bulrush
Typha Latifolia	Cattail

Phytoplankton

Phytoplankton is subject to seasonal influences. There are three obvious features of the seasonal cycle: the large spring diatom bloom, the smaller irregular summer peaks of various flagellates, and the large autumnal bloom of diatoms, blue-green algae and dinoflagellates (Horne and Goldman, 1994). During the spring, phytoplankton numbers usually increase under improved light conditions. In the summer phytoplankton population decrease because of interactions of physical and biological parameters such as a reduction of nutrients in the epilimnion, competition, and zooplankton predation. During autumn, phytoplankton biomass increases again due to the increase in nutrients in the epilimnion.

Overall, Kitsap Lake phytoplankton biovolume was low throughout the summer months 7.9 x 104 um3/L) and then sharply increased in October (1.64x106 um3/L). A combination of low dissolved oxygen, high pH, and the senescence of aquatic plants lead to an increase of nutrients available for algae uptake.

Characteristic Use

One of the tasks of this manual was for the steering committee to develop a list of beneficial uses Kitsap Lake provides and identify where those uses occur. Kitsap Lake is one of three public lakes in the county that allows water-skiing (the other two are Long and Tiger Lakes). It is the only freshwater lake in the City of Bremerton's land

inventory. The area around the lake is primarily single family residence, considered low-density and semi-urban. Camp McKean, a 12.5 acre recreational park serving military families, is located on the West side of the lake. The State has a boat launch also on the west side of the lake, and Bremerton Parks and Recreation Department is responsible for the 32 acre Kitsap Lake Park at the south end, however only 1.7 acres are developed. This developed area includes a boat launch, swimming area, dock for fishing, and picnic facilities.

A variety of lake uses occur and include, but may not be limited to:

Fishing	Swimming	Jet skiing
Water skiing	Sea Plane landings	Viewing
Boating	Nature walking	Windsurfing
Wildlife Observation	Hydroplaning	Wetlands habitat

Problem Statement for Kitsap Lake

At the height of the summer season, when increased sunshine and higher temperatures are experienced, weed growth accelerates. Kitsap Lake has a problem with aquatic weeds all around the lake. The most serious location however, is the area to the south of an imaginary line drawn between the northern edge of Kitsap Lake Park on the east side to the State boat launch on the west side. This growth seriously impacts the multiple lake users, from both a safety and enjoyment standpoint.

The citizens of Bremerton wish to be proactive in responding to Kitsap Lake's overall health and are seeking solutions to increase the longevity of the lake for both users and wildlife. Lake issues cannot correct themselves. Public lakes must be safe, appealing and functional. By determining a solution for the predominantly seasonal weed problem, the eutrophication of the lake should be delayed, and prevent the problem from enlarging.

Aquatic Plant Management Goals

An important step before beginning development of a plant control plan was to define goals against which the plan could be evaluated. These goals will be used to determine what control strategies will best work for Kitsap Lake and ultimately evaluate whether the plan implementation is successful. The steering committee developed the following:

User Goals

1. Maximize recreational opportunities while limiting impacts to the natural ecosystems.
2. Ensure that the lake's weed problem does not worsen—maintain a healthy, live lake.
3. Educate lake owners and users on ways to keep the lake healthy (e.g. proper use of fertilizer, removal of weeds from boats prior to launching, don't feed wildlife).
4. Maximize usable lake area to ensure safe water space for all users.
5. Preserve the aesthetics of the lake.

Lake's geographical/compositional Goals/Limitations

1. Ensure water quality.
2. Establish a lake water level that supports lake user activities.
3. Gain recognition in the City and County SWMS's Comp Plan.
4. Ensure that watershed management considers the impact their plans have on the health of Kitsap Lake.

Financial Goals

1. Research grant sources.
2. Utilize volunteer support for research and lake maintenance.
3. Determine annual funds required to maintain the lake, then determine on-going funding sources.

Timeframe Goals

1. Complete the CDBG grant for Weed Management Plan by fall 1999.
2. Implement selected methods when funding becomes available.

Aquatic Plant Management Options

The primary area of concern associated with the aquatic plant community in Kitsap Lake is the Southern end. The water is shallow and over the course of the summer growing season, plants spread into the boating and high recreational use areas. The continuing decomposition of decayed plant material, along with sediment inflowing into the lake will only make the lake shallower, therefore, resulting in greater aquatic plant densities in the future. Increasing amounts of aquatic plants will likely decrease the aesthetics and recreational ability of the lake, along with altering the sediment, water chemistry, and nutrients.

It was important to the steering committee that the whole ecosystem of Kitsap Lake be considered when selecting the aquatic plant control methods. It is understood that plants play a critical role in the lake's ecosystem, and any disturbance or removal of plants will have an impact on the lake and its physical, chemical, and biological interactions. Consideration was given for any side effects, actions, or lack of action may have on the long-term health of Kitsap Lake. Once remediation action is started, a new balance must be achieved. What the new balance will look like or how rapidly it will occur is not always easy to know. There is less cause for concern if initially a small portion of the lake is treated rather than a large area, and it is recognized and agreed that weeds will always be a part of Kitsap Lake.

All control alternatives described and approved by Ecology (1994) were considered for use in this problem area. These control measures included the use of various herbicides, mechanical removal or harvesting, sediment dredging, stocking Grass Carp, and other techniques.

Manual Methods (Hand-pulling, Cutting, Raking)—This method was eliminated due to the depths involved in the southern portion of the lake and the repeated labor requirement in the swimming area. It was further recognized that plant debris not totally removed from the water can rapidly regenerate itself in larger quantities.

Grass Carp—This was an area of interest, but has not been implemented in the state of Washington, so there is no known "track record". Due to the limited control over the fish, once they are introduced into the water system eliminated this choice was eliminated by the Committee.

Mechanical Cutting—Other lakes seldom select this method, and where it has been tried, the results seem to be worse than before cutting occurred. The problem seems to be on removing all the debris in order to prevent rerooting. The immediate results seem to be shortlived and the problem soon returns in larger proportion.

Mechanical Harvesting—This method and results is similar to mechanical cutting, only it uses motorized equipment that is more harmful to wildlife. Disposal of plant material is costly due to its weight and the process must be repeated several times a season.

Rotovation—This method was considered too invasive for the current situation at Kitsap Lake. In addition it is expensive, requires an extensive permit process, and still leaves the removal of plants as an extended part of the process.

Weed Rolling—It is known that logs and debris exist in the lake, thus a potential cause for damage to the equipment. There is concern that this method would allow plant debris to break free and reroot similar to manual and mechanical harvesting. Storage of the equipment during the off season is a concern, as well as being an enticement for vandalism during the time it is in the lake.

The steering committee reviewed the suggested control strategies shown below, looking at the pros and cons for each. They included:

- A southern end application, of Aquathol for the removal of submerged native plants and an application of Rodeo for the surface waterlily plants. The application for both these products would take place 100 feet on either side of the buoys at the southern end of the lake.
- Install a bottom barrier fabric (such as Texel) in the swimming area in Kitsap Lake Park to inhibit plant growth. Maintenance is required 2-3 times a year.
- An application of Aquathol along the entire lake bank out to 30', for the long-term control of submerged native plants.
- Mechanical harvesting of weeds in the south end only, twice annually, to control native plants.
- Control perimeter weeds in other portions of the lake consistent with the consensus opinion of respective shoreline owners.
- Control the level of the lake, since it is recognized that weeds grow more rapidly in shallower water.

- Implement an educational program for lake users and residents by establishing a Plant Control Advisory Committee.
- Ensure that Stormwater Management practices are being followed, especially as it relates to controlling the recognized higher than average alkalinity in the lake.

The first two strategies listed were eventually selected by the steering committee as the *immediate* preferred methods for dealing with some of the weed issues in Kitsap Lake. Prior to review of the recommended strategies, the safety of herbicide use was discussed. Specifically noted was that before an herbicide can be used in an aquatic environment, it must pass stringent toxicity testing by the federal government. These tests are designed to assess impacts to the target population (plants), as well as non-target populations such as fish, aquatic insects, and other organisms. The tests look at the long-term impact to insure that the chemical quickly breaks down into a non-toxic form that for example, does not accumulate in sediments or fish tissue. It was noted that Washington State has set even more stringent standards than the Federal government, making many of the aquatic herbicides invalid in this state. The very low toxicity of Aquathol and Rodeo warranted acceptance for use in Washington, and is the logical choice for Kitsap Lake's immediate needs.

Recommended Aquatic Plant Control Plan

Immediate Control Strategies (removal of both surface and submerged plants in the south end of Kitsap Lake)

At the South end of Kitsap Lake, a large concentration of aquatic plants are found, specifically waterlilies, both Flat and White Stemmed Pondweed, Elodea, Spirogyra, and Coontail. During the summer months, these plants grow into the boating and swimming zones, impacting safe, enjoyable recreational activities. An herbicide treatment was chosen as the preferred method of control based on the effectiveness and responsiveness of the treatment.

Rodeo is applied to the leaves of the emergent plants, which makes this a very controlled process, hitting just those plants in the targeted area. Sometimes a second application is needed. It is recognized that Rodeo kills the thick rhizomes creating a floating mass of debris that will require removal at some point. An HPA permit to remove the mass is needed through Fish and Wildlife. With the removal of the waterlilies, other pondweeds will surface, but hopefully will be controlled by the Aquathol, the treatment which follows the Rodeo application the second year.

Aquathol is fast-acting, offers "spot treatment" capabilities, and destroys the vegetative part of the plant, but not the roots. While the process usually requires an annual application, it is more effective than Sonar (which costs twice as much), but is applied only where needed, thus controlling costs. Aquathol does not have water use restriction, but has a three-day fish consumption restriction. The State of Washington does require

posting notice of swimming restrictions for eight days and a seven to twenty-one day restriction on irrigation or water supply use for areas within 400 feet of the application zone.

Rodeo is applied once, however sometimes a second application is needed depending on the starting density of the plants. Rodeo costs approximately $600-700 per acre. Aquathol is applied once and then on an as needed basis. It also runs approximately $600-700 per acre. It is important to remember that this proposal is for a designated area, 100' on either side of the buoys at the south end (refer to map in Appendix I.).

Long Term Plant Control Strategy

A bottom barrier has been selected for the swimming area at Kitsap Lake Park. Bottom barriers are manufactured sheets of material that are anchored to the lake bottom to prevent plants from growing, similar to weed barriers commonly used in lawn and garden activities. The woven polyester material Texel is suggested because it is durable and provides efficient exchange of gas produced from decaying organic matter (roots and other debris). It is typically installed in the winter by unrolling the 15-foot wide sections to the specified length, then anchoring with sandbags spaced 10 feet apart. An annual inspection and maintenance program is scheduled.

Bottom barriers are effective in deep as well as shallow water and do not have special requirements that eliminate their use in different areas. If properly installed and maintained, bottom barriers can provide a high level of control for five years or more. The primary advantage of bottom barriers is the intense level of control and ability to be very selective about the control area. The main disadvantage is the high cost per unit area controlled. The cost for installation and fabric is currently running $1.00 per square foot. A contingency for annual maintenance should be established at about $1,000. Please refer to Table 2 for a five-year break down in costs of both herbicides and bottom barriers.

Prevention, Detection and Education Program

Early detection and treatment of aquatic plant issues is the long-term, number one solution. Currently Kitsap Lake is dealing just with native plants. It is critical that non-native plants do not get introduced into the lake and existing conditions are not allowed to expand. A proactive approach is to develop and implement a prevention program that includes the dissemination of educational materials focusing on ways to preserve the health of Kitsap Lake.

The public boat launches represent areas where there is a high potential for introduction of invasive plants. The addition of a boat and trailer wash facility, while ideal is expensive and challenging to enforce, thus making its effectiveness questionable. As a minimum, signage at the boat launch areas is necessary to emphasize the importance of clean boats and trailers to the lake's health.

It is suggested that a Plant Control Advisory Committee be formed of local residents, City Park staff, and other interested agencies. The primary tasks would include:

- Conduct an annual plant survey and track potential problem areas
- Review annually the Integrated Aquatic Vegetation Management Plan for compliance and needed updates
- Recruit and direct volunteers for annual survey
- Provide information and newsletters to Lake Residents and users and act as spokespeople for answering questions on plant control problems and supporting long term implementation of this plan.
- Provide information for residents about securing individual permits for dealing with weeds directly in front of their property (Appendix E)

The public education brochures need to address several topics including:

- How to identify exotic plants and methods to prevent their introduction into Kitsap Lake.
- Lakeside residents need to know how to reduce the amount of pollutants entering the lake from their property (sources not limited to septic systems and use of fertilizers), as well as things they should do to help retain the complex, diversity of the lake environment.
- Lakeside owners need information about problems and solutions associated with typical urban type landscapes along shorelines, particularly vegetation that is best suited for waterfront areas.
- The importance of watershed protection especially as it relates to erosion and runoffs.

Plan Elements, Costs, & Funding

Table 2 provides a summary of each element identified in this plan and the associated costs. Total cost for the plan for the first five year period is estimated at $91,669, for an average cost of about $18,334 per year. The majority of the costs occur during the first two years when the plan components are implemented and again in the fifth year when all components need to be reimplemented. Some elements could be offset to future years to spread out the costs. These costs are based on 1999 estimates and where appropriate, increased by 3% annually.

Implementation of the Kitsap Lake Integrated Aquatic Plan Management Plan is projected to occur over a five-year period, once funding is secured. Currently the project is identified in the City of Bremerton's CIP plan, but funding is not secure. Because the weeds are native, grants through the Washington state Department of Ecology (DOE) Aquatic Weed Management Fund (AWMF) are not available. Other grant options are not known at this time and will require additional research to determine availability.

Table 2
Estimated cost for implementation of the Kitsap Lake Aquatic Plant Control plan.

TASK	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	5 YEAR TOTAL
Southern End						
Rodeo	$9,100	$9,373			$10,242	$28,715
Aquathol		4,687	4,827	4,972	5,121	19,607
Contingency	700	700	700	700	700	3,500
Permits	1,600	1,600	1,600	1,600	1,600	8,000
Bottom Barrier						
Installation	7,100				8,000	15,100
Maintenance		1,030	1,060	1,092	1,125	4,307
Public Education						
Brochures	1,500	1,550	1,600	1,650	1,700	8,000
Surveys	1,000	1,030	1,060	1,100	1,150	5,340
Total Costs	21,000	19,970	10,847	11,114	29,638	91,669

Implementation and Evaluation

The following is a detailed step-by-step approach to implementation of this plan:

1. Establish the Plant Control Advisory Committee. This group will be responsible for how and whether the plan is implemented.
2. Secure a funding source in order to implement the plan. The source for the needed money must be identified and a budget created.
3. Should a grant source be found under #2 above, prepare the grant application.
4. Prepare and distribute the Public Education brochures. Solicit and/or train volunteers to assist with reaching as many users and lakeside residents as possible.
5. Apply for permits and prepare bids for Rodeo and Aquathol applications. First applications should be completed no later than June 1st of the appropriate year.
6. Institute a Long Term Plant Monitoring Program to include an annual aquatic plant survey. Develop a plan to train volunteers to assist, and determine a method of handling review and information. Contact a professional aquatic plant expert to conduct a bi-annual survey (this cost has been factored into the plan's expenses).
7. Conduct an annual evaluation to be placed in a historical file for Kitsap Lake Aquatic Weed issues for each year and prepare a written report. This will provide the means for determining control of the existing concerns, provide a benchmark for future plant issues, and provide data for future goals and actions.
8. Continue to work with state agencies in establishing a water level that supports lake user activities.

Summary and Conclusions

The southern end of Kitsap Lake is the primary area of concern as it relates to excessive aquatic plant growth and infringement on recreational activities, especially during the latter part of the summer. This report details a plan for controlling and improving this problem through the use of Rodeo and Aquathol. In addition, the swimming area is to have Texel fabric installed to retard regrowth, thus making the area safer and more enjoyable. Implementation of this plan is estimated to cost a maximum of $91,669 over five years, or an average of $18,334 per year.

A public education program will focus on aquatic plant identification and provide general prevention measures in an effort to curb and improve future lake health and subsequent weed issues.

Lake residents will have the opportunity to be involved in the development of the yearly plant control strategy and will be responsible for soliciting volunteers for the surveys and plant control activities. This will insure long-term involvement of lake residents in lake management decisions and activities.

Appendix A

Aquatic Plant Identification and Descriptions

Flat stemmed pondweed—Potamogetan zosteriformis*
Also known as Eelgrass, it is found in still and slow moving water throughout North America. The stem is large and flattened, and the leaves are ribbon-like and extend upwards from the flattened surface of the stem. This plant was found to be the most dominant species at Kitsap Lake. It is most dense at the South end of the lake from the depth of one meter to greater than six meters. At the West side of the lake it was found at depths of 1 to 2 meters
(3.3 to 6.6 feet), and at the North end of the lake it was found at 2 and 4 meters (6.6 to 13.1 feet).

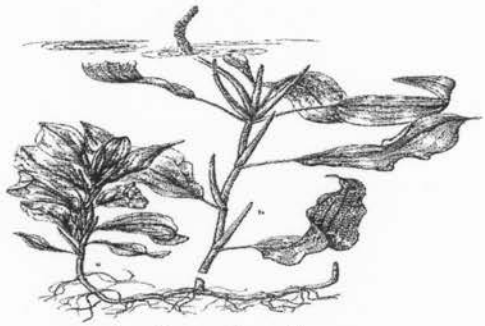
American Waterweed—Elodea canadensis
Elodea is often found in quiet water up to 4 meters (13.1 feet) in depth. Elodea was common at all sites sampled, up to four meters in depth. It was most dense at the South end of the lake mostly intermixed with eelgrass, Nitella, Coontail, and Large-leaf pondweeds. This plant is dominant in the summer months, turning black in the autumn and dying back in the winter.

