Pipe and Lucerne Lakes
2004 Hydrilla Eradication Project

A n n u a l R e p o r t

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INTRODUCTION

Pipe and Lucerne Lakes are located in the cities of Maple Valley and Covington in south King County. In 1994 hydrilla (*Hydrilla verticillata*), a Class A noxious weed, was discovered in the lakes, becoming the only known infestation in King County and the Pacific Northwest. The Washington State Department of Ecology (State) required immediate action to eradicate the weeds, and work began in 1995, continuing to the present. While different eradication methods have been used over the years, the extent of the infestation and the existence of a healthy tuber bank have prevented total eradication so far.

In 2004, a small hydrilla population continued to exist in the lakes. This was the second year of using a method that combines the use of herbicide, hand-pulling and frequent assessment. Herbicide and hand-pulling directly affected the plant and its ability to thrive, whereas assessment helped King County and its contractors understand the problem and how to best manage the project to insure success. This document summarizes the 2004 treatment season.

HISTORY OF TREATMENT

For several years in the 1990s it was known that an unusual plant species inhabited Pipe and Lucerne Lakes, but at that time hydrilla (*Hydrilla verticillata*) was misidentified as *Egeria densa* (K. Hamel, pers. comm). In 1994, King County tentatively changed the plant identification to hydrilla, based on samples taken during the King County Aquatic Plant Mapping project done on over 36 area lakes.

In late May of 1995, the state confirmed that the plant was *Hydrilla verticillata*, considered to be one of the world's worst aquatic weeds. Steps were taken to have hydrilla listed as a Class A noxious weed, which requires eradication measures. At the time the lakes were in unincorporated King County, so the County was the agency responsible for managing the control effort. In the summer of 1995, the County hired Resource Management Inc. (RMI) to apply the herbicide Sonar™ (active ingredient fluridone) to control the weed. RMI maintained herbicide levels from 10 to 20 ppb in the lakes over eight weeks. The hydrilla proved sensitive to the use of the herbicide, but based on advice from California, we understood that the tubers were long-lived and did not all germinate each year. This required a multi-year approach to eradication.

Based upon current research, tubers have been known to be viable for up to ten years and are not necessarily affected by herbicides. Because of the tuber bank, one herbicide treatment was clearly not going to be sufficient for eradication, so the project was extended, and whole lake herbicide treatments were applied from 1995 to 2000. This action greatly reduced the weed throughout both lakes, although localized populations continued to exist.

In the late 1990's a lawsuit was filed in Oregon entitled 'Headwaters Inc. vs. Talent Irrigation District' that called into question whether aquatic herbicides were considered pollutants. In 2001 the Ninth Circuit Court of Appeals decided that aquatic herbicides should be considered pollutants and held to the standards of the National Pollution Discharge Elimination System (NPDES) permitting requirements under the Clean Water Act (CWA). Herbicide treatments were stopped during the summer, while the State put the appropriate permits in place.

During the 2001 season SCUBA divers surveyed the littoral zone of the two lakes for hydrilla, hand pulling plants as they were found. In 2002 the DOE set up an aquatic herbicide licensing system under NPDES, but diver hand-pulling was seen as an effective treatment in Pipe and Lucerne Lakes, so it was again the control method of choice in 2002. However, in the fall of 2002 significant growth of hydrilla was found by State and spot treated by AquaTechnex with Aquathol Super K granular herbicide.

Initially, biological control in conjunction with herbicide was considered as a method of treatment in 2003. However, Kathy Hamel from the State learned of an eradication technique that was successful in California. California used low levels of slow release granular herbicide with the active ingredient fluridone in lakes during the growing season for several years until no hydrilla was found for three years. At the beginning of the 2003 treatment season, King County and the State decided to adopt the California strategy. To monitor the success of this new plan, King County internalized the project, hiring a consultant only to perform the diver surveys, but doing the herbicide treatments and snorkel surveys using County staff. This allowed the County to create comprehensive maps and detailed reports

about the patterns and locations of the hydrilla, as well as exercise detailed control over the amount of herbicide used and the areas of coverage.

With the success of the 2003 treatment season, King County followed the same procedures in 2004. The work was divided into assessment and treatment tasks; assessments were handled by a county snorkel survey and three SCUBA diving surveys. King County performed the snorkel survey in June at the beginning of the growing season. Envirovision was hired to do three SCUBA surveys throughout the summer (June, July, and September).

King County continued to use herbicide applications and hand pulling as the treatment methods for hydrilla control. The County performed herbicide treatments three times during the summer starting in May. During the survey assessment, both snorkelers and divers hand pulled plants when appropriate. In addition, an exploratory tuber survey was performed at the end of the season to assess the extent of the tuber bank.

Several King County staff members are involved in the hydrilla eradication project to insure its success. Sally Abella, King County Lake Stewardship Program Manager, acted as project manager: tracking the budget, assigning tasks, and providing technical expertise. Beth Cullen, King County Water Quality Planner I with the Lake Stewardship Program, acted as field manager and project coordinator. Drew Kerr of the King County Noxious Weed Program helped with herbicide treatment and technical support. Michael Murphy and Katie Messick, also of the King County Lake Stewardship Program, assisted with the snorkel and tuber surveys. Nora Kammer, an intern with King County Water and Land Resource Division, assisted in herbicide treatments, water quality sampling and snorkel surveys.

TREATMENT AND PUBLIC INPUT

There were two parts to the treatment plan during the 2004 treatment season. The major element of treatment was the application of Sonar PR™, a slow release granular herbicide containing the active ingredient fluridone. Diver hand-pulling was also used during the surveys.

