

**Scope of Work**

**Barnes Lake**  
**City of Tumwater**  
**Vegetation Management & Control Program**

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***Introduction:***

The program format presented represents the most up to date methods for aquatic plant control associated with floating aquatic macrophytes (lily pads). This particular project deals solely with the application glyphosate to Barnes Lake located in Tumwater Washington. **Northwest Aquatic Eco-System is not a registered agent for any of the materials that have been selected to complete the task.**

As a result of the 2007 project, changes in the original Scope of Work were necessary and this Scope of Work was updated to incorporate those modifications.

There are several key elements considered for the 2008 Scope of Work in the design and implementation of the Barnes Lake aquatic weed control program, ending December 31, 2008. Components of the program include:

- Mapping
- Public Notification
- Treatment
- Debris Removal
- Reporting

***Pre and Post Treatment Mapping of Plant Communities:***

Contractor will provide pre and post treatment mapping services for the City of Tumwater. Surveys will identify emergent, floating and submersed weed species present throughout Barnes Lake. Evaluation methods for plant densities and volumes should be such that provide some type of baseline data meaningful to the goals of the project. Sampling protocol will consist of point source data collection identifying species within a specific designated grid size. Within each grid, plants types will be documented and a statistical analysis of all plant types within the grids will be completed. For example: A nine square foot grid would be placed on the waters surface at each sampling location. All plant types within the grid

would be noted as a separate data point and collected on the GPS equipment. A typical 8 hour surveying event would produce between 200 – 400 data points lake wide.

The most efficient way to evaluate the long term progress of this project is through yearly late season aerial survey and through aerial satellite imagery. Once the treatments for 2008 are completed, an aerial survey of the lake will be conducted. Northwest Aquatic Eco-Systems will make the appropriate arrangements to complete this task.

Access to the floating islands and immediate lake shorelines is severely hindered because of the soft sediments present along their perimeters and throughout the land masses. Accurate detailed delineation of plant types, locations and concentrations is not possible without incurring substantial budgetary increases. At best, a visual observation from the waters edge noting plant types and densities while incorporating a qualitative scale of light, medium and heavy would provide enough background information to monitor future changes. Data points, along the islands' water shoreline interface, would identify the locations where any such observation-related data was collected. The islands' plant communities are fairly well established and large shifts related to plant types, plant diversity and locations is unlikely.

Sampling of the immediate lake shoreline emergent plant species will be conducted along only those LID parcels that provide access to the waters edge. Access to the shoreline residential properties will be requested by the City and/or Lake Management District. A list of participating landowners will be provided to Northwest Aquatic Eco-Systems.

Mapping will be accomplished utilizing a Trimble Geo XT, Pathfinder Office and Terra Sync software. Map production will be accomplished utilizing ArcGIS (Arc View). All digital file versions will be converted to a format compatible with AutoCAD 2006 for use by the City of Tumwater.

Pre and post treatment surveying will provide the following data:

1. Detailed map showing emergent, floating and submersed weed species present throughout the lake system.
2. Acreages and approximate densities of plants present.

Pre-treatment mapping will be completed by May 15 of the treatment year. Hard copies of mapping results will be provided to the City no later than June 15 of the treatment year.

### ***Program Development:***

As a result of the survey the contractor will develop a treatment plan and submit such to the City for approval prior to June 1. Contractor will utilize current industry standards in developing the plan. The plan will identify the targeted sites, concentration of materials to be used at each site and the size of each site. Access to planned treatment sites may be hindered as a result of the lake water level at the time of treatment. In general, treatments will be conducted so long as sufficient access to the lake is available in an effort to meet the projects long term goal of eradication.

**Beneficial High Use Areas** – Targeting and spraying of all floating plants within this particular water use designation. Typically this area comprises the residential shoreline area of the lake.

**Beneficial Use Areas** – Targeting and spraying of all *Nymphaea odorata* that is accessible within this zone.

**Identified Conservancy Areas** – Eradication of all *Nymphaea odorata* from within this zone. *Nymphaea odorata* constitutes over 90% of the plant diversity within these identified conservancy areas. Native species are intermingled throughout such areas. Eradication of the targeted species likely will severely impact the native floating plants in the area during the initial treatments. Once targeted species are eliminated from the area, the conservancy areas will likely become inundated with pondweeds. Pondweeds however are a valuable food source for waterfowl.

Due to the shallow water depth in these particular areas, late season treatments applied during the months of September and October may not be achievable. The inability to treat during this time frame may hinder complete eradication of targeted species in several locations and may require annual treatments to maintain reclaimed open water.

Proposed 2008 treatment sites will be identified on a treatment map developed as a result of the pre-treatment survey.