Coontail—Ceratophyllum demersum*
This is a submerged plant that is commonly found in Washington lakes with moderate to high nutrient levels. The leaves of Coontail are serrated, forked and arranged on stems in whorls with usually 5-12 leaves in each whorl. The color is generally a dark, olive green color and may be crusty to feel. Coontail does not produce roots, but instead is anchored to the bottom by root-like organs.

Coontail is a shade tolerant species that grows well in standing water. Growth is reported to maximize in the spring, decreasing during the summer, and ceasing growth at the onset of winter. Coontail can sometimes crowd out other, more desirable aquatic plant species.

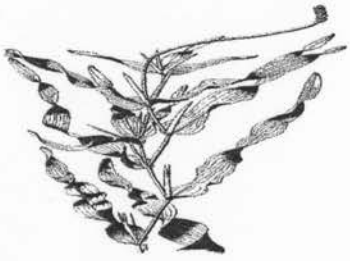
At Kitsap Lake, Coontail was found most abundantly at the South end of the lake at a depth of 1 to 2 meters (3.3 to 6.6 feet). It was shaded by many floating waterlillies and was quite dense in many areas.

Nitella
Nitella is an algae often found in soft water and is mistaken easily for other aquatic weeds, especially Chara. In appearance it looks like a regular pondweed, but is a collection of individual alga cells, and has no true root system. It is often found at deeper depths due to its low light requirements. It can become very dense in areas and is quite resistant to chemical treatment. Nitella helps to soak up nutrients that might fuel phytoplankton blooms and is excellent for fish habitat. For Kitsap Lake, Nitella was most dominant at the West side of the lake, but was also found in the South end up to 6 meters (19.7 feet) in depth.

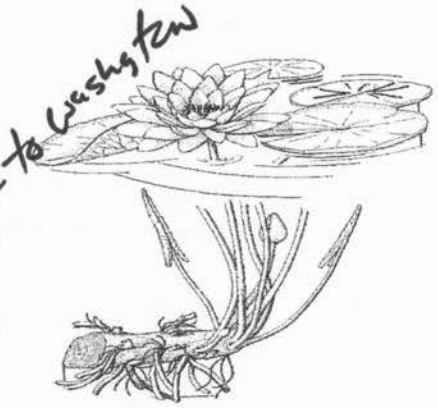
Large-leafed Pondweed—Potamogetan amplifolius*

Known as large-leafed pondweed, the submerged leaves emerge from stout rhizomes. The sheath-like, white stipules can be up to 10cm (3.9 inches) long around the floating leaves and blooms from June to August. The floating leaves are flat, whereas the submerged leaves are curved backwards and have wavy margins. Largeleaf pondweed grows in clean, fresh water up to 6 meters (19.7 feet) deep. At Kitsap Lake, this species was only found at the South end of the lake at
3 meters (9.8 feet) in depth.

Filamentous green algae—

This plant is comprised of cells containing long unbranched filaments, known as spirogyra. It forms floating green mats in shallow water. It looks cottony, but is slimy to the touch. It is typically found in waters high in organic acids. It has been known to grow in deep, warm waters.

White stemmed pondweed—Potamogetan praelongus*

This plant is known for its white stems and submerged leaves. It is most common in lakes from May through July in the deeper depths. This species was only found at 2 meters (6.6 feet) in depth on the West side of Kitsap Lake, but remember sampling was done in early September.

Fragrant waterlily—Nymphaea odorata



The white or pink water lily is a rhizomatous, aquatic perennial. It grows in dense patches, and blooms June to October. Waterlilies out-comptete native species by shading them out. They do create areas low in oxygen which impacts fish life. Waterlilies are native to the East Coast of North America and introduced in the late 1800's. They have been extensively cultivated and hybridized by the nursery industry and are widely offered for sale.

The round leaves with a notched base, float horizontally on the surface of the water in depths of up to 2.5 meters (8.2 feet). Flowers open in the late morning and close again at sunset. Although waterlilies can provide good habitat when patchy in distribution, when they form dense, extensive mats, they form a barrier to wind mixing and low oxygen conditions develop under these mats. This can exclude fish from using these areas in the summer. The native waterlily tends to hold its leaves more upright and more above the water. This allows better wind mixing in native waterlily beds.

Curly leaf pondweed—Potamogetan crispus*

Known as curly leaf pondweed, this is a non-native species, introduced from Eurasia over one hundred years ago. As its name suggests, the leaves are curled, wavy, and crisped along the edges. This species is most commonly found from late June through August. This plant is known to increase oxygen levels and increases the abundance of organic material in lakes. This species was especially prominent on the east-side, and intermixed with plants at the south end.

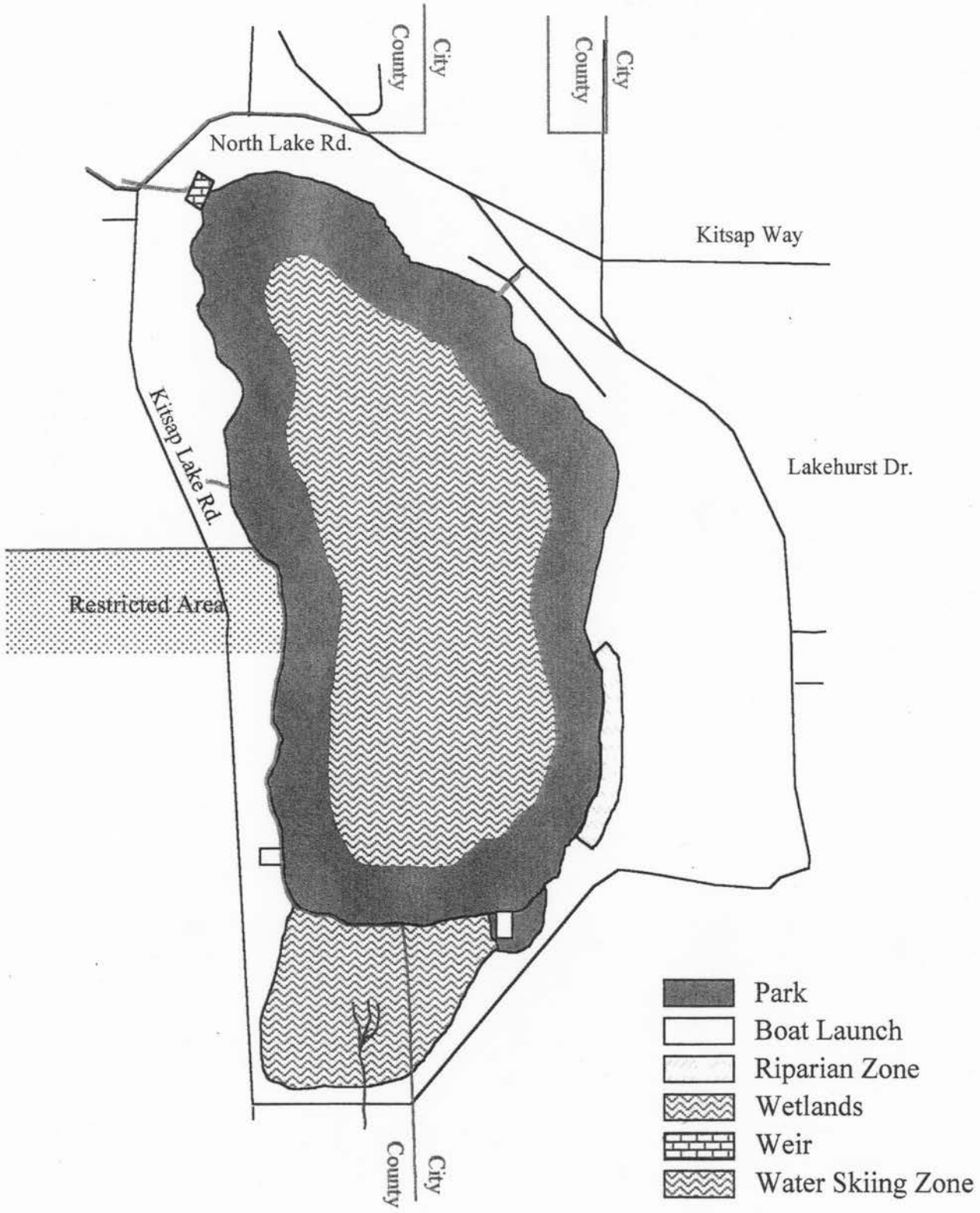
Watershield—Brasenia schreberi

The oval floating leaves of this aquatic water lily are 4-15 cm (1.6-5.9 inches) wide and 3-12 cm (1.2-4.7 inches) long. They are not notched and are centered over the stalks. The leaf stalks of watershields are attached to the center of each leaf and the steams and younger leaves and stems are covered with a jelly-like coating. The watershield roots in the silty bottoms of fresh, slow-moving streams and lakes. Low oxygen conditions can develop under extensive watershield beds.

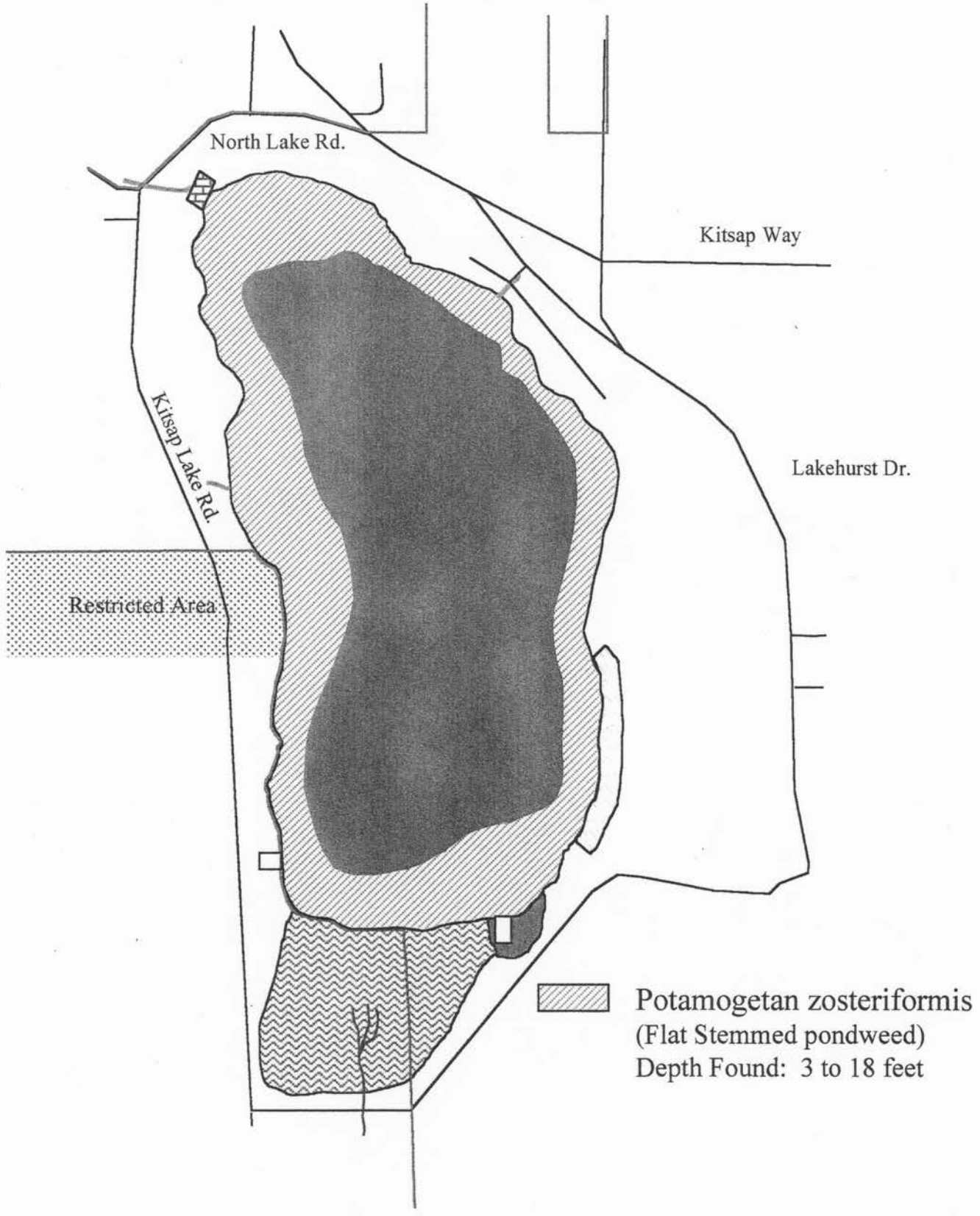
Appendix B

Maps of Plant Locations

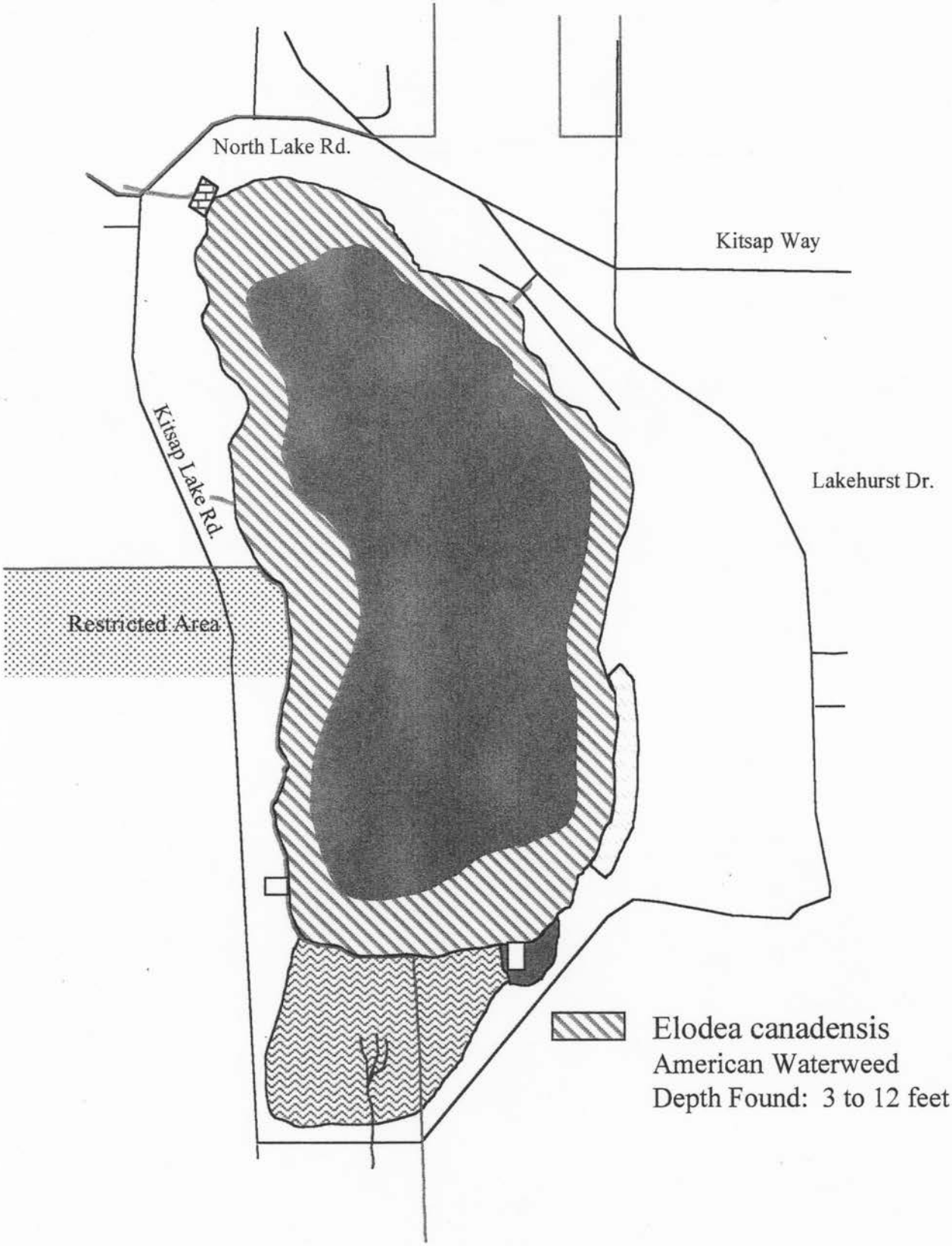
Kitsap Lake


City
County
City
County
North Lake Rd.
Kitsap Way
Kitsap Lake Rd.
Lakehurst Dr.
Restricted Area
City
County
Park
Boat Launch
Riparian Zone
Wetlands
Weir
Water Skiing Zone