In the beginning of the 2004 season, a public meeting was held to give citizens a chance to learn about the program, what the goals were, and the treatment process. On December 9th 2004, another public meeting was held to pass on results and answer questions. Ten people showed up to ask questions and learn about the 2004 treatment season as well as what will be occurring in the future.

Herbicide

As directed in the NPDES permit, a flyer went out to the community in the Pipe and Lucerne watershed three weeks prior to the first Sonar PR™ application, informing them of the treatment plan and the scheduled herbicide application dates. Within 24 hours before each herbicide application, every property on the lake was posted with signs stating that the herbicide treatment would be occurring.

Using the 2003 hydrilla location map and concentration levels from monitoring data, application areas and herbicide amounts were calculated for the first treatment. All areas that were known to have hydrilla in 2003 were treated again in 2004. The goal was to make sure that all potential areas of hydrilla were covered, and if new infestations were found through the season, treatment areas could be adjusted to include the new locations. No new infestations were found this year, so treatment areas were the same as 2003 (Figure 1).

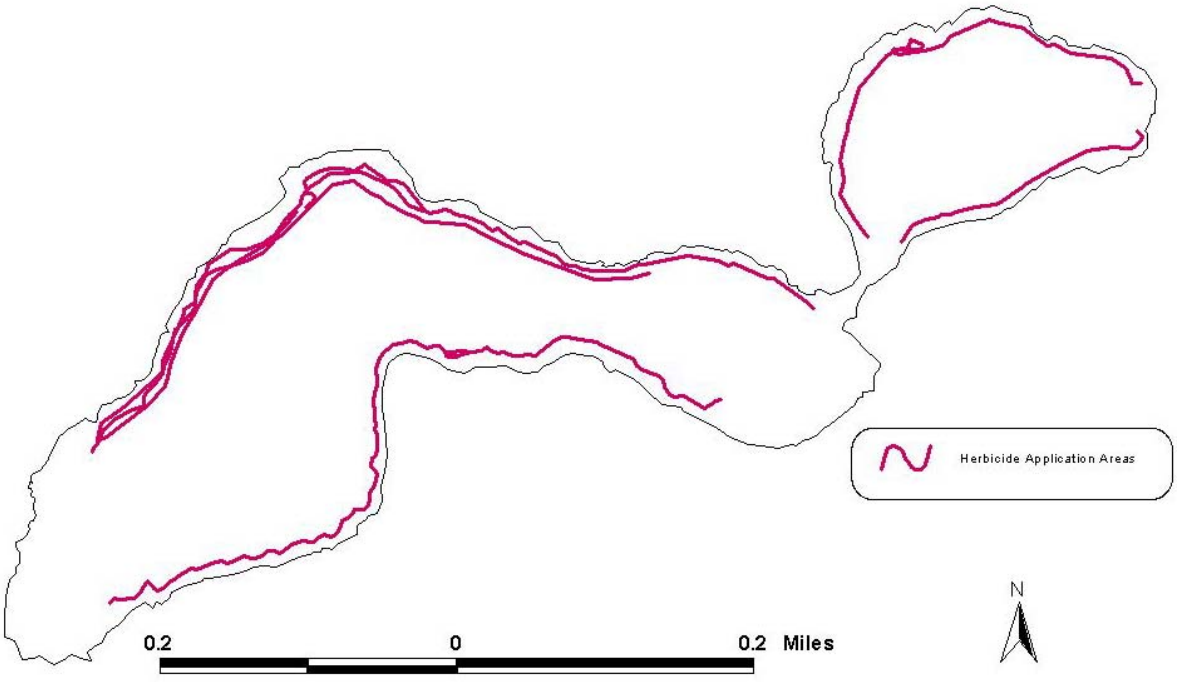

Figure 1: Herbicide Application 2004

Figure 1: Herbicide Application 2004

Rates of application were calculated based on the acreage of hydrilla infestation, the amount of fluridone necessary to maintain a consistent concentration in the water column and the results from the 2003 treatment season. The herbicide threshold for the treatment season was 5 ppb of fluridone present in the water column throughout the summer. In 2003 fluridone levels remained well above 5 ppb for the majority of the summer and into the fall in both lakes. This year the total amount of herbicide was decreased to remain closer to the threshold herbicide level. The first two treatments spread 50 ppb over selected areas in each lake; the last treatment was calculated at 39 ppb in Pipe and 24 ppb in Lucerne, totaling less than the 150 ppb limit. The first two applications in Pipe Lake applied 32.4 lbs. of herbicide per acre over a total of 10 acres. 27 pounds per acre was applied in Lake Lucerne over a total of 3.45 acres. On the third treatment Pipe Lake received 24.52 lbs/acre over a total of ten acres and Lake Lucerne received 12.9 lbs/acre over three acres. Based on herbicide monitoring (FasTEST) results, the fourth treatment was cancelled in the lakes because fluridone levels remained well above the target.

To insure accuracy, maps were made prior to each application event marking the treatment areas and the corresponding acreage. This made it easier during the application to know the exact location and how much herbicide corresponded to that area. Each treatment was mapped using GPS, converted into an ArcView map, and used as a guide for future treatment.

The NPDES permit requires monitoring of herbicide levels in the lake during the treatment. Water samples were collected prior to herbicide application and then at 14 day intervals after the first treatment. Samples were taken in treatment areas and the middle of the lakes (Appendix A). After each sampling event, the samples were shipped overnight to SePRO labs for analysis. Results from these tests allowed the County to track the herbicide levels and helped determine the locations and amounts of herbicide for subsequent applications.