### ***Treatment:***

Contractor will perform at least two treatments during the 2008 treatment season, dependent upon lake water levels and access. Treatments will be directed at those sites identified on the “treatment map.” Each treatment will consist of an initial application with a secondary spraying being performed approximately three to five weeks following each primary spraying event. Treatments will be conducted by a Washington Department of Ecology licensed applicator using equipment licensed by the Washington State Department of Agriculture. All equipment will be “sea-worthy” meeting all of the standards established for boating vehicles. The City of Tumwater representative will be encouraged to monitor the treatment and confirm that the appropriate equipment and materials are properly being utilized at the site.

Northwest Aquatic Eco-Systems will coordinate treatment dates with the City of Tumwater to minimize any potential disturbance to the surrounding residents or public use of the waterbody and to ensure all residents receive proper notification.

All treatments will be designed in an attempt to reduce the post treatment “floating island” scenario. It is likely that each treatment will consist of enlarging the existing channels created during 2007, treatment along the perimeter of the open water floating plant interface and establishing new channels where appropriate. It is highly unlikely that any large broad scale treatments of the lake will take place until both Northwest Aquatic Eco-Systems and

the City are confident that adverse impacts to the lake (i.e. floating islands) would not result from such action. The approach for 2008 will be conservative in nature but will continue to promote the long term goal of *Nymphaea odorata* eradication.

### ***Removal of Floating Debris:***

Any floating debris masses that surface following herbicide application will be removed using the following methodology:

High pressure water hoses will dislodge any sediment associated with floating root masses. Once the roots are separated from the sediment, root fragments will be harvested from the lake utilizing a small aquatic weed harvester. Debris will be stored near the identified staging area and then trucked to an appropriate disposal site. Removal of floating debris would take place during the month of November each year. Costs for this task are based on a daily basis.

### ***Reporting:***

Following the 2008 treatment season, a draft final report (1 copy) will be submitted to the City of Tumwater for review by the City and the Lake Management District. The draft will be received by November 30, 2008 summarizing the two-year program and addressing the following elements:

- Detailed maps showing selectivity treated areas as well as locations of complete eradication.
- Detailed description of the equipment, methods, and procedures used for all control methods employed.
- Estimated acres of each type of aquatic weed removed.
- Estimated acres of each type of aquatic weed undergoing herbicide treatment.
- An estimate of the total percentage of the lake bed covered by native aquatic vegetation.
- A copy of the NPDES permit, notification, and Pesticide Application Records.
- A summary of the current vegetation management program and recommendations for management actions in future years.

The City and Lake Management District will return comments no later than December 19, 2008. Northwest Aquatic Eco-Systems will incorporate comments, if any, and provide three (3) bound copies of the final report to the City of Tumwater by December 31, 2008.

### ***Measurable Results:***

Aquatic weed control is a biological science that produces variable results. When dealing with noxious species eradication is often difficult to quantify results due to the possibility of re-introduction of the targeted plant back into the system while treatments are not conducted. The program, as proposed, offers the City of Tumwater and the Barnes Lake Management District the best opportunity to control troublesome noxious weeds from the system now thus avoiding future large financial outlays. At the close of each treatment season, Northwest Aquatic Eco-Systems will utilize GPS technologies to document and report the decline of the targeted species and approximate plant densities.

Northwest anticipates no problems in performing the tasks as identified. We are confident that all timelines will be met. Northwest will guarantee that all treatment dates as specified and transmitted to the local residents will be met. Northwest will forfeit to the Barnes Lake Management District/City of Tumwater \$500.00 per missed event.

**Cost/Price Determination:** (Profit @ 5% of total project cost)

Costs have been broken down on a per-acre or hourly basis. Given the potential for changing field conditions at Barnes Lake, the project must be considered as one that will evolve according to conditions experienced during any specific treatment year. Budget maximums during any fiscal year will not be exceeded and all work will meet the terms of annual budgetary guidelines.

Project Element	Cost per Unit	Total Cost
Pre-Treatment survey and mapping		\$1,800.00
Public Notification (NPDES permit compliant)	\$1.00 per unit	
Post-Treatment survey and mapping (each year)	\$500.00 per survey	\$1,000.00
3 post-treatment vegetation surveys	\$100.00 per survey	\$300.00
7 acres of complete eradication	\$400.00 per acre	\$2,800.00
12 acres of control within conservancy area	\$500.00 per acre	\$4,800.00
Debris removal reserve, as needed (5 days max)	\$1,500 per day	\$7,500.00
Insurance		\$1,000.00
<b>Hourly Cost Breakdown</b>		
Large boat (Airboat)	\$500.00 per event	
Small aluminum boat	\$100.00 per event	
Applicator	\$90.00 per hour	
Applicator helper	\$45.00 per hour	
Shoreline notice delivery (day of treatment)	\$100.00 per event	
Launch site towing	as billed by provider	
Miscellaneous labor	\$35.00 per hour	
<i>Total Project Elements</i>		<i>\$19,200.00</i>
<i>10% Contingency</i>		<i>\$1,920.00</i>
<b>Total Project Cost (not to exceed)</b>		<b>\$21,120.00</b>