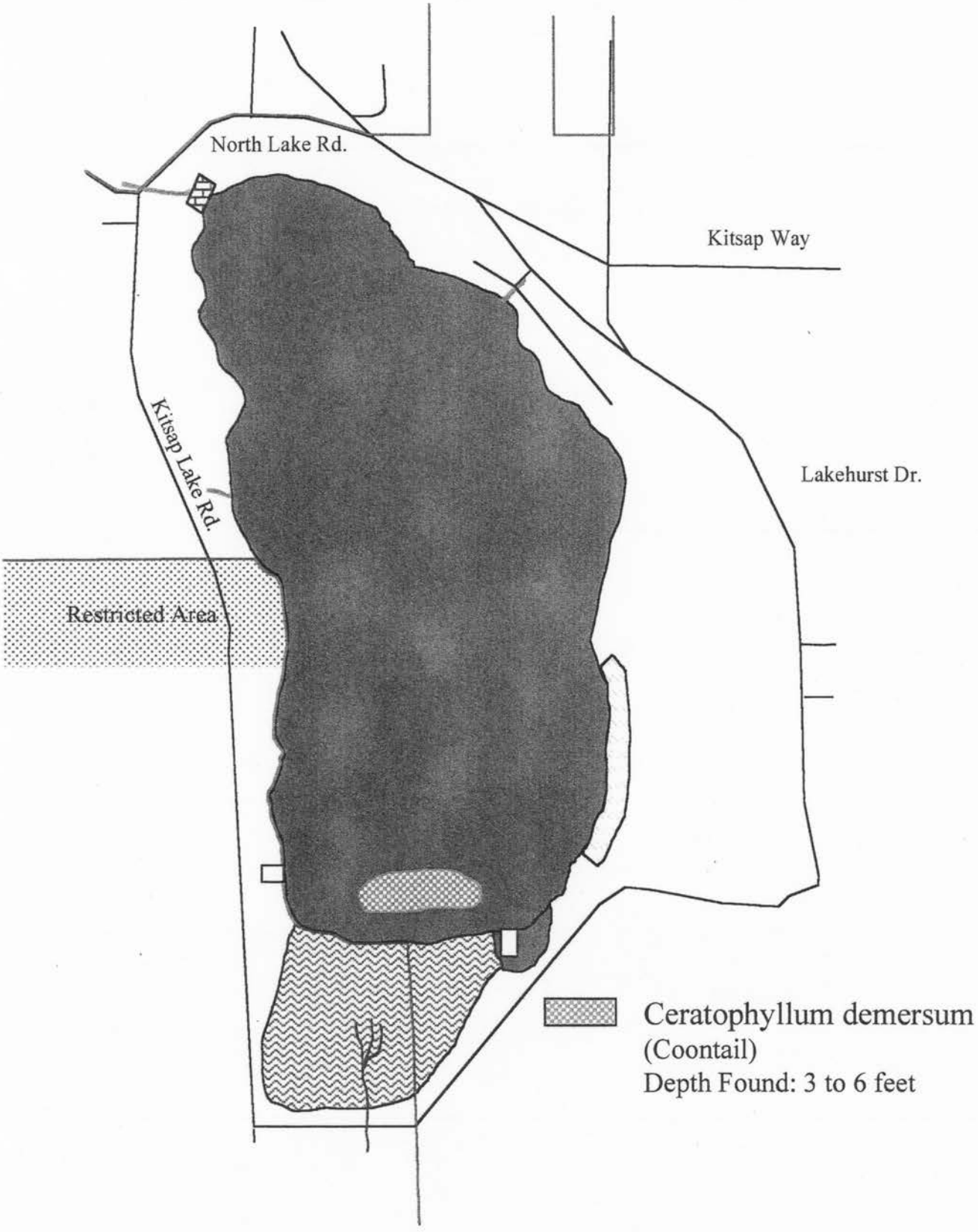
Kitsap Lake
Aquatic Plant Locations



Kitsap Lake
Aquatic Plant Locations



Kitsap Lake
Aquatic Plant Locations



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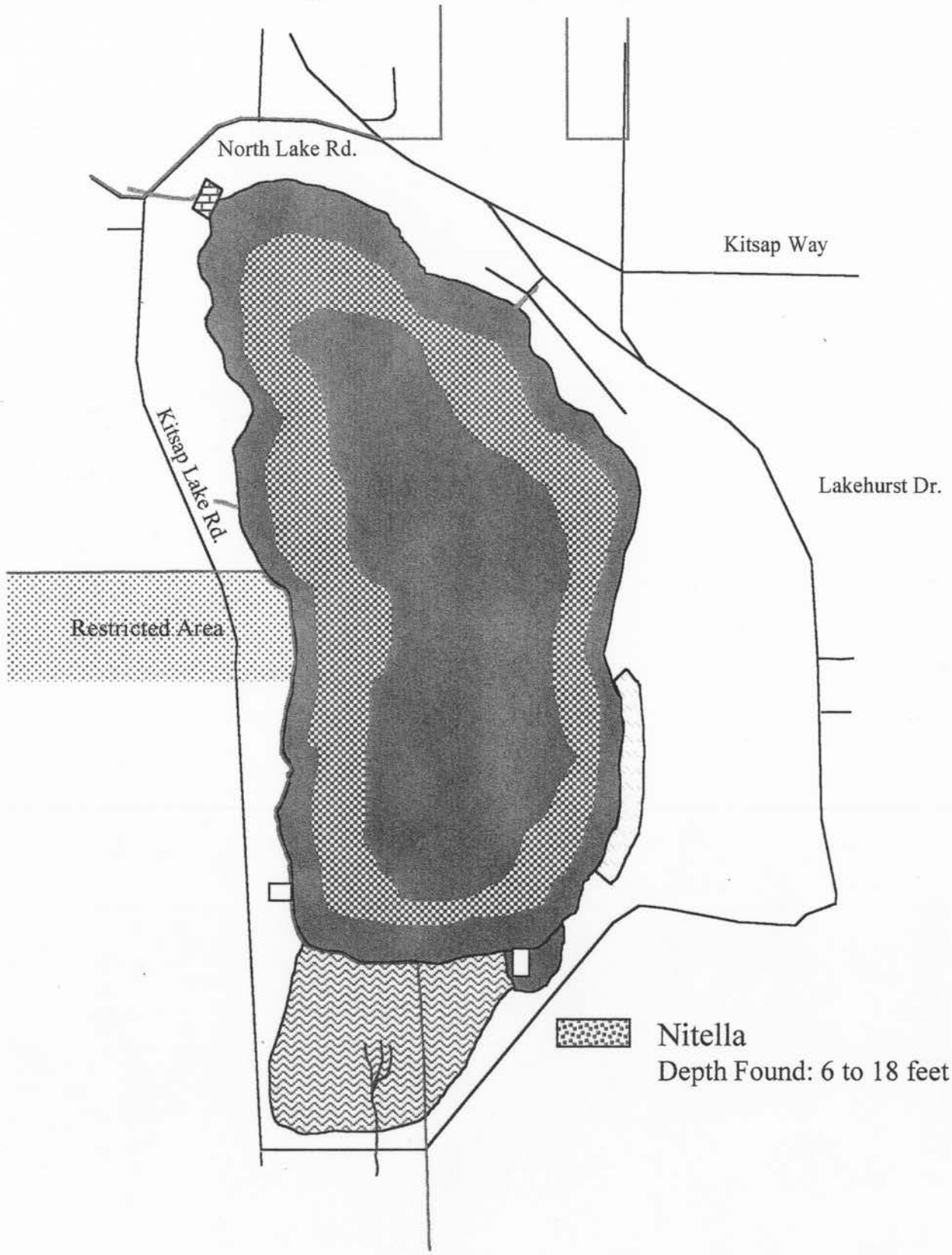
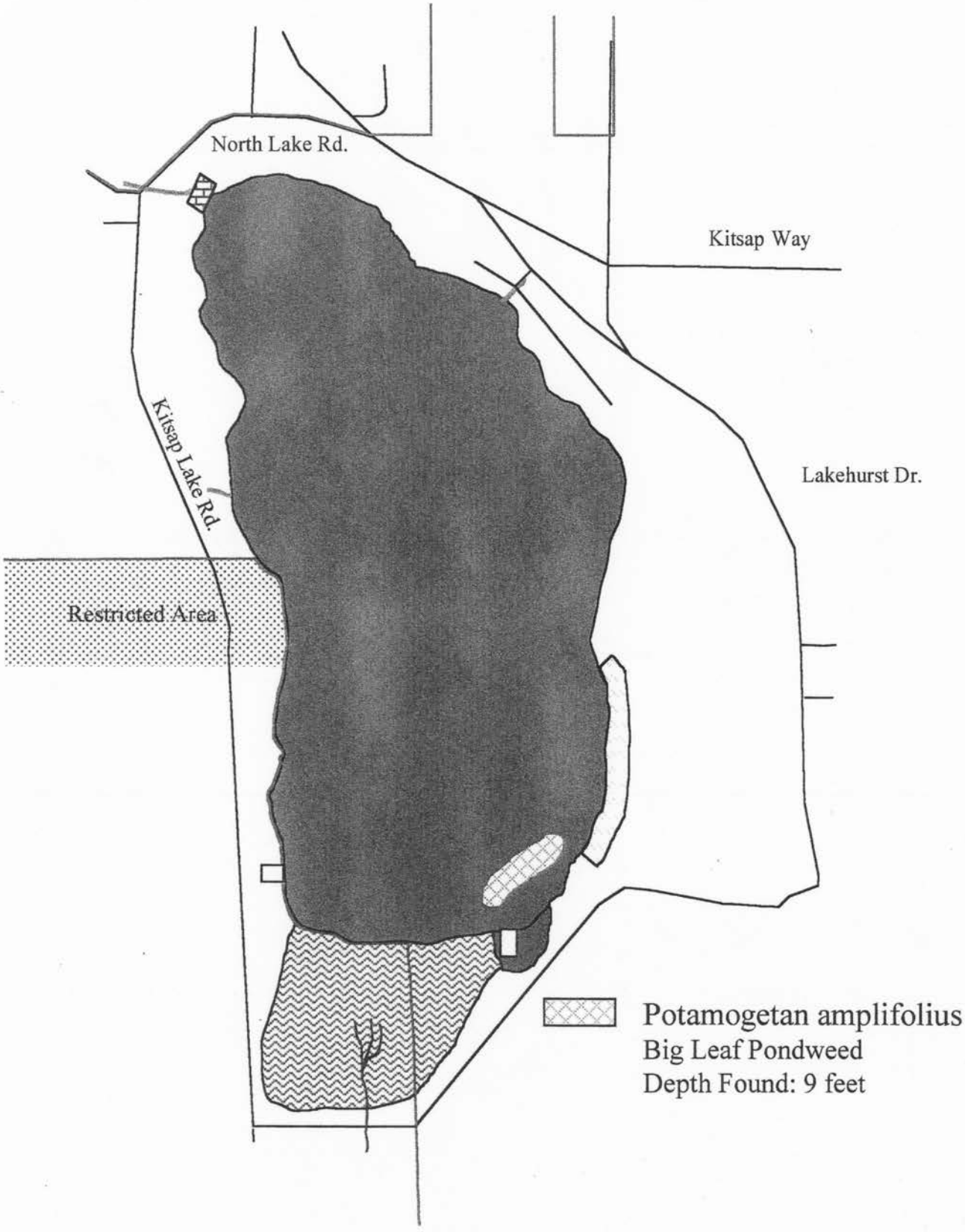
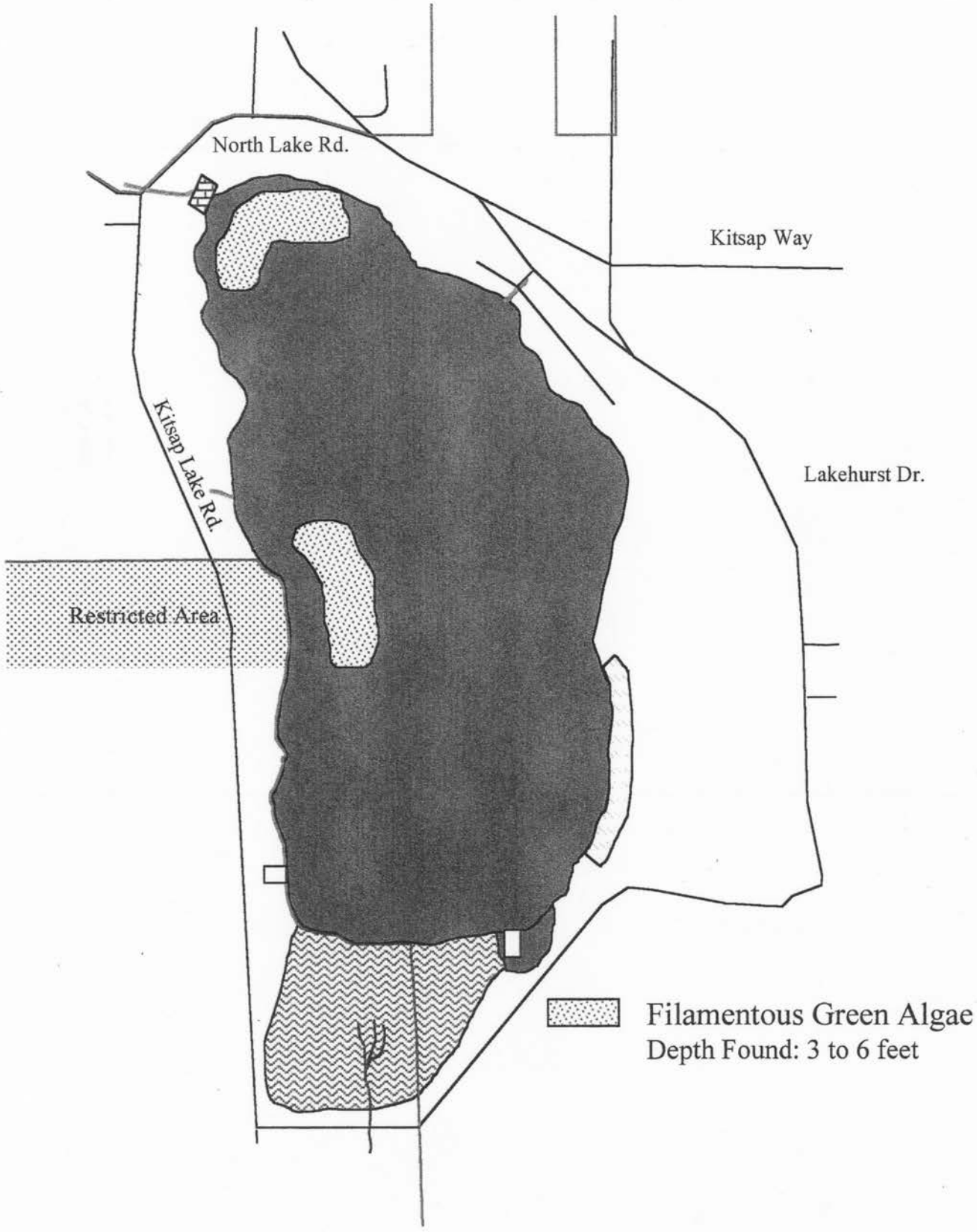
Aquatic Plant Locations