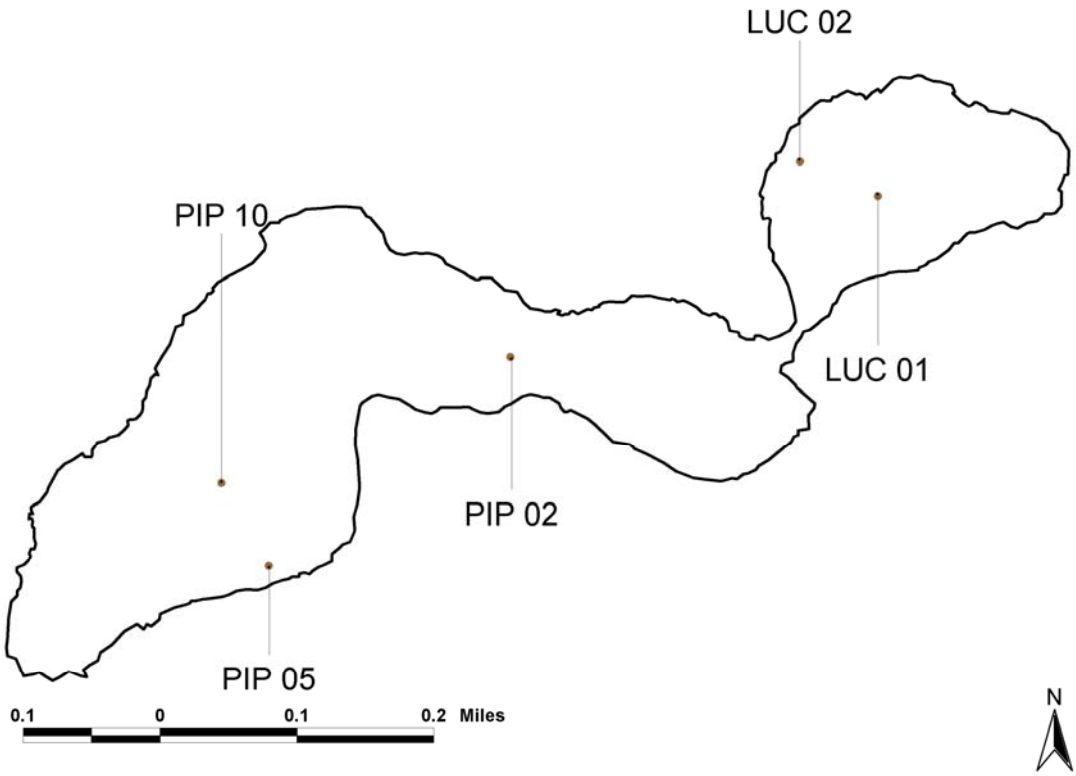

Figure 2: FasTEST Locations

Three treatments occurred in Pipe and Lucerne Lakes. Less herbicide was used this year, which helped fluridone levels remain on target. During most of the summer, levels stayed between 5 ppb and 10 ppb Pipe Lake and never exceeded 11 ppb (Figure 3). Fluridone was found in moderate levels throughout the lake, including areas that were not treated. This gave the County confidence that areas that possibly had hydrilla, but were not treated directly, still came in contact with sufficient fluridone. Herbicide levels were moderate in the lake throughout the summer and into the autumn.

The channel between Pipe and Lucerne is narrow and very shallow, limiting water circulation between the two lakes. Lucerne is a smaller lake, and the only outlet for both lakes is an ephemeral stream that exits from Lucerne, which remains dry throughout the summer. It was discovered in 2003 that fluridone concentrations remained remarkably steady in Lucerne, possibly because of the lack of flow through the outlet during the period. This meant that herbicide levels could be maintained over longer periods of time, with a lower rate of replenishment. Because of this, herbicide application could be reduced in Lake Lucerne with equally good results. With the application reduction, fluridone levels in Lake Lucerne stayed between 5 ppb and 11 ppb, never exceeding 12 ppb (Figure 3). The fluridone degraded slowly over time, and the water temperature decrease in fall kept the herbicide levels on target even beyond the growing season.