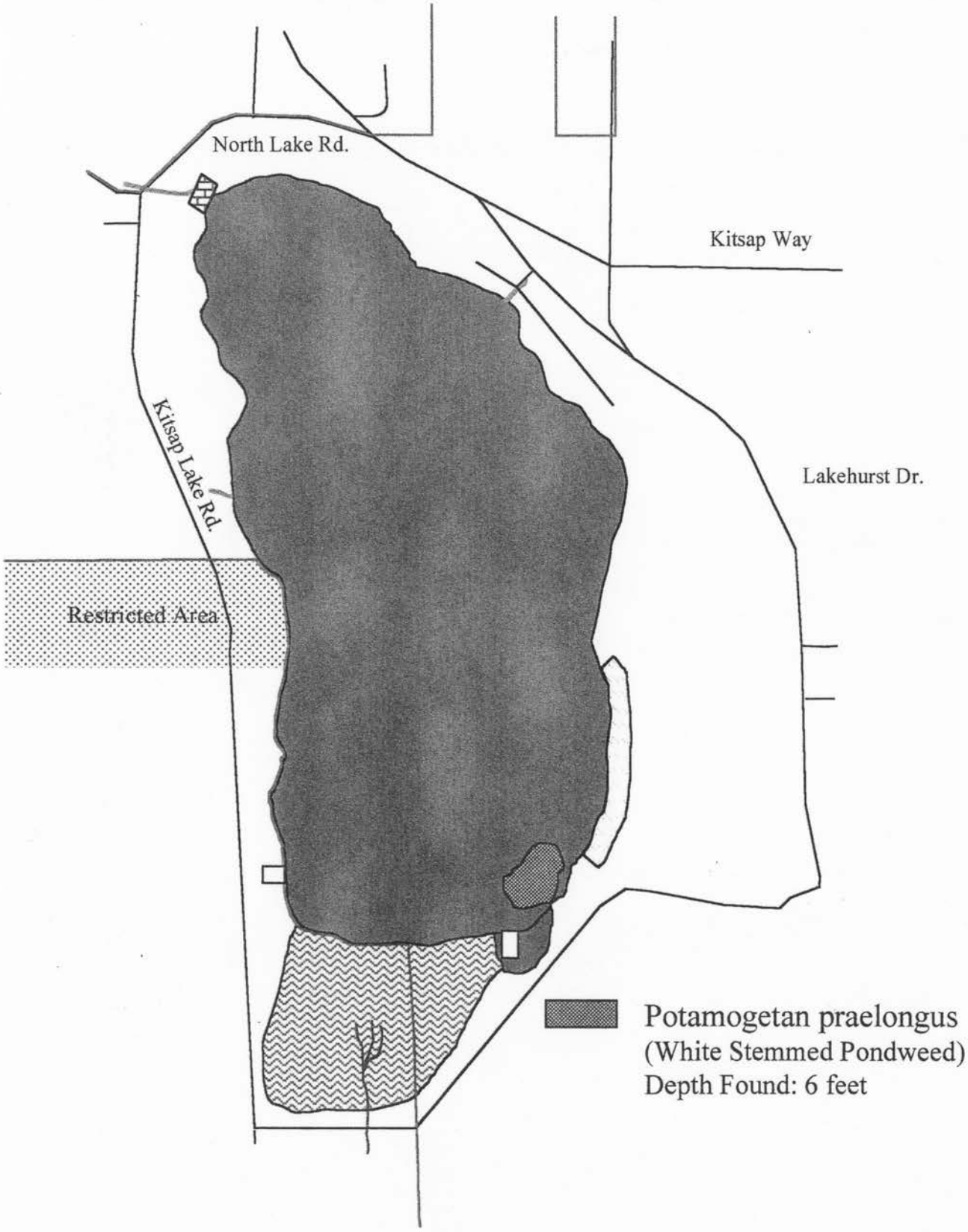
Kitsap Lake
Aquatic Plant Locations



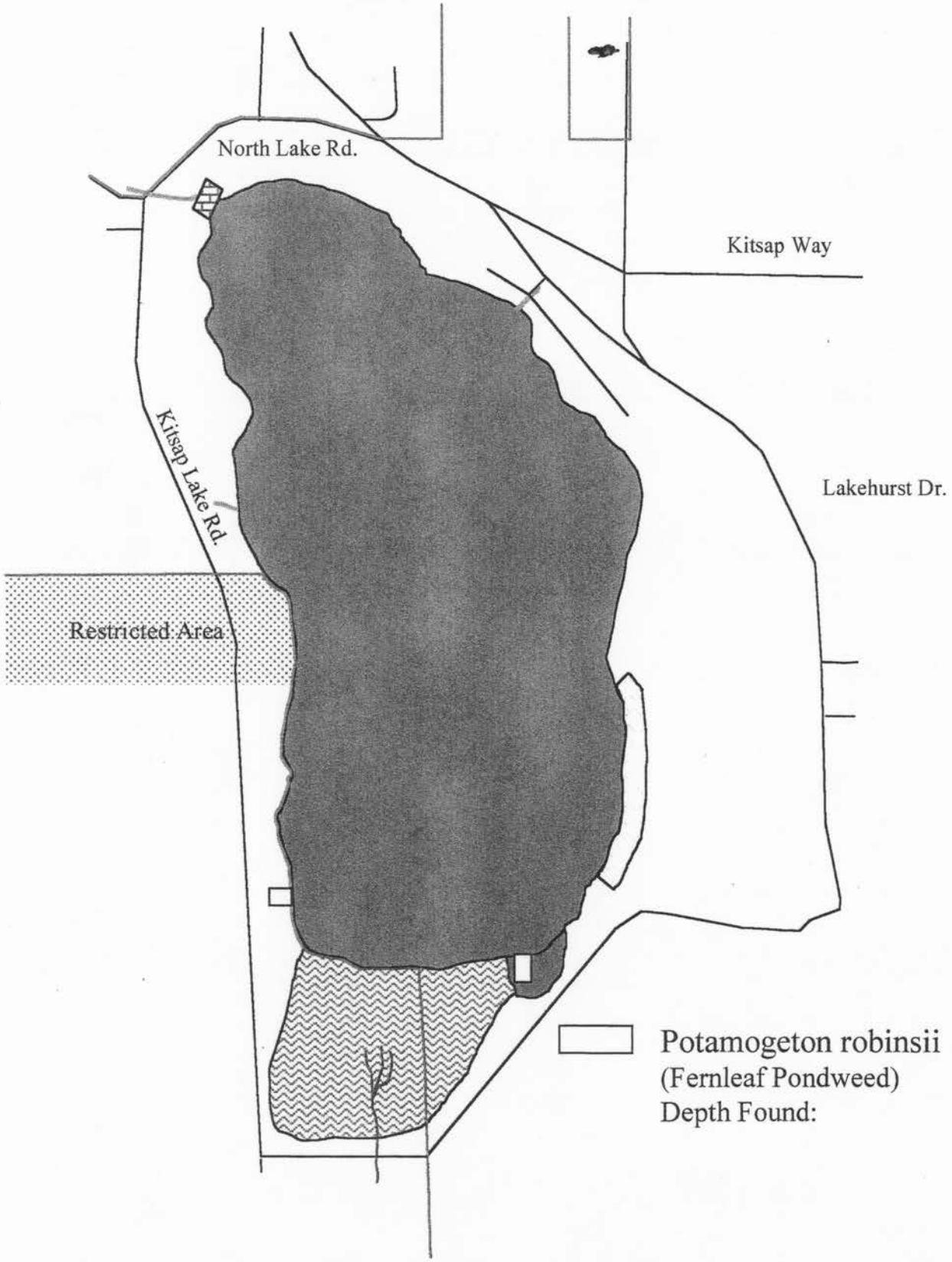
Kitsap Lake
Aquatic Plant Locations



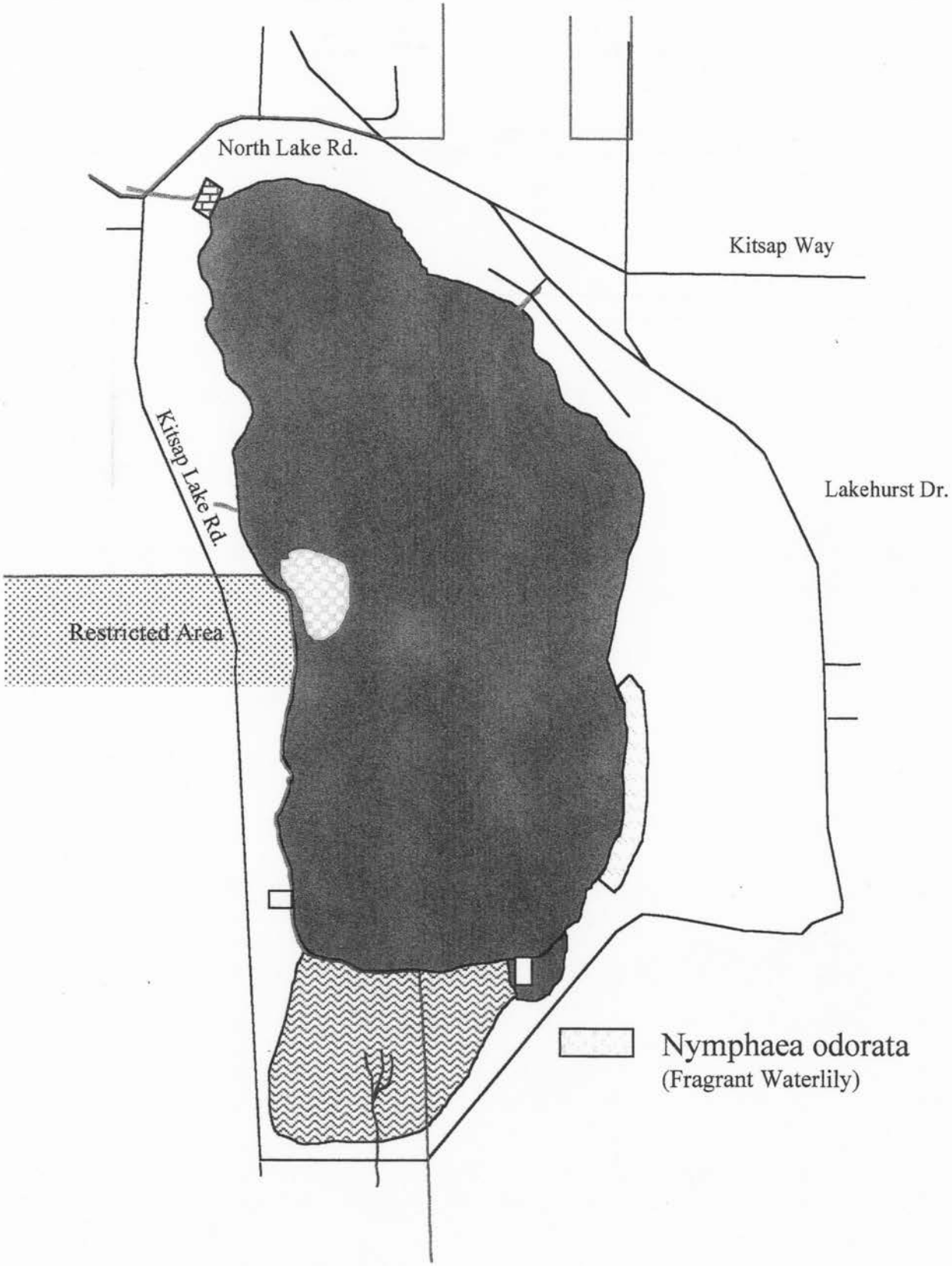
Kitsap Lake
Aquatic Plant Locations



Kitsap Lake
Aquatic Plant Locations



Kitsap Lake
Aquatic Plant Locations



Appendix C

Aquatic Plant Control
Department of Ecology

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Aquatic Plant Control

Manual Methods

Description of Method

Hand-Pulling
Hand-pulling aquatic plants is similar to pulling weeds out of a garden. Try to remove the entire plant, including roots.

Cutting
A nonmechanical aquatic weed cutter is commercially available. Two single-sided stainless steel blades forming a "V" shape are connected to a handle which is tied to a long rope. The cutter can be thrown about 20 feet into the water. As the cutter is pulled through the water, it cuts a 48-inch wide swath. Cut plants rise to the surface where they can be removed.

Raking
A sturdy rake makes a useful tool for removing aquatic plants. Attaching a rope to the rake allows removal of a greater area of weeds. Specially designed aquatic plant rakes are also available (see Contacts). Rakes can be equipped with floats to allow easier plant and fragment collection.

Cleanup

These methods create plant fragments. It's important to remove all fragments from the water to prevent them from rerooting or drifting onshore. Plants and fragments can be composted or added directly to a garden.

Advantages

- Manual methods are easy to use around docks and swimming areas.
- The equipment is inexpensive.
- Hand-pulling allows the flexibility to remove undesirable aquatic plants while leaving desirable plants.
- These methods are environmentally safe.

Disadvantages

- Treatment may need to be repeated several times each summer.
- These methods are not practical for large areas or for thick weed beds.
- It is difficult to collect all plant fragments.
- Some plants, like water lilies, are difficult to remove with manual methods.
- Manual methods are labor intensive.
- Pulling weeds stirs up the sediment and makes it difficult to see remaining plants.
- Hand-pulling disturbs bottom-dwelling animals.

Permits

Permits are required for many types of projects in lakes and streams. Check with your local jurisdiction and the Washington State Department of Fish and Wildlife before proceeding with your project.

Introduction

Rapid urbanization, the introduction of non-native aquatic plants, and excessive plant nutrients have created many aquatic plant problems for lakes and streams in Washington. However, there are numerous methods and devices available for managing excessive aquatic plant growth. The material provided in this report may be used by property owners, recreational users, and lake associations to determine options available for managing aquatic plant problems.

Contacts
Lists of vendors for each aquatic plant management method are presented in this report. However, it is not our intention to endorse or promote specific vendors or products and these lists may not be comprehensive. Check your telephone directory or contract your local Chamber of Commerce for local vendors. Vendors who wish to be added to one or more of these lists should contact Kathy Hamel at (206) 407-6562.

Costs

- Hand-pulling costs up to $130 for the average waterfront lot for a hired commercial puller.
- A commercial weed cutter costs about $250 with accessories.
- A commercial rake costs about $95 to $125. A homemade weed rake costs about $85 (asphalt rake = $75 and rope = 35-75 cents per foot).

Contacts

Companies providing weed pulling services include:

AquaZone
82 Foreman Road
McCleary, WA 98557
(206) 495-3920

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Global Diving/Tom Davis
2763 13th Ave. SW
Seattle, WA 98134
(206) 623-0621

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285

Companies that sell weed cutters and weed rakes include:

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Aqua Equipment
6924 N. 27th Ave.
Tacoma, WA 98407
(206) 759-0313

Bottom Barriers

Description of Method:

A bottom barrier covers the sediment like a blanket, compressing aquatic plants while reducing or blocking light. Materials such as burlap, plastics, perforated black mylar and woven synthetics can all be used as bottom barriers. There are also commercial bottom barriers which are specifically designed for aquatic plant control. These include:

❖ *Texel®* A heavy, felt-like, polyester material.

❖ *Aquascreen®* A polyvinylchloride-coated fiberglass mesh which looks similar to a window screen.

The ideal bottom barrier should be durable, reduce or block light, prevent plants from growing into and under the fabric, be easy to install and maintain, and should readily allow gases produced by rotting weeds to escape without "ballooning" the fabric upwards.

Even the most porous materials, such as window screen, will billow due to gas buildup. Therefore, it is very important to anchor the bottom barrier securely to the bottom. Unsecured barriers can create navigation hazards and are dangerous to swimmers. Anchors must be effective in keeping the material down and must be regularly checked.

The duration of weed control depends on the rate that weeds can grow through or on top of the bottom barrier, the rate that new sediment is deposited on the barrier, and the durability and longevity of the material. For example, burlap rots within two years, and plants can grow through window screening material. Regular maintenance can extend the life of most bottom barriers.

Bottom barriers can be installed by the home owner or by a commercial plant control specialist. Installation is easier in winter or early spring when plants have died back. In summer, cutting or hand-pulling the plants first will facilitate bottom barrier installation. Bottom barriers may also be attached to frames rather than placed directly onto the sediment. The frames may then be moved for control of a larger area.

Advantages:

❖ Installation of a bottom barrier creates an immediate open area of water.

❖ Bottom barriers are easily installed around docks and in swimming areas.

❖ Bottom barriers control 100 percent of aquatic plants.

❖ Barrier materials are readily available and can be installed by homeowner or by divers.

Disadvantages:

❖ Bottom barriers are suitable only for localized control.

❖ Harvesters, rotovators, fishing gear or boat anchors may damage bottom barriers.

❖ Bottom barriers must be regularly inspected and maintained.

❖ Improperly anchored bottom barriers may create safety hazards for boaters and swimmers.

❖ Swimmers may be injured by poorly maintained anchors used to pin bottom barriers to the sediment.

❖ Some bottom barriers are difficult to anchor on deep muck sediments.

❖ Bottom barriers interfere with fish spawning and bottom-dwelling animals.

Permits:

Bottom screening requires hydraulic approval, obtained free from the Department of Fish and Wildlife. Check with your local jurisdiction to determine whether a shoreline permit is required.

Costs:

Barrier materials cost $0.22 to $1.25 per square foot. The cost of some commercial barriers includes an installation fee.

Commercial installation costs vary depending on sediment characteristics and type of bottom barrier selected. It costs up to about $750 to install 1,000 square feet of bottom barrier. Maintenance costs for a waterfront lot are about $120 each year.

Contacts:

AquaZone
82 Foreman Road
McCleary, WA 98557
(206) 495-3920

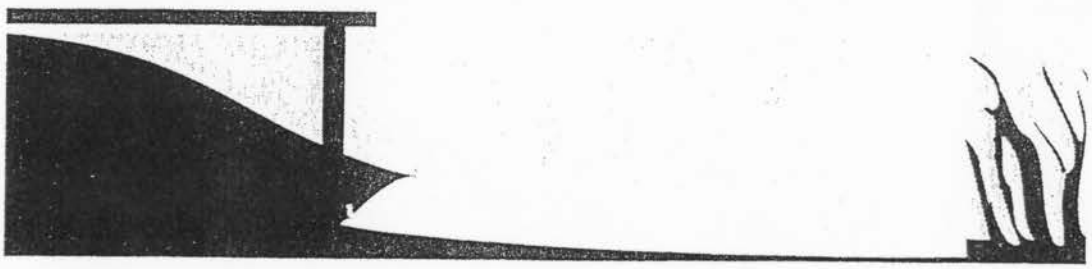
Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Global Diving/Tom Davis
2763 13th Ave. SW
Seattle, WA 98134
(206) 623-0621

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285

Charles Watts Company
P.O. Box 70708
Seattle, WA 98107
(206) 783-8400
FAX (206) 783-8545

For information on owner-installed bottom barriers on frames — Contact:
Thurston County Lake Management Program
2000 Lakeridge Drive S.W.
Olympia, WA 98502



Grass Carp

Description of Method

The grass carp, also known as the white amur, is a vegetarian fish native to China and the Soviet Union. Because this fish feeds on aquatic plants, it can be used as a biological tool to control nuisance aquatic plant growth. Sterile grass carp were recently legalized for introduction into Washington.

The objective of using grass carp to control aquatic plant growth is to end up with a lake that has about 20 to 40 percent plant cover, not a lake devoid of plants.

The Department of Fish and Wildlife determines the appropriate stocking rate for each waterbody. Stocking rates for Washington lakes generally range from 40 to 80 - eight- to eleven-inch fish per vegetated acre. This number will depend on the amount and type of plants in the lake as well as spring and summer water temperatures. To prevent stocked grass carp from migrating out of the lake and into streams, all inlets and outlets to the pond or lake must be screened.

Once grass carp are stocked in a lake, it may take from two to five years for them to control nuisance plants. Survival rates will vary depending on factors like presence of otters, birds of prey, or fish disease. A lake will probably need restocking about every ten years.

Grass carp

- Are only distantly related to the undesirable European carp, and share few of its habits.
- Live for at least ten years and probably longer in Washington waters.
- Will grow rapidly and reach at least ten pounds. They have been known to reach 40 pounds in the southern United States.
- Feed only on plants.
- Will not eat fish eggs, young fish or invertebrates, although baby grass carp are omnivorous.
- Feed from the top of the plant down so that mud is not stirred up.
- Have definite taste preferences—water lilies and Eurasian milfoil are not preferred.
- Are dormant during the winter. Intensive feeding starts when water temperatures reach 68° F.
- Are a river fish and have the desire to move from still waters into flowing waters.
- Are difficult to catch.
- They may not feed in swimming areas, docks, boating areas, or other sites where there is heavy human activity.