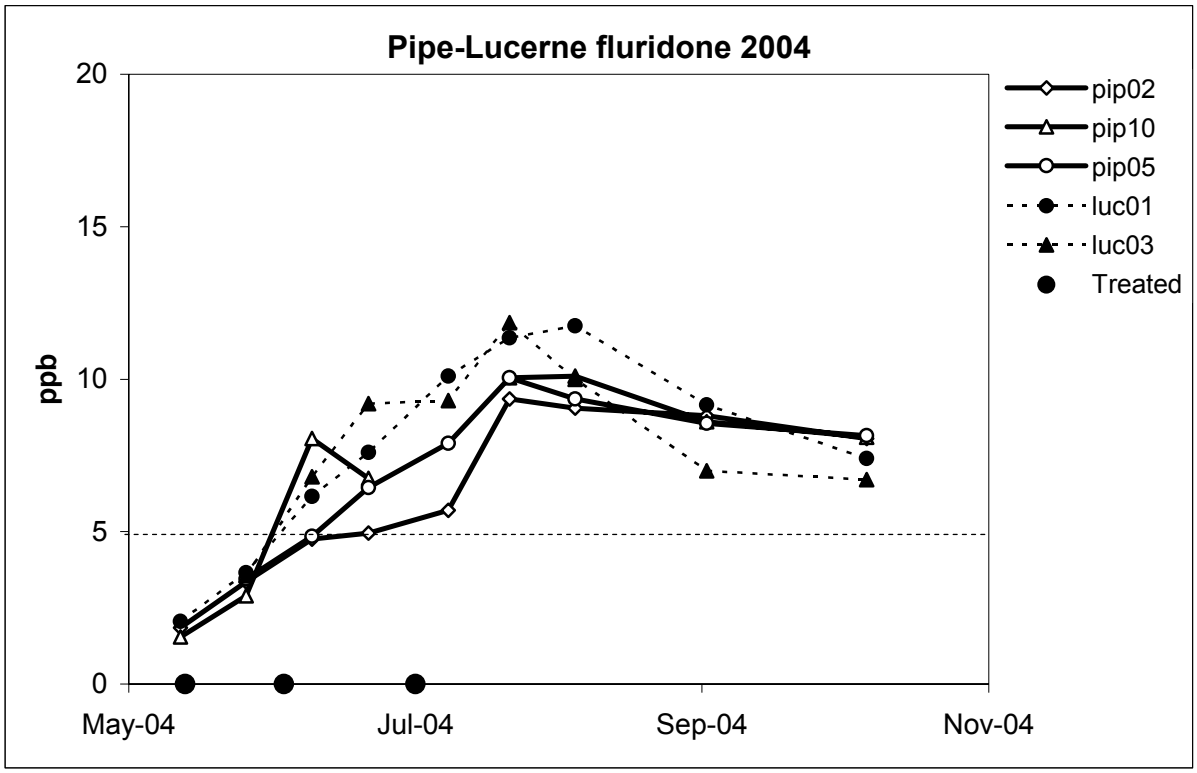

Figure 3: Herbicide Levels

Part of the water quality testing included collecting temperature profiles and Secchi depths for both lakes. Temperature data illustrated where stratification occurred in both lakes and suggested how the herbicide was distributed in the water column (see Appendix B). Data showed that the lakes were stratified by mid May, before the first treatment. This suggests that the fluridone did not mix between the epilimnion (top water) and the hypolimnion (bottom water). Since plants were found both in the epilimnion and hypolimnion, it was imperative that the granular herbicide was applied over both the shallow and deeper water to insure all plants came into contact with the fluridone.

Herbicide treatments can be complicated and time-consuming events. However, they are the most effective option against the hydrilla because of the ability to target all areas of infestation and the continual inhibitory effect on the plants. Herbicide is currently the most viable and successful option for eradication.

Diver Hand-pulling

Hand-pulling of individual plants was done by snorkelers and SCUBA divers during assessments. When it was feasible, divers and snorkelers would record the location and hand-pull discovered plants, placing them in plastic zip-lock bags to remove all plant fragments from the lakes. Hand-pulling is time consuming, and the tubers can be difficult to remove. Tubers are often rooted deep into the sediment and when plants are pulled, they can snap off at the stem, leaving potentially viable tubers behind. Divers pulled plants mostly in the beginning of the treatment season, when herbicide effects were slight and there were fewer plants. In areas of heavy infestation hand-pulling was not done, as it was too time consuming and took away from the assessment goals of the dive.

Conclusions

The 2004 treatment season of the hydrilla eradication project was informative for the King County staff. This was the second year King County was directly involved in control activities, and it was instructive to see how the two seasons compared. The Sonar PR™ herbicide again performed as we had expected. The first application was applied in the middle of May so that newly sprouted plants came into direct contact with the herbicide. Fewer hydrilla plants were found this year than last year (474 in 2003 and 146 in 2004), and all individuals appeared pinkish and bleached, making them easily identifiable against the vivid green of the other plants.

Acceptable levels of fluridone stayed in the water column for the entire growing season, through the last FasTEST sample in October. The herbicide was found dispersed into all parts of both lakes, including areas where herbicide was not applied. The plants repeated the same growth and spread patterns as in 2003. Early in the season, very few plants were found and they were mostly in shallow water. As the summer wore on, more plants and more dense patches were found in deeper water. However, this year the total plant population was much lower than last year, suggesting that the plan for eradication is working well.

Throughout the summer, other plants such as *Typha* spp*., Nymphaea odorata,* and other submerged aquatic weeds also showed signs of herbicide damage. However, the bleaching of hydrilla was most profound and easily spotted among the other plants.

Both hand-pulling and herbicide were used in treating hydrilla. The Sonar PR™ was the main control method covering the whole lake, and the hand-pulling was an excellent follow up to remove isolated, small areas of hydrilla. These treatment methods combined with frequent assessment are still proving to be effective in Pipe and Lucerne Lakes.

ASSESSMENT

Assessment throughout the growing season was a critical part of this project. The surveys were performed two ways: (1) snorkel surveys, and (2) SCUBA diver surveys. SCUBA divers carried out three surveys this year in June, August, and October. The snorkel survey was only done once, in conjunction with the June SCUBA survey. An exploratory tuber survey to gauge the potential for increases in the hydrilla population was conducted in October.

The assessment portion of the hydrilla project was necessary for the evaluation of the success of eradication efforts. Without consistently checking the plants for herbicide damage and extent of populations, there is no way to gauge the effects of treatments. This year, the same hydrilla growth pattern observed in 2003 emerged, but the plants were in lower densities. Instead of many plants being in shallow water, the plants were mostly in five to six feet of water, to which the divers had easier access than the snorkelers. As the summer progressed, more plants were discovered in deeper water (approximately ten to twelve feet) in clumps of one to six plants. By October, several patches of plants were found in deeper water up to 13 feet. Densities were still small, with the largest group having approximately 20 plants. Because no plants were being found in the shallow waters later in the summer, only one snorkel survey was done in June.

Pipe Lake was the most heavily infested of the two lakes, with most areas along both the northeastern and southern shorelines producing some plants. The coves in the east and west had no plants this season, compared to having a few plants in 2003. There were more plants in the late summer at 10 to 13 feet deep, and they came up in scattered patches. There fewer differences in the plant populations found between the beginning and end of the 2004 treatment season than there were in the 2003 season. Only one plant was found (in June) at three feet depth in Lucerne. This compares favorably with the 10 to 15 plants found at this spot at the same time in 2003. No other plants were found in Lucerne during the 2004 treatment season. GPS points and notes are taken of the exact plant locations allowing for easy illustration of hydrilla dispersal in the lakes (Fig. 4).

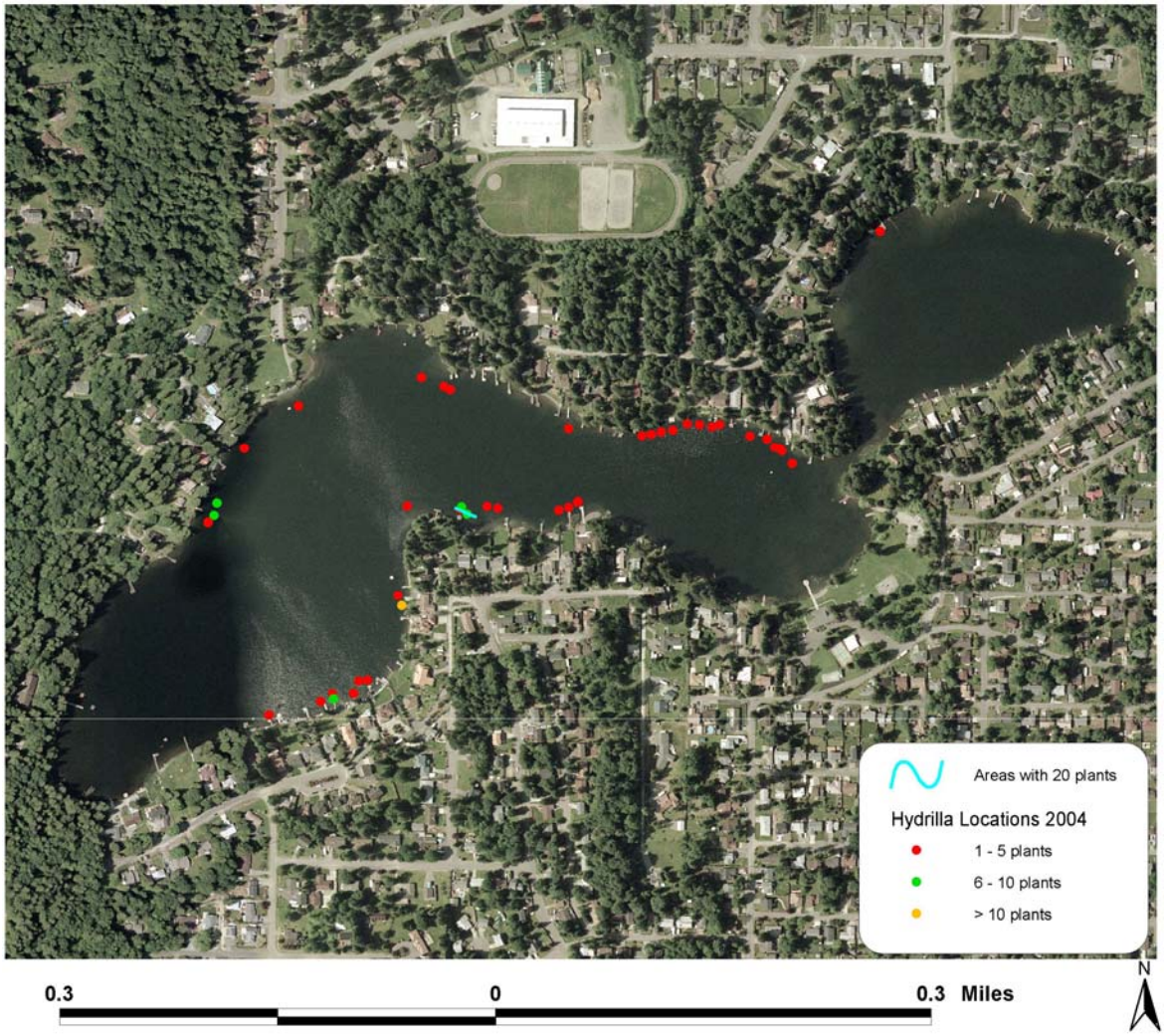

Figure 4: 2004 Hydrilla Locations

Overall, hydrilla has decreased from 474 plants found in the lakes in 2003 to 146 plants found in 2004. Even though each hydrilla plant was counted as an individual so that every survey allowed for some possible double counting, there is still a significant decrease in the amount of plants found in 2004. This noticeable decrease in plants suggests that the treatment approach is working very well.

The herbicide treatment also had an effect on the native aquatic plant populations in the lake. The EnviroVision SCUBA team recorded the other submerged aquatic plants observed during the hydrilla surveys. They estimated the density and distribution of the aquatic plants in the lakes over the three surveys. Table 1 is a list of all aquatic plants and macro algae that have been documented in the lakes since the spring of 2003.

Table 1: Aquatic plants and macro algae in the lakes

Scientific Name	Common Name
Potamogeton zosteriformis	Flat-stem pondweed
Potamogeton robbinsii	Fern-leaf pondweed
Potamogeton amplifolious	Bigleaf pondweed (1)
Potamogeton spp.	Thinleaf pondweeds (1)
Hydrilla verticillata	Hydrilla
Utricularia spp.	Bladderwort spp.
Isoetes spp.	Quillwort spp.
Scirpus	Bullrush spp.
Juncus spp.	Rush spp.
Typha spp.	Cattail spp.
Iris pseudacorus	Yellow-flag iris
Solanum dulcamara	Bittersweet, nightshade
Spirea spp.	Spirea
Nuphar polysepala	Spatterdock
Nymphaea odorata	White water lily
Polygonum hydropiperoides	Waterpepper
Chara	Muskgrass, stonewort
Tolypella intricate	Tassel stonewort (2)
Nitella spp.	Nitella
Fontinalis antipyretica	Common water moss (1)

(1): Not found in lakes in 2004
(2): Macro algae found in past surveys but not positively identified until August 2004.