Advantages

- Grass carp are inexpensive compared to some other control methods and offer long-term control, but fish need to be restocked at intervals.

Disadvantages

- Depending on plant densities and types, it may take several years to achieve plant control using grass carp and in some cases control may not be possible.
- The type of plants grass carp prefer may also be those most important for habitat.
- If the waterbody is overstocked, all aquatic plants may be eradicated. Removing excess fish is difficult and expensive.
- If not enough fish are stocked, less-favored plants, such as Eurasian milfoil, may take over the lake.
- Stocking grass carp may lead to algal blooms.
- All inlets and outlets to the lake or pond must be screened to prevent grass carp from escaping into streams, rivers, or other lakes.

Permits

A game fish planting permit must be obtained from the Department of Fish and Wildlife.

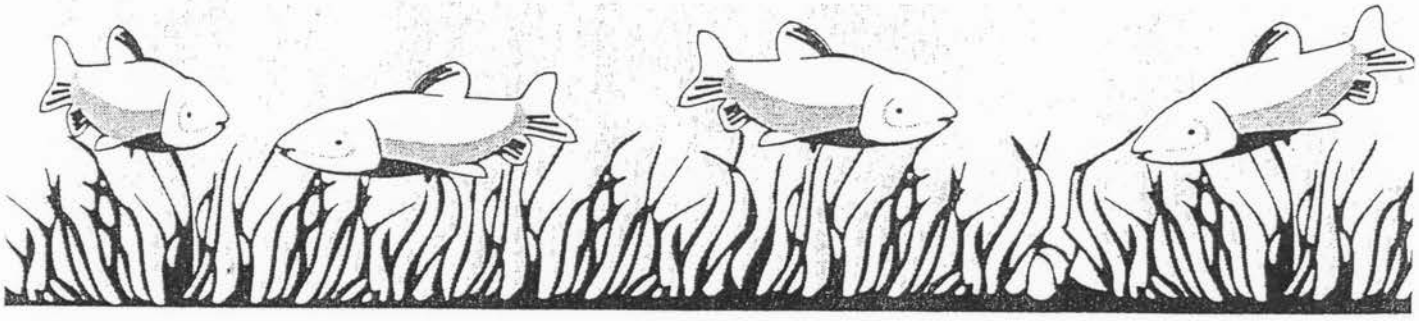
Costs

In quantities of 10,000 or more, 8 to 12 inch sterile grass carp can be purchased for about $5.00 each for truck delivery. The cost of small air freighted orders will vary and is estimated at $8 to $10 per fish.

Contacts:

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285



Mechanical Cutting

Description of Method

Mechanical weed cutters cut aquatic plants several feet below the water's surface. Unlike harvesting, cut plants are not collected while the machinery operates. There are several versions of underwater weed cutters commercially available, including:

- Hand-held, battery-powered cutters
- Portable, boat-mounted cutting units
- Specialized barge-like cutting machines

Cutting is generally performed during the summer when plants are near the surface.

Battery-operated, Hand-held Cutters

A stainless steel underwater cutting blade works like a hedge trimmer to cut aquatic plants. An adjustable shaft allows the operator to reach to twelve feet below the water's surface and cut a four foot swath. It generally takes about an hour to clear an average waterfront lot of weed growth.

Portable Boat-mounted Cutters

A portable underwater cutting unit can be installed on a 14-foot or longer boat. A boat-mounted underwater cutter cuts a seven-foot swath four feet below the water's surface. About one acre of plants per hour can be cleared using this device.

Specialized Underwater Cutters

Specialized underwater weed cutters can cut weeds in water as shallow as ten inches and as deep as five feet. The main sickle will cut a swath ten feet wide. Specialized cutters can cut about 12 acres per day.

Cleanup

Cutting generates floating plants and fragments. It is important to remove all plants and fragments from the water to prevent them from rerooting or drifting onshore. Cleanup can be accomplished using a weed rake. Specially designed nets should be used when using boat-mounted and larger underwater cutters. The time needed for cleanup depends on the density and types of plants and the amount of acreage cut.

Advantages

- Cutting creates immediate open areas of water.
- Mechanical underwater cutters can work in shallow waters not accessible to larger harvesters.
- Hand-held equipment can easily be maneuvered around docks and marina areas.
- Habitat for fish and other organisms is retained if the plants are not cut too short.
- Hand-held cutters are easily transportable.
- Prices of mechanical cutters are substantially lower than harvesters.
- Renting hand-held cutters at equipment rental stores may be possible.

Disadvantages

- Cutting is similar to mowing a lawn—the plants grow back and will likely need to be cut several times during the growing season.
- Some plants are difficult to cut.
- Cutting creates plant fragments which may enhance the spread of invasive plants such as milfoil. These fragments may also drift onshore and decompose.

Permits

Mechanical cutting requires hydraulic approval, obtained free of charge from the Department of Fish and Wildlife. For projects costing over $2,500, check with your local jurisdiction to see if a shoreline permit is required.

Costs

- The price of hand-held cutters ranges from $350 to $1,300, plus accessaries.
- Portable boat-mounted cutting units cost from $400 to $3,000.
- Specialized underwater cutters cost about $11,000.

Contacts

Companies selling mechanical cutters include:

Underwater cutters and boat-mounted portable cutters

Hockney Company-Underwater Cutters
P.O. Box 1000,
913 Cogswell Drive
Silver Lake, WI 53170

Sutek Services
1200 Burrard, St. 500
Vancouver, B.C.
Canada, V6Z2C7
(604) 987-9329

Hand-held cutters

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Waterside Products Corp.
P.O. Box 876
Lake Mahopac, NY
10541-9942
1-800-552-1217

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285

Note: Check with equipment rental stores in your area.

Mechanical Harvesting

Description of Method

Mechanical harvesters are large machines which cut and collect aquatic plants. Cut plants are removed from the water by a conveyor belt system and stored on the harvester until disposal. A barge stationed near the harvesting site for temporary plant storage is an efficient disposal method; alternatively the harvester carries cut weeds to shore. Cut weeds are disposed in landfills, used as compost, or in reclaiming spent gravel pits or similar sites.

Harvesting is usually performed in late spring, summer and early fall when aquatic plants have reached or are close to the water's surface. Harvesters can cut and collect several acres per day depending on weed type, plant density, and storage capacity of the equipment. Depending on the equipment used, the plants are cut from five to ten feet below the water's surface in a swath 6 to 20 feet wide. Because of machine size and high costs, harvesting is most efficient in lakes larger than a few acres.

Advantages

❖ Harvesting results in immediate open areas of water.

❖ Removing plants from the water removes the plant nutrients, such as nitrogen and phosphorus, from the system.

❖ Since the lower part of the plant remains after harvest, habitat for fish and other organisms is not eliminated.

❖ Harvesting can be targeted to specific locations; protecting designated conservancy areas from treatment.

Disadvantages

❖ Harvesting is similar to mowing a lawn; the plant grows back and may need to be harvested several times during the growing season.

❖ There is little or no reduction in plant density with mechanical harvesting.

❖ Off-loading sites and disposal areas for cut plants must be available. On heavily developed shorelines, suitable off-loading sites may be few and require long trips by the harvester.

❖ Some large harvesters are not easily maneuverable in shallow water or around docks or other obstructions.

❖ Many small fish and insects are often collected and killed by the harvester.

❖ Harvesting creates plant fragments which may increase the spread of invasive plant species such as Eurasian watermilfoil.

❖ Plant fragments may accumulate and decompose on shore.

Permits

Harvesting requires hydraulic approval from the Department of Fish and Wildlife. Some Shoreline Master Programs may also require permits for harvesting. Check with your local jurisdiction.

Costs:

Costs per acre vary with numbers of acres harvested, accessibility of disposal sites to the harvested areas, and whether a private contractor or public entity does the work. Costs as low as $250 per acre have been reported. Private contractors generally charge $500 to $800 per acre. The purchase price of harvesters ranges from $30,000 to $110,000.

Contacts

Contractors offering harvesting services include:

AquaZone
82 Foreman Road
McCleary, WA 98557
(206) 495-3920

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Outdoor Directions
P.O. Box 455
Newport, WA 99156
(509) 447-2570

Waterfront Construction
P.O. Box 3208
Kirkland, WA 98083
(206) 828-3600

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285

U.S. companies selling harvesters include:

United Marine International, Inc.
2337 Lemoine Ave.
Ft. Lee, NJ 07024
(201) 944-5600

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Aquarius Systems
P.O. Box 215
220 N. Harrison
North Prairie, WI 53153
(414) 392-2162

Rotovation

Description of Method:

Rotovators use underwater rototiller-like blades to uproot aquatic plants. The rotating blades churn seven to nine inches deep into the lake or river bottom to dislodge plant roots. Plants and roots may then be removed from the water using a weed rake attachment to the rototiller head, or by harvester or manual collection.

Rotovation can be used year-round to control aquatic plant growth. However, it is most effective in the winter and spring when plants have died back. Summer and fall rotovation usually requires the plants to be cut first since the longer plants wrap around the rototiller head, slowing the rotovation process.

Depending on plant density and sediment type, two to three acres per day can be rotovated. Because of the size of the equipment and high costs, rotovation is most suitable for use in larger lakes or in rivers.

Rotovation is very effective for Eurasian milfoil control. Tests have shown that rotovation can produce a high level of milfoil control for up to two seasons. However, milfoil will gradually re-invade the cleared area.

Because rotovation disrupts the sediment, it can create harmful environmental effects:

❖ Rotovation churns up the lake bottom causing water to become temporarily turbid with suspended sediments.

❖ Plant nutrients in the sediments, such as nitrogen and phosphorus, may be released into the water.

❖ Long-buried toxic materials in the lake bottom which may be present from land use activities such as boat building or storm water drainage may be released into the water.

❖ Rotovation may interfere with fish spawning or migration.

For these reasons, the Department of Ecology and other agencies require special permits for rotovation.

Advantages

❖ Rotovation potentially removes the entire plant rather than just "mowing" off its top like harvesting and cutting.

❖ Plant density is generally decreased by successive treatments.

❖ Control generally lasts two growing seasons.

❖ Rotovation can be used year-round to control aquatic plants, depending on permit requirements.

❖ Rotovation may stimulate growth of some desirable native aquatic plants.

Disadvantages

❖ Rotovation is expensive.

❖ Rotovation disturbs bottom dwelling animals.

❖ Some rotovators are difficult to maneuver around docks and in shallow water.

❖ Rotovation causes fragmentation which may increase the spread of invasive weeds like milfoil.

❖ Rotovation is labor intensive. It may require cutting the plants and removing bottom obstacles like logs and rocks.

❖ Sunken logs can impede rotovation; however some logs may be required to be left for fish and wildlife habitat.

❖ Underwater utilities, such as gas, water, sewer, telephone or water intake pipes, need to be located before rotovation begins.

Permits

❖ Rotovation requires hydraulic approval from the Department of Fish and Wildlife.

❖ An approval for a short-term modification of state water quality standards is needed from the Department of Ecology regional offices (in Bellevue, Olympia, Yakima or Spokane) and may take 45 to 60 days to obtain.

❖ A shoreline permit from the appropriate local jurisdiction may also be needed and may take up to three months to obtain.

❖ A Section 404 permit obtained from the Army Corps of Engineers may be required.

Costs

Costs for a private contractor to harvest plants, remove obstacles, rototill, and collect and dispose of plants range from $1,500 to $2,000 per acre. As plant density decreases and obstacles are removed, costs and time needed to rotovate each acre will decrease.

Contacts

Companies offering rotovation services include:

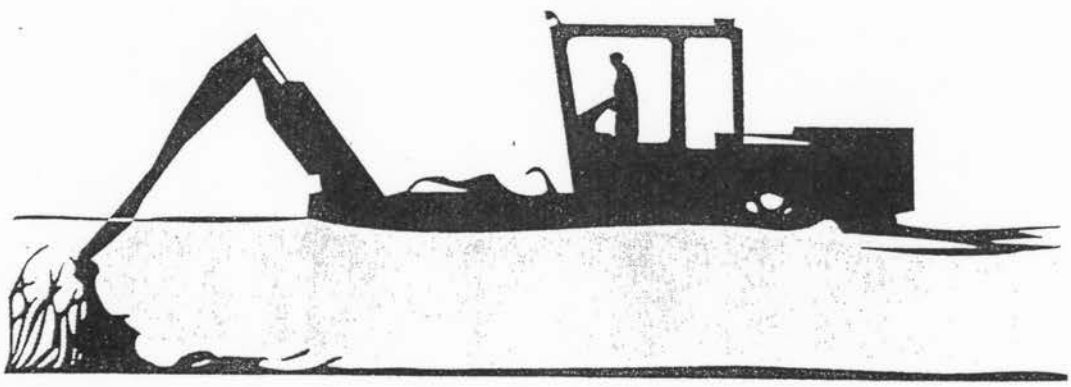
Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Allied Aquatics
4426 Bush Mountain Dr. SW
Olympia, WA 98502
(206) 357-3285

Companies selling rotovators include:

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

A1 Machine and Welding
4401 31st Street
Vernon, BC Canada V1T5J8
(604) 542-1047



Aquatic Herbicides

Description of Method

Aquatic herbicides are chemicals specifically formulated for use in water to kill or control aquatic plants. They are sprayed directly onto floating aquatic plants or are applied to the water in either a liquid or pellet form. **Systemic herbicides** kill the entire plant. **Contact herbicides** cause the parts of the plant in contact with the herbicide to die back.

Because of environmental risks from improper application, aquatic herbicide use in state waters is regulated and has certain restrictions:

- Applicators must be licensed by the State Department of Agriculture.
- Applicators must obtain a permit from the Department of Ecology before application.
- Generally, a certain percent of all aquatic plants in each waterbody must remain untreated to provide food and habitat for fish and wildlife.

Although there are a number of EPA registered aquatic herbicides, the Department of Ecology currently issues permits for only four aquatic herbicides:

- **Rodeo®** – Active ingredient *glyphosate*. This systemic herbicide is used to control floating-leaved plants like waterlilies, and purple loosestrife and cattails. It is generally applied as a liquid to the leaves.
- **Sonar®** – Active ingredient *fluridone*. Sonar® is a slow-acting systemic herbicide used to control Eurasian watermilfoil and other underwater plants. It may be applied in pelleted form or as a liquid. It may take six to twelve weeks before the dying plants fall to the sediment and decompose.
- **Aquathol®** - Active ingredient *endothall*. A fast-acting contact herbicide which destroys the vegetative part of the plant but does not kill the roots. Aquathol® may be applied in a granular or liquid form. There are swimming, drinking and other water use restrictions.
- **Copper Compounds** – copper sulfate and chelated coppers – Copper compounds are generally used for algal control only, but several treatments each season may be needed to control algal blooms. Copper compounds are toxic to fish and must be used with extreme care. Ecology requires sediments to be tested for copper before a permit can be issued for copper application.

Advantages

- Aquatic herbicide application can be less expensive than other aquatic plant control methods.
- Aquatic herbicides are easily applied around docks and underwater obstructions.

Disadvantages

- Some herbicides have swimming, drinking, and water use restrictions. Herbicide use may have unwanted impacts to people who use the water and to the environment.
- Non-targeted plants as well as nuisance plants may be controlled or killed by some herbicides.
- Depending on the herbicide used, it may take several days to weeks or several treatments during a growing season before the herbicide controls or kills treated plants.
- Rapid-acting herbicides like Aquathol® may cause low oxygen conditions to develop as plants decompose. Low oxygen can cause fish kills.
- To be most effective, herbicides must be applied to rapidly-growing plants.
- Some expertise in using herbicides is necessary in order to be successful and to avoid unwanted impacts.
- Many people have strong feelings against using chemicals in water. Find out how your neighbors feel about the use of aquatic herbicides before considering their use.
- Some local jurisdictions have policies forbidding or discouraging the use of aquatic herbicides.

Permits

A permit called a short-term modification to water quality standards is needed from the Department of Ecology. The permit usually takes 45 to 60 days to process. Apply to your Ecology regional office for a permit in winter before plants become a problem.

Costs

Approximate costs for one acre herbicide treatment:

- *Rodeo®*: $200
- *Sonar®*: $900 to $1,000
- *Endothall*: $300 to $400
- Copper compounds: $150 to $200

These costs are estimates and will vary.

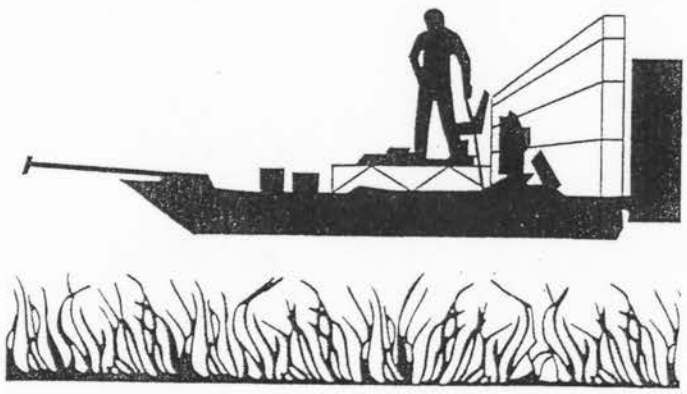
Contacts

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Darry Air Inc.
P.O. Box 733
Ephrata, WA 98823
(509) 754-5800

Allied Aquatics
4426 Bush Mountain Dr, SW
Olympia, WA 98502
(206) 357-3285

Haines Tree and Spray Service (Whatcom and Skaget Counties only)
4120 Irongate Road
Bellingham, WA 98226
(206) 733-6680



Weed Rolling

Description of Method

Like the "well-worn" or "often-trod path," this method of controlling aquatic weed growth depends on frequent agitation and slight compaction of lake sediments. This new method appears to offer the individual property owner a means of controlling weed growth within a small defined area.

The method uses a commercially available, low-voltage power unit that drives an up-to-30-foot long roller set on the lake bottom through an adjustable arc of up-to 270 degrees. A reversing action built into the drive automatically brings the roller back to complete the cycle. Fins on the rollers detach some plants from the soil, while the rollers force other plants flat, gradually inhibiting growth. Detached plants should be removed from the water with a rake or gathered by hand.

Once plants are cleared from the area, the device can be used as little as once per week or less to keep plants from recolonizing the area. When not in use, the equipment should be stored along side a dock or in a place where people will not step on the roller and accidentally injure themselves.

Little maintenance is required but the unit must be removed from the water in winter in areas where lakes are expected to freeze. The life of the unit is predicted at a minimum of five years.

Advantages

- Rolling suppresses regrowth of plants in areas where it is regularly used.
- The treatment area can be modified by using up to three, ten foot roller tube sections, as well as by adjusting the roller tube travel arc.
- Weed rolling creates and maintains areas of open water adjacent to docks.
- Operating costs are low—about the same as using an ordinary light bulb.

Disadvantages

- Weed rolling may disturb some bottom dwelling animals and may interfere with fish spawning.
- Weed rolling may cause plant fragmentation, which may increase the spread of some invasive weeds.
- When the cleared area is to be used for activities such as swimming or wading, the rollers should be unplugged from the power source, moved and stored under or along a dock.
- Never allow people in the water when the equipment is operating.
- Never allow water activity above or along side of the equipment to keep people from contacting the roller tube and accidentally injuring themselves.

Permits

Installation of weed rolling devices requires hydraulic approval obtained free from the Department of Fish and Wildlife. Check with your local jurisdiction to determine whether a shoreline permit is required.

Costs

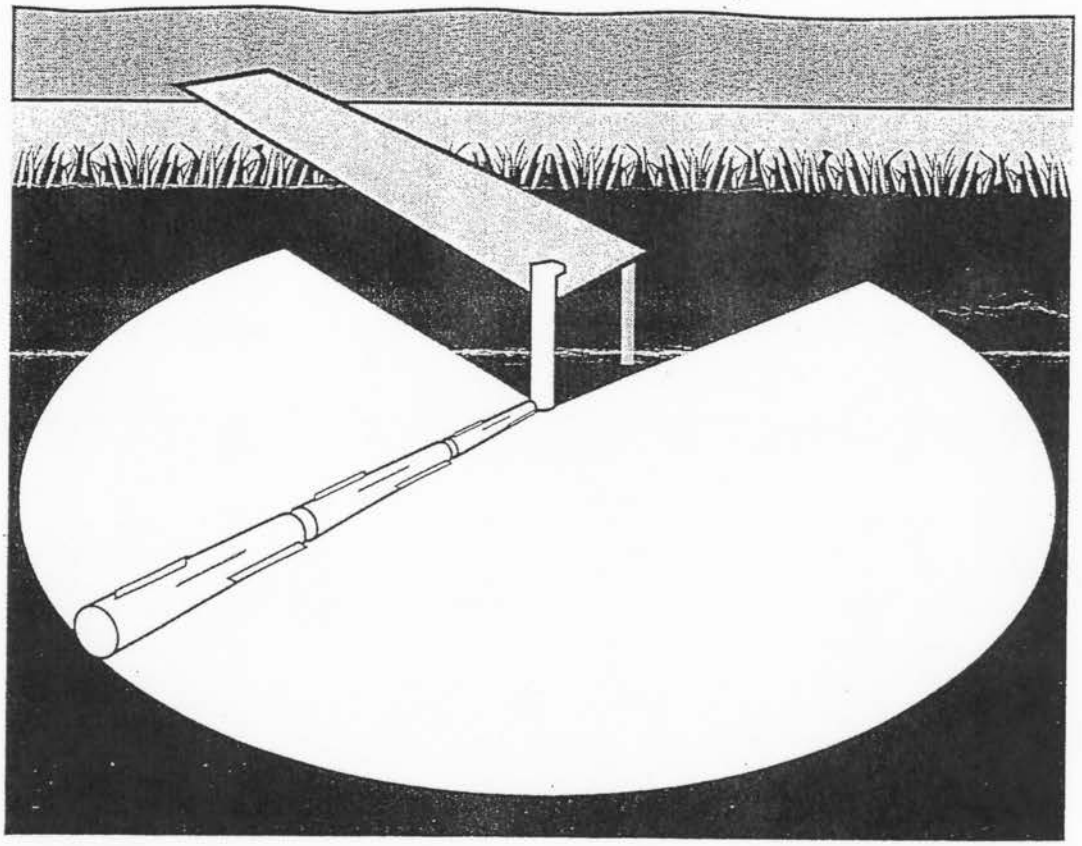
Purchase cost is approximately $2,000. Installation is simple and requires only a 110 volt ground fault interrupter and an outdoor extension cord in addition to the equipment package supplied by the manufacturer.

Operating costs are analogous to the costs of using a 75 watt light bulb.

Contacts

Resource Management, Inc.
2900B 29th Ave. S.W.
Tumwater, WA 98512
(206) 754-3460

Crary Company
237 North West 12th Street
P.O. Box 849
West Fargo, North Dakota
58078-0849
(701) 282-9522



Appendix D

Public Comments

Kitsap Lake
Public Meeting #1 (Chapter 5)
May 18, 1998
At Cascade Natural Gas Building

AGENDA

I. Introductions
II. Process
III. Problem Statement
IV. Management Goals
V. Citizen Input

MINUTES

ATTENANCE: Horace Burks, John Cattell, Doug Groneman, Karl Gruber, Dale Holden, C. Hoppe, Pam Kreif, Jack Lefcoski, Wynne and Charles Littman, Jeff Pfost, John McKay, Scott Sandin, and Ben Zlafteff.

STAFF: Becky Lorber and Jim Spencer.

I. Introduction
Jim Spencer addressed the audience on the project at large: the completion of a weed management plan by the end of the year, in order to satisfy the CDBG funding for the study, and provide future direction for lake care once funds are identified. Tonight's meeting would focus specifically on weed issues and the first two components of the plan: i.e. the problem statement and management goals. The citizen volunteer steering committee with Parks and Recreation staff are taking the lead, but need citizen input to ensure that the findings dovetail with the community needs and expectations.

II. Process
Jeff Pfost shared the twelve steps required by DOE for the completion of the Weed Management Plan. The attached handout provided a pictorial flowchart including a written synopsis of the requirements. Citizens were encouraged to join with the steering committee in those areas where they have specific interest.

III. Problem Statement
Becky Lorber introduced the draft problem statement. It is anticipated that the problem statement will be revised several times as information is gathered and processed during the entire process. Becky shared the steps used to reach this draft, which included: identifying all user groups, known problems encountered by each user group, grouping the users into like categories, identifying weed problems for each group, and finally, condensing these problems into the draft problem statement.

The main emphasis derived by the steering committee is to be proactive on weed issues. It was critical to preserve the health of the lake, ensure that the lake serves the community at large, that recreational and natural uses of the lake be as symbiotic as possible, and ensure the future of the lake as much as possible.

IV. Management Goals

Ben Zlateff covered the draft Management Goals. These goals provide the foundation for determining reasonable expectations and benefits that will also be compatible with the lake's health.

V. Citizen Input

At this point the meeting was opened up for public input with John McKay leading the discussion. Effort was made to ensure that the focus was limited to the plan, specifically the problem statement and goals. The following comments were shared:

- The problem statement needs to be stronger, clearly stating that there is a problem
- The weed problem is getting worse annually—include in problem statement
- The problem will not correct itself alone
- Swimmer's itch is a problem
- Public education is needed for protecting and improving lake health
- Prevent lake closures from weed issues
- Determine sources of plant nutrients (e.g. salmon, fertilizers, fowl, etc.)
- It may be premature at this point in the plan process, but the weed problem is worse
- People responding to the survey indicate there is a problem (88%)
- It was strongly encouraged to communicate the issues, concerns, and needs of the lake with the public and city officials. The weed problem needs to be viewed as a community issue, not a district, home-owner, or user issue.
- Need to determine who is responsible for ensuring the lake's health (e.g. users, watershed, city, county, state, etc.)
- They Storm Water Management Program needs to become involved both as a part of the financial solution and the control of water quality. *
- Money sources for the implementation of the study's findings was critical.
- Lake levels need to be controlled **

* It was recognized that weed issues and remediation funds traveled a parallel course. Discussion encouraged Kitsap Lake weed solutions be placed as a line item in the City's 1999 budget, even if an exact dollar amount could not be identified. This will be difficult since most budgets require justification for fund commitments, and the plan will likely not be complete prior to the beginning of the 1999 budget cycle.

** The lake level could impact weed solutions and findings. A solution to the lake level question is being pursued separately and in parallel to this project. A question was posed by one of the attendees regarding the current lake level, and those in attendance seemed satisfied with this level which coincides with the top of the boards at Fish and Wildlife's existing dam.

Appendix E

Individual Permit Application Process

Aquatic Pest Management
Permit Application*/Addendum

*For short-term modification to state water quality standards

Complete all of the items in this application and return to: Department of Ecology, Water Quality Program, Northwest Regional Office, 3190 - 160th Avenue SE, Bellevue, WA 98008-5452. If more space is needed to answer any questions, please attach a separate sheet. Questions? Call (206) 649-7036.

1) a) Name of water body to be treated:

b) Is this a lake ___ wetland ___ irrigation canal ___ drainage ditch ___

golf course pond ___ stormwater pond ___ other small pond ___ reservoir ___
river or stream ____ estuary ___ other... describe:

2) City (if within city limits): County:

3) Section(s)_____ Township_____ Range_____

Section(s)_____ Township_____ Range_____

4) Project Sponsor(s): Name:_____Phone: _____

Address: _____

5) Applicator: Name: _____Phone:_____

Address:_____

Applicator: Washington State Aquatic Pesticide License #: _____

6) Water Resource Inventory Area (WRIA): _____

99.app

7) Attach a map of the waterbody that describes:

a. Area(s) to be treated
b. The pesticide to be used in each area
c. Use abbreviations to outline the approximate areas that are covered by each type of plant: emergent (E) (AQ), floating (FL), algae (AL), and free-floating (FF). These coverage estimates should be for July or August.
d. Public access sites including official and unofficial trailer-boat launches and swimming areas
e. Location and name of all outlet(s) and inlet(s)
f. Direction of water flow
g. Directions to the waterbody from the nearest major highway (another, smaller scale map such as those found in the Thompson's Guide may be helpful)
h. Development and use within 200 feet from high water (lawn, houses, landscape type, cleared or forested, cattle grazing, roads, etc.)

8) Size (acres or feet)_____ Mean Depth_____ Max. Depth_____

9) Describe the size and location(s) of area(s) to be treated:

10) Describe and name inlet(s) and outlet(s) to waterbody. Include expected flow levels (approximate cubic feet per second) during treatment(s) and 30 days after treatment(s):

11) Describe types of uses of all access sites (farms, homes, trails, parks, camps, clubs, marinas, etc) to the waterbody within .5 mile along the shore of the treatment area. Describe all public and private boat launches to the waterbody within 1.5 miles of the treatment area:

12) Describe frequency and location of recreational uses such as water skiing, fishing, plant and fruit harvesting, golfing, and swimming on both public and private properties:

13a) Give a brief history of how plant or pest problems have interfered with necessary activities and public interests:

13b) Give a brief history of previous methods of pest control:

13c) What non-chemical controls were considered for this waterbody?

13d) What were the conclusions?

13e) Have you considered a long-term management plan for this waterbody? If so, please describe:

14) Check the types and state the amounts of the chemicals that you propose to use for each of the pest types you want to control. Please include adjuvant.

Chemical	amount (ppm)	pest type
__ Glyphosate (Rodeo®)	_____	_____
__ Endothall (Aquathol®)	_____	_____
__ Fluridone (Sonar®)	_____	_____
__ Copper compounds	_____	_____
__ 2,4-D	_____	_____
__ Insecticides _____		
__ Adjuvant _____		
__ Other _____		

15) Describe application methods for each type of chemical proposed for use:

16) Proposed timing and frequency of treatment:

17) Are you aware of any domestic, potable, or irrigation withdrawals from the waterbody? NO _____ YES _____
If the answer is yes, please show the location(s) on the map (see question #7).

18) List any other governmental approvals or permits that will be needed for your proposal. Also, list any other prepared environmental information that is directly related to this proposal.

19) Use a separate page to further answer questions or describe special considerations.

I certify that the answers to the above questions are correct, complete, and true to the best of my knowledge.

_____ _____
Applicant Signature Date

Affilliation: _____

INSTRUCTIONS

Question #1. Use the name(s) commonly used to refer to the waterbody.

Question #2. The city and/or county where the project is planned.

Question #3. Please include all Sections, Townships, and Ranges that overlay the waterbody. This information can be found on various types of maps including U.S.G.S. quadrangle maps, the Washington Gazetteer, and many county maps. If the project is for noxious plants on a countywide basis, disregard this question.

Question #4. A project sponsor is the individual(s) or organization(s) who either performs the treatment on their own lands or contracts with an applicator. This information must be provided before you can be issued a permit.

Question #5. The applicator is the person holding a Washington State aquatic pesticide license who plans to apply the pesticide. If you do not have this information when you send in the application request, the application will still be processed.

Question #6. WRIAs (water resource inventory areas) describe watersheds. (WRIA map on the website - http://www.wa.gov/ECOLOGY/wr/wrias.html.

Question #7. Show the geography, land use, existing environmental conditions, and where you plan to treat. Take time to make your map neat and accurate.

Question #8. How large is the waterbody? If the size can be better understood by describing it in square feet, please do so. If the waterbody is a wetland with little or no surface water, mean depth and maximum depth are not applicable.

Question #9. How large is the planned treatment? List the area(s) in square feet or acres, consistent with the unit of measure that you used to answer question #8.

Question #10. Water flowing away from the treatment site can transport pesticides downstream. Water flowing into the treatment area can dilute herbicide concentrations.

How to measure cubic feet per second (cfs) of water flow: Example--A floating object took 5 seconds to travel 10 feet down an outlet stream: 10 ÷ 5 = 2 feet per second. The outlet stream was 2 feet across with an average depth of 0.5 feet: 2 x 0.5 = 1.0 square foot. To get cubic feet per second multiply 2 feet per second x 1 square foot = 2cfs.

Question #11. Describe the types of access to the treated area from the land and, if appropriate, from the water. Also, describe how people use the surrounding areas. Make sure that your descriptions can be correlated to the map (see question #7)

Question #13a-e. Before treatment begins, it is important to develop a long-term management plan. If a plan is not presently available, please identify the status of management planning efforts.

Question # 14. List the trade and chemical name of the product(s) you wish to apply. Please note that some pesticides and adjuvants that are registered by EPA for use in the water are not allowed for use by Ecology. Please call if you would like more specific information about these chemicals.

Question # 15. List the type of equipment that will be used (aerial boom, hand spray, wiper, underwater injection, etc.) for each pesticide. Also describe other treatment operations such as design of any experimental treatment and the type of vehicle that the sprayer will be operated from.

Question #16. List when the planned treatment is to begin, how many times is planned to occur, and when the last date of treatment is proposed.

Question #17. To get registered Washington State water right information, contact Department of Ecology's Water Resource Program's water right information office at (360) 407-6608. They maintain a database that is accurate to the quarter/quarter section (1320 feet). The water rights information office will direct you to the appropriate contact if you need ownership information.

Question #18. Describe city, county, federal, or state permission that will be needed to legally proceed with your project. List as a bibliography, any environmental impact statement and assessment, report or study, funding requests, contract, etc., that includes your specifically proposed waterbody.

Question #19. This form may not have enough space to completely answer all of the questions. You may also want to give additional information (studies, brochures, maps, etc.) to further describe your proposal.

Please remember: the application must be signed and dated to be valid.

Past experience has shown that most of these projects result in impacts that have already been addressed in either the Aquatic Plant Management EIS or the Noxious Emergent Plant Management EIS. Normally this application will serve as an addendum. However, if project impacts are significantly different than those assessed in the EIS, additional review under SEPA may be required.

Appendix F

Survey Questions & Results

CITY OF BREMERTON • 239 4th Street • Bremerton, WA 98337

To: Kitsap Lakefront Property Owners
From: Jim Spencer, Interim Director, Bremerton Parks and Recreation Department
Date: January 23, 1998
RE: Kitsap Lake Aquatic Weed Survey

There have been continuing concerns raised regarding the aquatic weed situation at Kitsap lake. In an effort to address these concerns, the City of Bremerton's Parks and Recreation Department was successful in obtaining some Community Development Block Grant money to help develop a comprehensive Aquatic Management Plan for this lake. Before starting this plan, we need to understand your opinion of the magnitude of the weed problem as it currently exists. Please take a minute and answer the questions on the attached survey. Your input is very important.

The objective of the proposed plan is to develop a definitive solution to the lake's overall health, including the weed concerns. A funding source to implement the solution has not been identified. If you have questions concerning this survey, please contact Becky Lorber at 415-5420.