This year, according to EnviroVision, none of the native plants showed any signs of herbicide damage in June 2004. However, by the last survey in October 2004, several of the submerged and floating-leaved aquatic plants in Pipe and Lucerne Lakes were showing significant herbicide damage (Table 2). Emergent aquatic plants are not shown in Table 2, but observations suggest that they have not been appreciably damaged by the Sonar PR™. There is no measurable difference in the level of damage observed between the treated and untreated areas; therefore, the does not list plant location in the lakes.

Table 2: Presence (or absence) of submerged aquatic plants and macro algae in the lakes, October 5-6, 2004

Scientific Name	Common Name	Presence ?
Potamogeton zosteriformis	Flat-stem pondweed	Yes (1)
Potamogeton robbinsii	Fern-leaf pondweed	Yes
Potamogeton amplifolious	Bigleaf pondweed	No
Potamogeton spp.	Thinleaf pondweed spp	No
Hydrilla verticillata	Hydrilla	Yes
Utricularia spp.	Bladderwort spp.	Yes
Isoetes spp.	Quillwort spp.	No
Nuphar polysepala	Spatterdock	No
Nymphaea odorata	White water lily	No
Chara spp.	Muskgrass, stonewort	Yes
Tolypella intricate	Tassel stonewort	Yes
Nitella spp.	Nitella	Yes

(1) Winter buds only

Duplicating the same work done in 2003, in August the divers observed aquatic plant density and distribution referencing eight transects in the lakes (Figure 5). EnviroVision compared the 2003 and 2004 plants identified and their relative abundance and compiled the results in Table 3. The notable differences were observed in transects 2, 5, and 6. *Potamogeton zosterformis* was not found in transect 2 and no submerged plants were present in transects 5 and 6 in 2004 (see Appendix C).

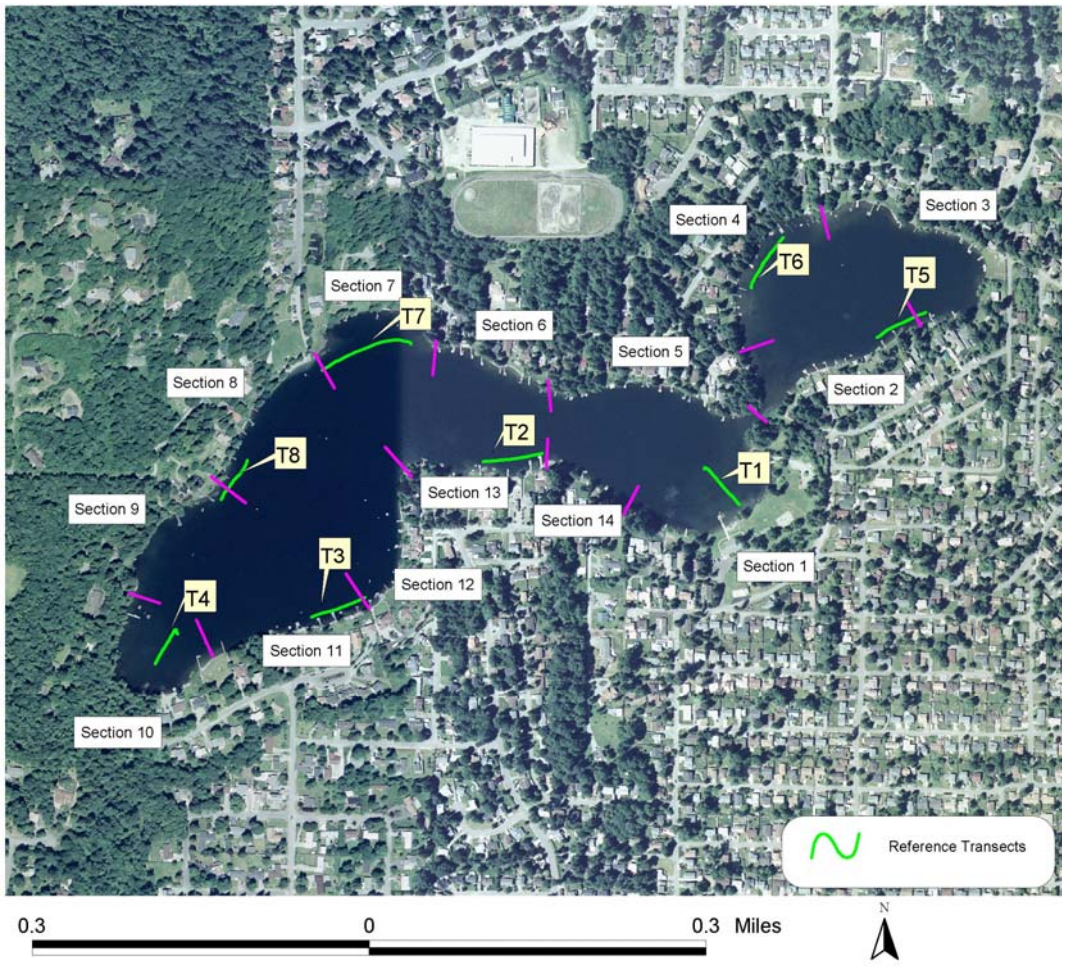

Figure 5: Plant Survey Transects

Table 3: Submerged aquatic plants in reference transects for August surveys. Densities (or range of densities) are in parenthesis