City of Bremerton

PARKS & RECREATION

"Committed to Enriching Life in Bremerton"

Kitsap Lake Aquatic Weed Survey

Please check the approriate response(s):

1. I believe Kitsap Lake has an aquatic weed problem that needs to be addressed.

   31 Yes 4 No

   If yes, specify the area(s) on the lake: See attached

2. I use Kitsap Lake for the following activities:

   28 Fishing 22 Water Skiing 8 Jet skiing

   31 Swimming 16 Rowing 20 Boating

   ____ Other (please specify) Windsurfing - 2, Nature Walking - 1, Sailing - 1, Kyaking - 1, Canoes - 1, Viewing - 4, Paddleboats - 1

3. I would be willing to serve on the steering committee to develop a definitive solution to the problems that may be afflicting Kitsap Lake. *

   * see attached
   13 Yes 18 No ? 2

* If you answered "Yes", please include your name and phone number.

Name: _____ Day Phone: _____ Evening Phone: _____

4. Other comments: See attached

Return your survey to:

Kitsap Lake Aquatic Weed Survey
Bremerton Parks & Recreation Department
680 Lebo Blvd.
Bremerton, WA 98310

Please return by Friday, February 13, 1998

Thank you for time and input!

Other Comments:

1. Lake use is also degraded by swimmers' itch, algae blooms and accelerated sittification due to poor storm water management practices upstream of lake.
2. The lake will turn into a swamp if the weed problem is not corrected. Recommend approved chemicals or weed-eating sterilized carp be introduced.
3. Most of the lake residents are passive. The weeds we have now will only expand and must be minimized/controlled.
4. Jeff Pfost is willing to share his survey from summer 1997.
5. The lake is an extremely important asset of Bremerton. Its multi-use for recreation of the general public, the Navy, and the citizens of Bremerton must be preserved.
6. Weed growth in the South end seems significantly greater than ten years ago.
7. Notify Paul Lindblad of any meetings (396-4116, days).
8. There are more important things than weeds in the lake. Sure they are worse some years due to weather and increased jet ski use. Yeah, attack the weeds because they can't talk back. Save our money! Just leave the lake to naturally take care of itself. Development is complete around the lake--it is o.k.
9. Weed problem is a result of the lake being filled in with silt & soil that has been washed in by the creeks. You won't get rid of the weeds until the silt is removed.

Appendix G.

Minutes from Steering Committee Meetings

Kitsap Lake Steering Committee Meeting #1
Agenda for
March 18, 1998, Wednesday
7:00 p.m.

7:00 p.m.	Call to order and introductions
7:10 p.m.	Kitsap Lake issues---Jim Spencer
7:30 p.m.	Purpose, tasks, and timeline for the steering committee
7:40 p.m.	Committee input
8:00 p.m.	Identify the possible subcommittees needed (problem statement, lake mapping, plant identification, etc.)
8:20 p.m.	Determine the next meeting date and time
8:30 p.m.	Adjournment

STEERING COMMITTEE MEETING
MARCH 23, 1998

Purpose of the steering committee:

1) Represent the public
2) Complete the steps in the manual
3) Communicate and share information with the public

Process:

1) Overview of the task at this meeting
2) Perhaps break into three subcomittees--suggest
    a) lake mapping & weed identification group
    b) problem statement and goals group
    c) control alternatives and funding sources group

Kitsap Lake Weed Meeting Minutes
March 23, 1998

In attendance: Hod Burks, John Carlson, Roger Hudson, Ruth Kuhlman, Jeff Pfost, and Ben Zlatree.

Missing: John Cattell, Dr. Ken Cogen, Mark Duncan, Louise Gent, Jeanette Kelso, John McKay, John Mitchell, and Wayne Sargent.

Staff: Becky Lorber and Jim Spencer.

Meeting began at 7:05 at Sheridan Park Community Building. Jim Spencer recapped historical information about previous department efforts to determine a solution to weed problems at the Kitsap Lake Park location. He referenced the 1994 FishPro report that concentrated on the area in front of the existing park on the lake. The report provided options but no clearly defined direction for solving the weed issue.

Jim briefed the group on recent conversations with Fish and Wildlife staff relating to the removal of screens within two years, and possible removal of the boards which control lake water levels. He referenced RCW 90.24 which provides direction for lake owners seeking to maintan a certain water level, plus his concerns as it relates to the park area.

Discussion on this topic included Jeff commenting that his discussion with Steve Jackson of F&W, was that his department was not opposed to supporting a set lake level. Jim expressed concern about maintaining the easement agreement that F&W currently has with the two adjacent property owners, which will expire once the screens are pulled. Roger commented that discussions between Larry Hall and John Mitchell (one of the easement property owners) was that John originally wished to see the dam moved 50' down steam. It was pointed out to John that some of the best spawning locations run right up to the existing dam and this move would undoubtedly be challenged and discouraged by the Tribe and F&W.

Jim concluded with his desire to tackle the problem without "reinventing the wheel"; the need to develop a working plan that everyone believes in--not another "dust catcher"; and a plan that can be implemented once funding has been identified and secured.

The steering committee is tasked to help develop a "Citizen's Manual for Developing Integrated Aquatic Vegetation Management Plan", as required by Department of Ecology. Without this document, it will be difficult to secure funding to implement a weed control program that ensures the ongoing health of the lake. Becky handed out a purpose and proposed process for the steering committee along with a suggested timeline for plan development.

Input from the committee included:

* Desire to not recreate a document/research already in existence
* Contact King County who has Service Water Specialist staff and see what recommendations and direction they can suggest
* Research Lake Limerick (a private lake) which currently uses chemical applications every few years for weed control
* Determine Storm Water Management's role in lake health (possible future funding source)
* Contact Neal Bass of Lake Tahuya--he is a licensed engineer who has completed some lake plans for other locations

The committee inquired about Jack Lefcoski's absence on the committee. Jim stated that it was his decision based on comments returned with the survey, and that he was trying to maximize the number of participants. Since these meetings are open to the public, Jack is always welcome to participate. It was suggested that Jack's expertise could be used at the subcommittee level, with members of the committee recognizing Jack's enthusiasm and knowledge on lake related matters.

Discussion was brought back to the committee's organization. It is the group's choice on how to conduct the project. Becky briefly reviewed the twelve steps involved in completing the plan, pointing out that it can be broken into three primary tasks. Decisions were postponed until the next meeting, when hopefully a larger representation of the committee will be available.

Becky will draft minutes of tonight's meeting, send it to all committee members, including a flow chart of the manual and proposed committee structuring. **The next meeting is slated for Thursday, April 16, from 7:00-8:30 p.m. at the Cascade Natural Gas Building on Kitsap Way.**

Meeting adjourned at 8:30.

Attachments: Timeline
Purpose Statement
Committee Structuring ideas
Flow Chart

Please call Becky at 415-5420 regarding your attendance or absence for the April 16th meeting, from 7:00-8:15 p.m., at the Cascade Gas Building on Kitsap Way. Thank you!

Committee Structuring Ideas:

It is recognized that all committees consist of people of different interests, talents, skills, and preferences. Each person has committments, time constraints, and demand for their time and energy. In an effort to complete the Weed Managment Plan within the next eight months and honor each committee memebers needs and desires, it is proposed that the group divide into three subcommittees according to their interests and time. However the group as a whole will need to convene collectively for public meetings and plan finalization. Becky is the staff member assigned to assist the committee in their endeavors, but the plan needs to be the citizens' plan, not the Parks and Recreation plan. A consultant may be required for technical expertise and advisement.

The first subcommittee would tackle the Problem Statement, goal compilation, and drafting the action plan towards the end of the project. All members would be involved in reveiwing the drafts and voicing support and direction. This group is for those that like to write, review research and propose direction, visualize the need and communicate to others, and are good listners, able to incorporate the views of the public.

The second subcommittee would map the lake for physical characteristics and recreational uses. It would also conduct the plant inventory and samples, and determine quantity and impact. This is a very "hands on" group, that will involve being on the lake and developing a visual map for others to see the various components and interrelations.

The third subcommittee involves people who are interested in researching the solutions for weeds on the lake. This may involve research, contact with suppliers, talking with communities that have incorporated some of the options being considered, etc. In addition, this committee will propose recommendations, including the level of involvement. Some time will be spent on cost considerations, possible sources for future funding, and the development of pros and cons for each solution.

If subcommittees are selected, each group would need to designate a chair, with one person overseeing the subcommittees.

If the subcommittee idea is not preferred, the group can consider working as one unit with everyone involved in each aspect. The manual is fairly straight-forward and not difficult to follow. At least one chair needs to be designated under this structure, and preferrably co-chairs.

Bring your choice to the next meeting on April 16 at the Cascade Gas building on Kitsap Way!

Kitsap Lake Weed Meeting #2 Minutes
April 6, 1998

In attendance: Hod Burks, John Carlson, Ruth Kuhlman, John Mitchell, Jeff Pfost and Ben Zlateff.

Missing: John Cattell, Dr. Ken Cogen, Mark Duncan, Loise Gent, Roger Hudson, Jeanette Kelso, John McKay, and Wayne Sargent.

Staff: Becky Lorber and Jim Spencer.

Meeting began at 7:20 at the Spinnaker Building (thanks to John Mitchell, since we were locked out of the Cascade Natural Gas Building!). Introductions were shared, then the minutes from the March 23, 1998 meeting were reviewed.

There were two typos: one for Ben Zlateff's last name and the King County Water "Surface" Specialists was corrected from "Service".

Closure items:
Becky attempted to contact King County water surface personnel, but has not linked with anyone yet. She did speak with Dan Robinson who has been active with Lake Limerick weed issues (see attached sheet). It was thought that Neil Bass resided at Lake Tahuya, but clarified that he was a consultant at the Poulsbo office, EFA Northwest and had done some consulting work on lake health. Staff will again attempt to reach him.

Copies of the Fish Pro study were available for review. Jeff volunteered to loan the City a copy of the 1980's report to copy for use as backup material.

Group Discussion:
John Lehman, a resident near Horseshoe Lake and member of the group for the Preservation of Kitsap County Lakes, has assisted with mapping portions of Kitsap Lake and sent some weed samples to Olympia for identification. He is currently out of town, but will be contacted in early May about sharing his findings for incorporation into this study.

It was reported that Steve Jackson of Department of Fisheries has found the fish traps vandalized three times over the last week. He believes that he has spoken with the individual responsible, who was misinformed about the dam's operation and effectiveness. Steve will visit the dam on April 17, with a biologist. If the traps have once again received abusive treatment, he will consider abandoning the two year study and pulling the dam structure in its entirety.

Steve, in speaking with Jeff Pfost, indicated that the residents on the lake might want to consider starting adjudication proceedings, in light of the information above. This would involve the residents petitioning the Superior Court of the County for an order to provide for the regulation of the outflow to maintain a certain water level.

As a representative of Fish and Wildlife, Steve indicated that his department could possibly support this action and approve the installation of a permanent 12" concrete sill. Currently the boards are placed at approximately 24". A discussion on the optimum height followed.

John Mitchell noted that during the heavy winter storm of 1997, the culvert determines the lake height, not the boards. He is in support of a permanent fixture that does not require any mechnical devises. It was clear that the group recognized the significanse of having the lake water level controlled. Jim Spencer will talk with City Engineers and other staff about appropriate actions for beginning the process. It is clear that ultimately all interest users, agencies, and residents will need to meet to determine the acceptable level in order to proceed with the petition.

Agenda:
There were two primary action items for the evening. The first was to decide on the committee organization. The three options included total group involvement in all aspects of the plan, breaking into subcommittees and dividing the tasks, and/or having Parks and Recreation staff with the technical assistance of a qualified consultant draft material and conduct action tasks which would then be reviewed by the steering committee. The latter was selected.

The second action was to select a chair or co-chairs. Jeff Pfost and Ben Zlateff volunteered to accept this responsibility.

Timeline:
Since the report needs to be completed by year's end, the project will begin to be fast-tracked. On **April 30th**, those interested in **developing the Problem Statement**, are invited to meet at **Sheridan Park Community Center, Clubroom "A", at 6:00 p.m.** Attached are the sheets relating to this task.

The steering committee will meet again at Sheridan Park Community Building on May 7th at 7:00 p.m. to prepare for the first of two mandatory public meetings. The Cascade Natural Gas Building is only available once per month. We will use it for the public meeting.

The first public meeting is Monday, May 18th at 7:00 p.m. at the Cascade Natural Gas Building. Full publicity efforts will be made, including contacting local newspapers, the Channel 12 TV calendar, and mailings. The 21st, 19th, and 20th were all unavailable.

The meeting was adjourned at 8:20 p.m.

Cc: Mayor Horton
Councilman Jim Reed, District #9

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The meeting was adjourned at 8:20 p.m.

Cc: Mayor Horton
Councilman Jim Reed, District #9

Kitsap Lake Steering Committee Meeting #2
Agenda for
April 16, 1998, Thursday
7:00-8:30 p.m.
Cascade Natural Gas Building on Kitsap Way

7:00 p.m.	Introductions
7:05 p.m.	Closure on action items from first meeting
7:20 p.m.	Determine how committee will be organized
7:50 p.m.	Select a Committee Chair and/or Co-Chair(s)
8:00 p.m.	Review project timeline and individual interest areas
8:25 p.m.	Determine next meeting date, time, and location for committee and public meeting
8:30 p.m.	Adjournment

To: Kitsap Lake Steering Committee
From: Becky, Bremerton Parks & Recreation
Date: May 4, 1998
RE: Meeting on May 7, 1998

A big thanks to Jeff, Ben, Ruth and Jim, who helped draft the enclosed problem statement and goals. Please review and bring your written comments to the meeting this Thursday, May 7, at Sheridan Park Community Building. We will begin at 7:00 and hope to conclude no later than 8:15 p.m. Below is the proposed agenda for the evening. Please let me know if you can not make it!

Proposed Agenda:

Review Problem Statement—make adjustments and changes
Review Management Goals
Plan for the upcoming Public Meeting on May 18, 1998 at Cascade Natural Gas Bldg.
Set a date for reviewing the watershed and water body features (if anyone is interested in participating in this step)

To: Kitsap Lake Weed Management Steering Committee
From: Becky Lorber, Bremerton Parks and Recreation
Date: May 26, 1998
RE: The next step!

Thanks to the steering committee members who participated in the first public meeting! I appreciate your efforts and time. Please reserve **Thursday, June 11th at 6:30**, at Sheridan Park Community Building, for the next steering committee meeting. The proposed agenda includes:

- Rework Problem Statement and Goals to incorporate public input
- Review and comment on Step D information
- Develop a new timeline
- Discuss the need and use of a consultant
- June 28th Boat & filming

Enclosed is the information on Step D—Identify Water Body/Watershed Features. I will send the first draft on June 8th. If you have any questions and/or input, please call or now you can E-mail!

Kitsap Lake Weed Management Meeting #4
June 18, 1998
Minutes

In Attendance: Horace Burks, Ruth Kuhlman, Jeff Pfost, and Ben Zlafteff

Staff: Becky Lorber and Jim Spencer

Meeting began at 6:35 p.m. The public meeting was reviewed and discussion centered on the Problem Statement and possible changes as a result of public input (see attached problem statement and goals as amended). At this point these items stand as presented until such time as the committee wants to modify based on new information.

The committee received information on the Water Body and Watershed just that day. Due to the limited time to review the drafts and input on the reduced size of the watershed to be considered, only the Water Body was evaluated in detail. Ruth volunteered to provide a geographical survey map, more closely defining the watershed area that immediately surrounds the lake. A different draft of the Watershed is to be enclosed with the minutes, for review prior to the July 9th committee meeting. The second draft of the water body is included also.

Several committee members noted that streamlets not easily identified on maps feed into Kitsap Lake. In particular is a creek feeding the lake on the west by Camp McKean.

Roger Hudson contacted Dr. T-HO-KE who has a 30' boat equipped with an underwater camera, and is willing to film the lake's bottom for a reduced fee, recording the actual weeds. Ruth volunteered her husband Mark to ride on the boat in order to provide directional assistance.

The final evening's task was Step E of the Weed Management Plan, and involved labeling the Beneficial Use Areas on the lake. Jeff recorded on an enlarged map the present water body use areas, as provided by the committee (see attached, reduced map version).

The next meeting is scheduled for Thursday, July 9, at 6:30 p.m. at Sheridan Park Community Building.

Meeting adjourned at 8:15 p.m.

To: Kitsap Lake Weed Steering Committee
From: Becky Lorber, Bremerton Parks & Recreation
Date: June 15, 1998
RE: June 18, 1998 meeting 6:30 pm Sheridan Park

Enclosed is a rough draft on water body, and I hope to have the watershed draft ready for Thursday's meeting. Please review and bring your input, especially as it relates to water quality (this section has not been prepared). I visited the Poulsbo Health Department last Thursday, and they are sending information some time this week. I apologize for the delay, but information has required a little more "digging" than I expected.

I am also including the Step E on Identifying Beneficial Use Areas. I hope we can accomplish this task on Thursday also, in fact it should be rather fun! Following this step we begin to work on plant identification. Roger Hudson has arranged for underwater video taping of Kitsap Lake for Sunday, June 28th, and I am tracking down a scuba club, hoping that they will be interested in taking plant samples from the bottom of the lake. I expect the next three months to be quite busy. Bring your thoughts and together we'll get this task accomplished! Thanks for your continued support!

To: Weed Steering Committee
From: Becky, Bremerton Parks & Recreation
Date: July 3, 1998
RE: Packet

Enclosed is the second DRAFT of the watershed and water body related to Kitsap Lake. It is still in a rough format, but the area to be addressed has been identified as noted on the enclosed map. Please review and bring your marked up copies to the meeting on July 9th, at 6:30 p.m.at Sheridan Park Community Center!!

Thanks to Ruth for providing the maps and determining the watershed area. It has helped us stay close to our current project schedule!

Thanks to Roger Hudson for arranging for the underwater filming of the lake. The tapes are incredibly clear and an invaluable documentation of the lake's condition. Our hats off to you! The tapes will be shared with the committee on July 9th.