Transect #	2003 [1,2]	2004 [1,2]
T1	Pz (L), Pr (L),	Pz (L-M), Pr (L-H)
T2	Pz (L)	Hy (L)
T3	Pz (L), Pr (M), Hy (L)	Pz (M), Pr (M), Hy (L)
T4	Pz (L-H), Pr (L-H)	Pz (L-H), Pr (L-H)
T5	Pz (L), Ut (M)	No plants
T6	Pz (L), Pr (L), Pa (L)	No plants
T7	Pz (M), Pr (M), Hy (L)	Pz (L), Pr (L)
T8	Pz (L), Pr (L), Hy (L)	Pz (L), Pr (L)

(1): Pz=*Potamogeton zosteriformis*, Pr=*Potamogeton robbinsii*, Pa=*Potamogeton amplifolius*, Ut=*Utricularia spp*., Hy=*Hydrilla verticillata*.
(2): L =1-5 plants/m^2, M=6-10 plants/m^2, H=>10 plants/m^2.

As in 2003, after each assessment a complete summary of the survey was submitted to the Project Manager by the consultant. These summaries have been attached to the appendix of this report for a detailed account of each assessment event in Pipe and Lucerne lakes (Appendix C).

The surveys are the most direct method to assess how the herbicide affects the hydrilla and the other aquatic plants in the lakes. These assessments not only helped direct the treatments, but also collected important information for the future treatment seasons. In addition to the regular diver and snorkel surveys, this year an informal tuber survey was done to assess the extent of the tuber bank.

TUBER SURVEY

Field Sampling

Hydrilla tubers can lay dormant for up to five years in the bottom sediment of lakes; these tubers make up what is called the "tuber bank." While the tubers are dormant it is likely that the herbicide in the water column has no effect on them, and the tuber banks may be capable of re-infesting a lake even after the weed has been seemingly eradicated. On October 13, 2004 an exploratory tuber survey was performed at Pipe and Lucerne Lakes to evaluate both tuber sampling methods and the extent of the tuber bank. This exercise better informed County staff as to how to execute tuber sampling in the future and to design a more extensive survey for 2005.

The sampling team consisted of three personnel from Envirovision: two SCUBA divers and a field technician. Three County staff members also were present, with two lending boat support and one on the shore sieving bottom samples. Two transects were established in Pipe: one in Section 5 and the other in Section 13 (Fig. 5). Stakes from the 2003 survey year were located within these sections, which acted as guides for where the samples were taken. This gave staff confidence that samples were taken from likely areas for tuber banks, based on mapped locations for plants. An eight meter length of rope was staked at the site by the divers and samples were taken at 0, 2, 4, 6, and 8 meters, with additional samples taken to the left and right of the four meter mark.

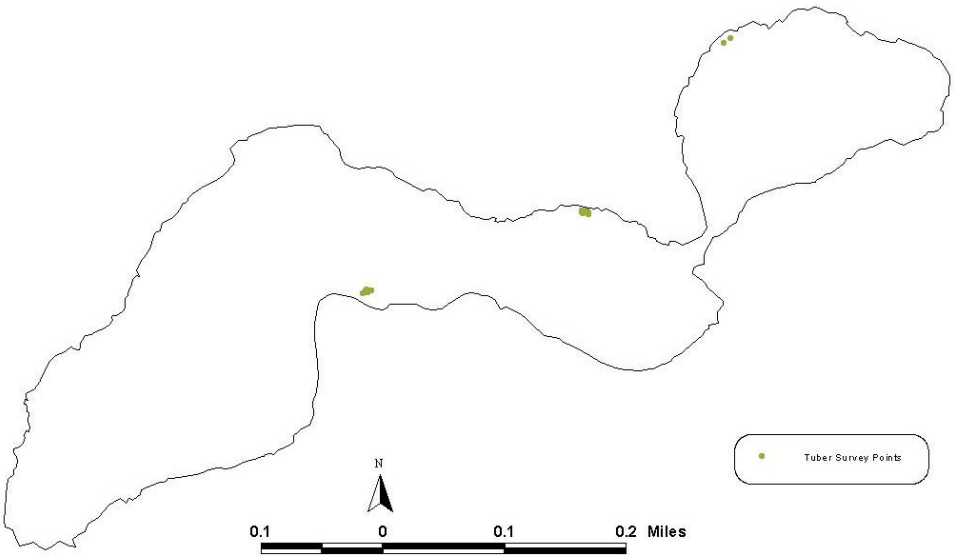

Figure 6: Locations of transects and points for the tuber survey

The boat staff prepared the Eckman dredge and lowered it to the SCUBA divers who set the dredge at the proper site and manually triggered the device (this would penetrate about 6", based on observations). The divers positioned the dredge in areas that were free of woody debris, rocks, and vegetation. The boat staff raised the dredge and released the sample into a plastic bag that was taped and marked. A County staff member shuttled the sample by canoe to the shore, where it was sieved to remove fine sediment. Very large objects were picked out, noted and removed.

Sediment samples at four additional locations were also collected using a 0.5m^2 quadrat (Fig. 6). Two samples were taken near the transect locations in Pipe Lake, and another two were taken near the dock along the northwest shore in Lucerne, where the sole hydrilla plant was located in 2004. According to Envirovision divers: "one diver placed a plastic bag under on side of the quadrat, opened the bag, and held the quadrat to the bottom. The second diver filled the bag with sediment by using a small shovel to excavate the area inside of the quadrat to a depth of 12 to 18 inches. All sediment sample locations were marked by divers with a wooden stake," (EnviroVision, 2004) (See Appendix).

After the samples were bagged they were taken to shore by canoe and were washed through a fine sieve, which separated water and silt from larger objects. After sieving was complete, the residue was placed in zip lock bags and taken to King County for analysis.