Tursday's proposed agenda:
Review the mail out—fine tune the watershed and water body text
Review existing information of identified plant life within the lake
Review the underwatering taping
Discuss water quality and nonpoint sources of pollution
Review timeline

I really appreciate the time and energy everyone is providing on this project. It is exciting to see each person's knowledge and experience moving us closer to a document that will assist the long-term health of Kitsap Lake. Thank you!

August 12, 1998

Dear Kitsap Lake Weed Steering Committee!

I hope you are enjoying your summer and have the opportunity to be on the lake! I took a quick swim there last night and it felt great! This is an update letter to let you know things are continuing to happen and to set a September meeting date, just in case that month is beginnning to fill, as mine is!

Dana Zlateff, a graduate student at WSU is doing her thesis study on Kitsap Lake and has agreed to provide technical support and data. We have begun to collect water samples and mail to her, and this will continue until mid-October. So far, Dana and I have been able to facilitate this effort, but should things change, I'll call those of you who voiced support.

Thanks to Ruth's excellent maps, and a little hiking, we have definitely determined that the watershed exists as presented and that the water sources are from the southwest. This allows us to finalize this portion of the plan, of which a final draft will be available at our next meeting.

Enclosed is the information returned from DOE on weed identification from the first batch of weed samples mailed in late June.

The second filming of the lake weeds is slated for the week of September 8-11th. This time we will have a split-screen tape that will show surface point-of-reference locations, as well as the weed issues directly below that point. We are waiting for maximum blooms for the season. Those of you who have requested a copy of the first tape, I appreciate your patience. My "source" for taping, has had mechanical difficulties.

I would like to suggest that our next meeting be Thursday, September 10th at 6:30, at Sheridan Park Community Building. Please advise if this date does not work for you! Thank you for your continued support! It is appreciated and needed!

Sincerely,

Becky Lorber

Becky Lorber
Bremerton Parks and Recreation

To: Weed Committee Members
From: Becky Lorber
Date: November 13, 1998
RE: Meeting on Tuesday, November 17, 1998

Greetings!

Time does fly by! The good news is that progress is happening and it is time to get together and share information. Attached is a list of the eleven plants that have been collected from Kitsap Lake. A complete description of the plants follows on the next few pages. The first map identifies where the weeds were collected and the corresponding information addresses the depths. The map will need to be expanded to better identify the depth and density. Please review location at this point and come with ideas on how to best represent a picture of the weeds on the Kitsap Lake. The last sheet is a map prepared on the beneficial use areas the committee compiled in late summer.

Agenda for Tuesday, November 17, 1998 at 6:30 p.m. at Sheridan Park

1. Evaluate weed information.
2. Determine readiness for public meeting to share weed types/location—upon further review of the manual, this meeting is not mandatory. We could wait and hold a meeting that includes this information along with proposed remedy options. As a group we need to decide our course of action.
3. Set date for public meeting—if applicable
4. Jim Spencer—discuss lake level monitoring

To: Weed Steering Committee
From: Becky Lorber, Bremerton Parks & Recreation
Date: January 27, 1999
RE: Next meeting on February 18, 1999

Please reserve Thursday, February 18, 1999 for the next group meeting. We will start at 6:00 p.m. at Sheridan Park Community Center, in the Conference Room. Dana Zlateff, the graduate student at WSU, will be here to discuss all progress to date, and specifically to discuss the water quality analysis, weeds and the locations they have been identified.

You will receive via mail, no later than February 12, a packet that will contain all information developed to date. It will have weed descriptions with pictures and maps for each plant and where it has been found on/in the lake. Please set aside time to mark up your copies with changes, additions, modifications, etc. so that they can be reviewed for incorporation as we move ever closer to a final document.

The other key issues to discuss at the February 18th meeting are:

- After reviewing the identified plants and maps---is there a weed problem at Kitsap Lake, and if so, where and which weeds
- Depending on the answer(s) to the above question, what control measures need to be investigated (physical, mechanical, biological, and/or chemical)
- How do we want to pursue gathering information on the control measures (individuals on the steering committee contact a source and report back; invite professionals in to discuss their methods; contact users at various lakes for effectiveness, etc)
- Establish a timeline for completing the above step and last three chapters (Control Intensity, Choice of Treatment Selection(s), and Action Plan)
- Set a tentative date for Public Meeting
- Final plan completion date is no later than June 1999

It is happening and I think you will be pleased with the information packet soon to be mailed. I now have copies of the second tape for those who requested one. I will bring them to the February 18th meeting. As always, if you have questions or input, call me at 415-5420. Thank you for your continued support.

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To: Kitsap Lake Weed Steering Committee
From: Jim Spencer, Bremerton Parks & Recreation Dept.
Date: April 2, 1999
RE: Status update

Several things have occurred since our last meeting that impacts our next meeting date. Hod Burks had encouraged us several times to contact King County in regards to work they have done on lake water quality as it relates to weed issues. After several calls we connected with King County Department of Natural Resources and the Water and Land Resource Division. They were gracious enough to provide us with a recently completed Integrated Aquatic Plant Management Plan, which we are in the process of reviewing.

In addition, we are setting up a site visit with a professional consultant to review the weeds and the condition of the south end of the lake, including recommendations for reduction/elimination, should this be their findings.

Three people have alerted us that April 8th is not a good day to meet. In light of the new data and upcoming site visit, and consideration for your personal schedules, the Bremerton Parks Department will try drafting the final three chapters of the manual and target to mail a complete draft May 7th. A steering committee meeting to review the draft and findings is slated for May 13th, at 6:00 p.m. at Sheridan Park Gym. If the draft is found to be acceptable with your new inputs, it will be time to consider the final public meeting date for presenting our findings, hopefully no later that June 3rd.

So...feel free to contact Becky at anytime (415-5420), if you have concerns or input to include. If you feel that a meeting prior to May 7th is needed, let us know. We continue to appreciate your time and commitment to this project. We are close to finishing this plan!

To: Kitsap Lake Weed Steering Committee
From: Becky Lorber, Bremerton Parks & Recreation Becky
Date: May 20, 1999
RE: Draft revisions/Upcoming Meeting

In preparation of the Draft review meeting this coming Monday, May 24, at 6:00 p.m. at the Sheridan Park Conference room, I have enclosed a couple of pages of revised text suggested by Hod, Ben, and Jack at the 13th meeting. Please look them over and bring your thoughts on these pages as well as the rest of the document.

Please remember that all material is subject to rewriting. The Parks department was tasked to construct a complete document for the committee to review. In regards to the LMD section, that was included in case one of the strategies selected would require this approach. Depending on the group's conclusion, it may be eliminated entirely. The intent was to give as much pertinent material to work with as was possible. Along that same line, it is recognized that the discussion on herbicides has not taken place in depth. All this material is still open for discussion, but necessary in order to put the package together.

I look forward to seeing you all. Please let me know if you can not make it. My work number is 415-5420 and 478-5357.

90 Hours { $143 per year

91669

$\frac{90}{70\%} = \frac{X}{100}$

$\frac{70}{100} = \frac{70}{90} = \frac{100}{X}$ 200 per year per home

128 hours

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May 7, 1999

Dear Kitsap Lake Steering Committee,

Enclosed is the **DRAFT** for the Kitsap Lake Integrated Aquatic Plant Management Plan, as promised in your last letter. Please review the entire document and bring your ideas and input to our meeting scheduled for Thursday, May 13, at Sheridan Park, starting at 6:00 p.m. The goal is to get through the entire document and any suggested changes and/or modifications, prior to presenting the draft to the public in June, the date to be determined by you on Thursday. Please pay particular attention to the strategies identified on page 13.

A couple of points for clarification purposes prior to you reading the draft:

- A Reference Page of sources used in developing this document this document will be handed out on Thursday
- The Lake Management District section (pages 16-17) may be eliminated entirely, based on the strategy(ies) determined by the committee (page 13)
- When the final document is printed, the maps in Appendix B will be in color

If you can not make the May 13th meeting, please let me know (415-5420), and mail or drop off your draft with your input clearly identified. Thank you again for continuing with this project. See you Thursday!

Sincerely,

Becky

Becky Lorber

To: Kitsap Lake Weed Steering Committee
From: Becky Lorber, Bremerton Parks & Recreation
Date: June 3, 1999
RE: Revised Draft

Enclosed is the revised draft, hopefully incorporating all input from the May 24, 1999 committee meeting. I have included all pages except the Appendices. Please review carefully and bring your **written changes/corrections** to the meeting on Monday, June 7, 1999 at 6:00 p.m. at Sheridan Park Community Center, Conference Room.

At this time we will also organize the Public Meeting being held a week later (see enclosed announcement being mailed to all lake residents). Come with ideas on how to structure the presentation of the Draft!

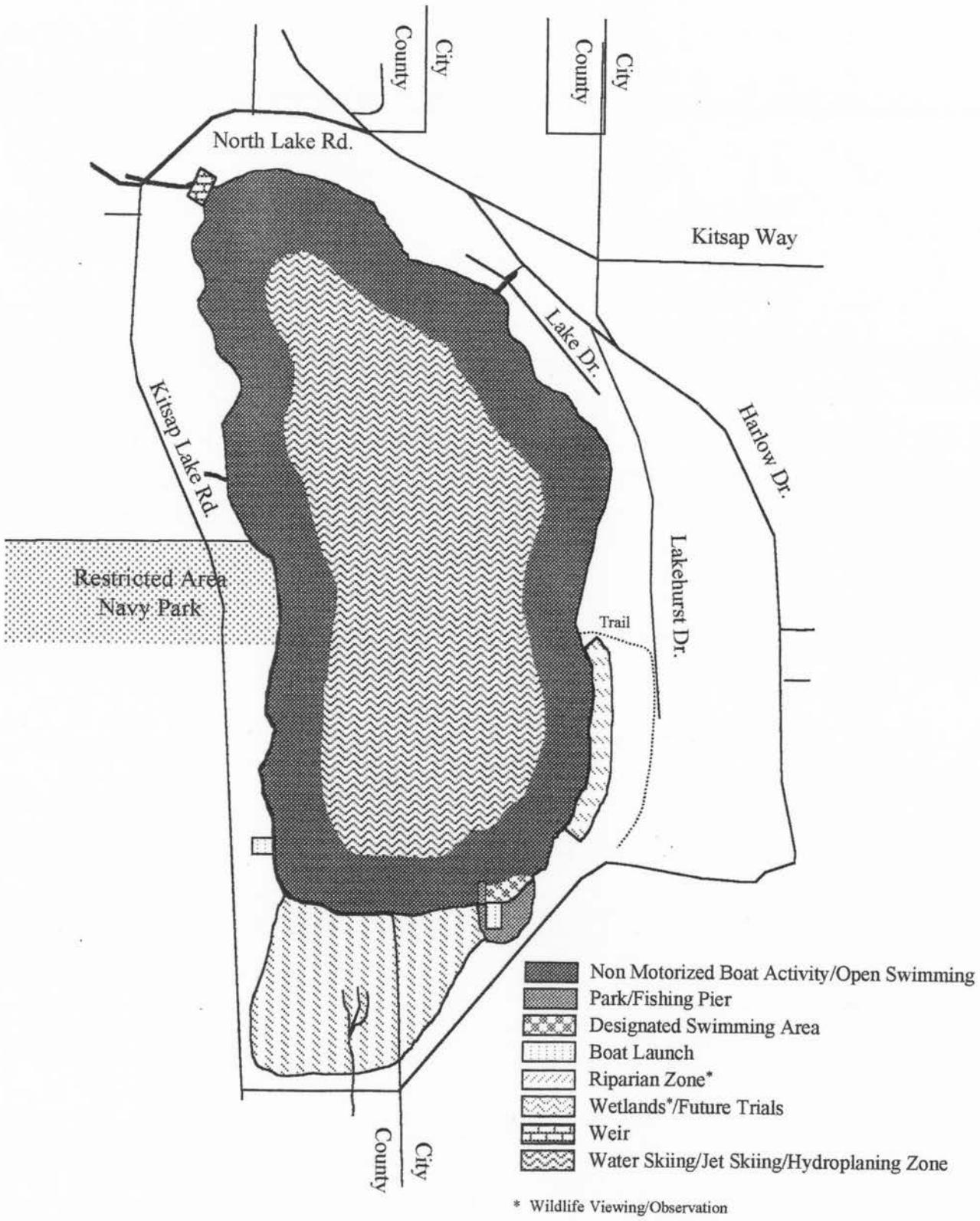
We've come a longggg ways! I again thank you for staying with this project. Once we incorporate the public comments, the Draft will be sent to the Department of Ecology. Barring unforeseen circumstances, that will complete this part of the process and satisfy the grant.

If you have any questions, please call me at either 415-5420 or 478-5357.

Appendix H

Map of Characteristic Uses

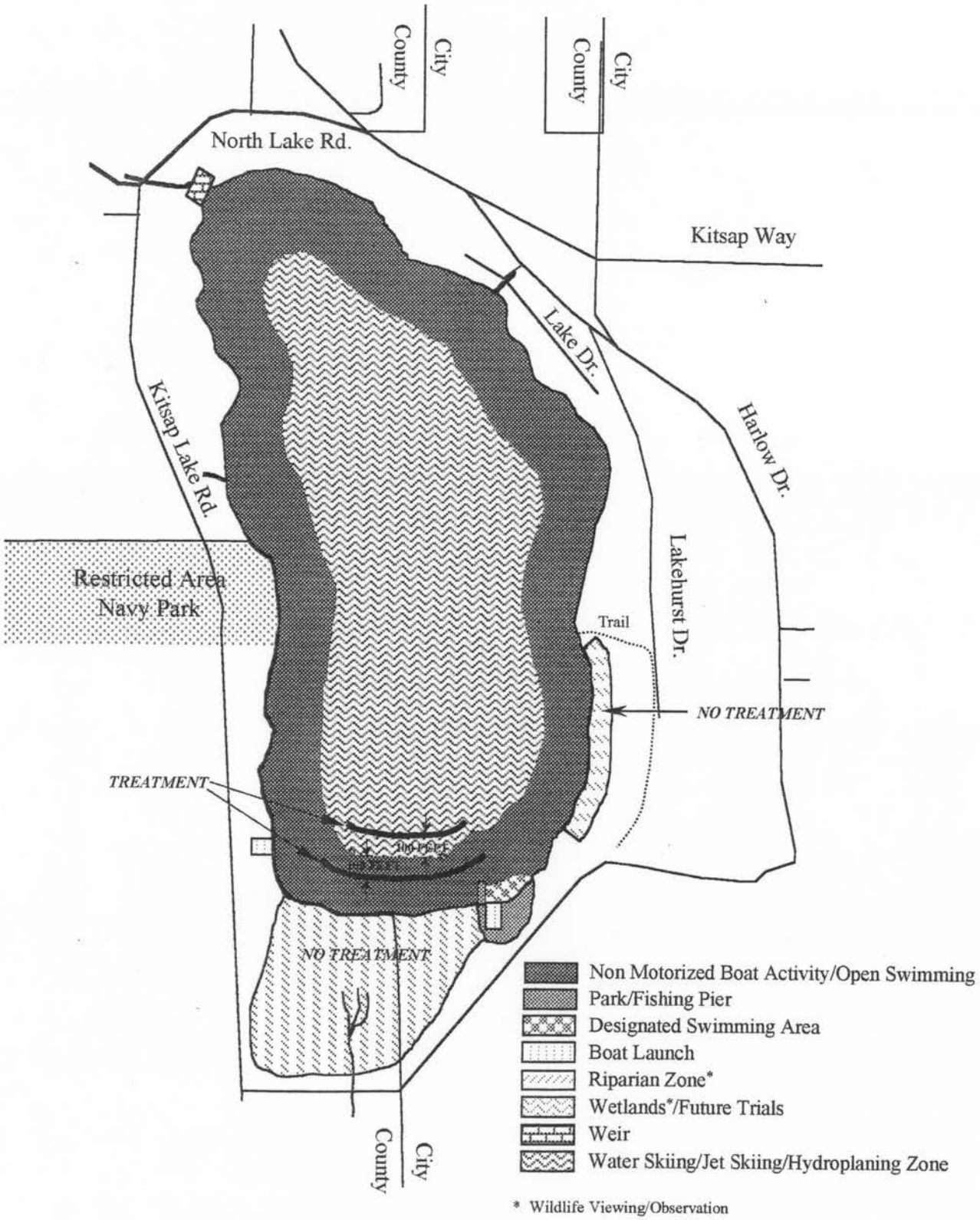
Kitsap Lake
Characteristic Uses



Appendix I

Map of Proposed Treatment Area

Kitsap Lake
Proposed Treatment Area



Appendix J.

Steering Committee Members

Steering Committee Members

Horace Burks---Lake Resident, Poggie Club, retired

John Carlson---Lake Resident

John Cattell---Lake Resident and Mechanical Engineer

Roger Hudson---Lake Resident and Transportation Contractor

Ruth Kuhlman---Lake Resident

John McKay---Lake Resident

John Mitchell---Lake Resident and Attorney

Jeff Pfost---Lake Resident and Crane Engineer

Ben Zlateff---Lake Resident and Environmental Engineer

REFERENCES

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Kitsap County Surface and Storm Water Management, June 1997. Lake Monitoring Program 1996 Annual Report.

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Sandin, Scott. Personal Communication (meeting to discuss Long Lake's findings and process for completing their Integrated Plant Management Plan), January 1998.

Doc T-HO-KE, Underwater videotaping of Kitsap Lake, June and September 1998.

Zlateff, Dana M., Limnological Assessment & the Development of a Lake Management Plan for Kitsap Lake. May 1999.

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