Bottom Sample Examinations

Methods

Samples arrived in zip-lock bags and were kept in the refrigerator. Bags were taken at random and picked through carefully to find tubers, if present.

Originally, the plan was to examine samples under a dissecting microscope, but after initial trials this level of magnification was deemed too time consuming and unnecessary, so the remaining samples were examined under high light without magnification, only using the dissecting scope when something tuber-like was difficult to identify.

The method involved placing a fist-sized amount of the sample in a square 8"x 8" Pyrex dish and spreading it apart. When the last of the sample was taken from the bag, a small amount of water was poured into the bag and shaken to dislodge any remaining material, then poured over the sample in the dish. The sample was placed in one corner of the dish and moved a bit at a time to the other corner using a curved metal stake. In this way every bit of material large enough to be a hydrilla tuber was examined. Once all the material in the dish had been examined, it was discarded into a common bucket. The dish was cleaned in between sample bags.

Findings

No hydrilla tubers were found. The substrate was very sandy, with frequent gravel and cobble sized rocks, plus sticks, pieces of wood and unidentifiable bits of detritus. Some samples contained very little muck (broken down organic material), while others had a considerable amount. A list of what was found follows:

- Living plants found included *Chara sp*., *Nitella sp*., and *Lemna minor*.
- Zooplankton was noted in the sample examined under the microscope and was occasionally visible in other samples.
- Almost every sample contained very small clams and clamshells, and a few samples contained snails of two different species.
- Almost every sample contained worms of some kind.
- Almost every sample contained one or two very active *Megaloptera* (alderfly) nymphs.
- 5 caddisfly larva cases were found.
- Many seeds of different kinds were found, including some from trees along the shore (maple and hemlock among others) and many that were not identified. Some of these

were soft and the same color as Hydrilla tubers, but were determined not to be tubers based on size, form, texture, and density.
- Bits of trash were found in many samples, sometimes not identified, but including pieces of plastic, a chunk of charcoal, a screw, a fishing weight and a penny.

The following items were preserved in alcohol:
- A quantity of the small soft seeds mentioned above.
- A few small hard oval seeds that were brick red in the sample but turned black when dried out or soaked in alcohol.
- A number of small clams.
- The caddisfly cases.

Conclusion

Although this tuber sampling event was exploratory only, the information gained from it was very useful. From what was observed, it seems the existing tuber bank is not very extensive and may be nearly exhausted. Samples were taken at areas known to have extensive hydrilla infestations in the past, and yet no tubers were found. It is possible the Eckman dredge did not go deep enough into the sediment and the tubers are below the level of what was dredged this year. However, the two much deeper excavations done by the divers also did not produce tubers. It may be beneficial next year to use only excavation since it goes deeper into the sediment than the dredge.

It is very encouraging that no tubers were found during this small survey. This suggests that the treatment techniques are working, and the tuber bank may no longer be as extensive as once previously thought. Sampling methods will need to be expanded to include sampling deeper into the sediment to see if there is a deeper tuber bank that was not sampled in this exercise.

BUDGET

Table 4: Hydriall Eradication Project Budget

Task	Cost: 2004	Est. 2005 Costs
Task 1: Project Mangement	$23,703.00	$24,000.00
Task 2: Treatment	$38,052.00	$38,050.00
Task 3: Monitoring and Assessment	$35,449.00	$37,500.00
Total	**$97,204.00**	$99,550.00
Washington Department of Ecology	$88,844.46	TBD
Cities Match	$8,359.54	TBD

In 2004 the State awarded a grant in the amount of $100,000 to King County to perform the hydrilla eradication work. A budget was constructed breaking the money into three major tasks, project management, treatment and assessment. Project management included tasks such as report writing, budget, and project organization. Treatment included all aspects of herbicide treatment in the lake, purchasing equipment and herbicide, creating treatment maps, and the herbicide application. The final task is Snorkeling and Dive Assessment, which included staff time spent surveying the lake, writing reports and creating survey maps.

Table 4 shows the total spent for each task. This year a total of $97,204 was spent by King County of which $88,844.46 was considered eligible for grant reimbursal, due to differing third burden rates between King County and Ecology. The cities of Maple Valley and Covington contributed the necessary matching funds to the grant for a total of $8,359.54. The table also includes the estimated costs for the 2005 treatment year.

FUTURE

It is not anticipated that the treatment strategy will change in the near future. The 2005 hydrilla eradication treatment methods will stay essentially the same. Slow release granular Sonar PR™ will be the herbicide used and rates of fluridone will most likely remain the same due to the fact that we stayed well within range of our target concentration. Next year one snorkel survey early in the season may suffice. This year no plants were found by snorkelers that the divers were not able to get to.

This year the Integrated Aquatic Vegetation Management Plant (IAVMP) was written. This document characterizes the lakes and assesses all possible methods for aquatic plant control and their appropriateness for hydrilla. The IAVMP helps make predictions on how the project might progress or change over the years, in treatment strategies and budget requirements. The IAVMP is the most comprehensive look at any particular aquatic plant project and ensures the best and most practical control method is chosen for the specific project.

Next year a more formal and detailed tuber survey may be done in Pipe and Lucerne Lakes. It would be instructive to set up a more comprehensive survey that looked at soils in and around exact plant locations to see how deep and widely distributed the tubers are. The tuber surveys would be done in conjunction with the diver surveys to insure that samples are taken at the exact location of hydrilla plants.

Hydrilla has decreased from 474 plants found in 2003 to 146 plants in 2004. This is a significant decrease in one year and it is hoped that the treatment is working and plant numbers will continue to drop over the next few years.

APPENDIX

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