This final report provides information about the development and current status (as of February 2007) of the Lake Sutherland Milfoil Control Program, located in Clallam County, Washington State. The initial program was made possible through an Early Infestation Grant provided by the Washington State Department of Ecology.

The report contains four general sections. The first section summarizes program development and the lessons learned from each control season. The second section summarizes, then describes in detail, control methods, procedures, materials, and equipment employed to date. Although volunteer involvement is touched on in the second section, the third section details the day-long pull events including how they are structured and organized. The fourth and final section briefly describes obtaining a more secure funding base through a property owner approved Lake Management District (LMD). We followed the LMD process described and modeled by a Thurston County manual.

Many sample documents, such as newsletters, volunteer packets, liability forms, newspaper articles, public notices and committee by-laws are appended. Although some pictures are shown in the report, a more complete album can be found on the CD at the back. Some were taken by a professional photographer who retained exclusive copyright privileges unless permission is otherwise granted, or the pictures are used for educational purposes. An electronic copy of this report and a recent presentation to one of the Lake Associations are also available on the CD.

I would like to thank all the other aquatic program managers who patiently answered my many questions or sent me copies of their forms. I would especially like to thank Kathy Hamel who cannot be praised enough for her support, insight, and practical advice, and who is truly responsible for setting this program in motion. She is the ultimate example of an excellent public servant. It is obvious that it is the public’s best interest that she has always kept firmly in mind.

Clearly, there is not time to document every pertinent aspect of our program. Please feel free to contact me at the Clallam County Noxious Weed Control Program at 360-417-2442 with any questions or if I can be of any further assistance.

Cathy Lucero
Clallam County Noxious Weed Control Coordinator

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This rock has been placed at the base of the Hixson dock in memory of Ed Hixson, a founding member the Lake Sutherland Steering Committee and dedicated milfoil volunteer.
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SECTION ONE - PROGRAM DEVELOPMENT
General Program Overview 2000-2006

Lake Sutherland is a 360-acre public access lake located in Clallam County. Once the eastern portion of nearby Lake Crescent, scientists conjecture that an earthquake triggered a massive landslide that separated the two. Lake Sutherland is an extremely popular waterbody, heavily used for numerous recreational activities including fishing, swimming, boating, and water and jet skiing. The lake is home to native kokanee as well as cutthroat and rainbow trout. When the Elwha dams are removed, (beginning in 2009) there may be potential for sockeye salmon to return to the lake. The lake is open to fishing year-round.

Department of Ecology staff did not detect Eurasian watermilfoil (*Myriophyllum spicatum*) during a routine plant survey in 1996. However, during a return visit on August 14, 2000 an Ecology team found plant fragments near the Fish and Wildlife boat launch and a significant, fairly dense patch at the west end of the lake. This was the extent of their survey. Their opinion was that Eurasian watermilfoil was not yet well established, and should be considered an early infestation. Eurasian watermilfoil is a class B designate noxious weed whose control is required in Clallam County. All told, we estimated there were less than 2 infested acres scattered throughout the lake.

The Clallam County Noxious Weed Control Board applied for and received a $50,000 early infestation grant (including 12.5% match) in September 2000. The obvious long term answer for controlling Eurasian watermilfoil lay in community stewardship. To that end, the Weed Board strategy was to develop a volunteer-based control program which would not only lower overall cost, but also result in heightened public awareness and involvement in all aspects of the program.

The Weed Board conducted a survey, held a public meeting, and recruited a Steering Committee to help develop a feasible control program. The Steering Committee gathered public input and expert advice, then discussed all sorts of milfoil control options, such as releasing grass carp, administering herbicides, removing milfoil mechanically or physically, and multiple combinations thereof.

The limited amount of milfoil, general reluctance to use herbicide, (made problematic by lake depth and other factors), a robust native plant population, as well as proximity to waters containing threatened or endangered fish, influenced the Committee’s decision to limit treatments to handpulling and the use of barriers, unless emergency circumstances dictated otherwise. As time went on, Committee members assumed more and more
responsibility for developing the volunteer program, promoting public awareness and spurring ever greater community participation.

The use of volunteers and assistance from the general community enabled the grant funding to last for four years. Ecology was extremely supportive by allowing grant funds to purchase some SCUBA equipment and dive instruction for the Weed Board Coordinator, and later, to cover expenses to develop a Lake Management District measure for a public vote. In 2004, a majority vote approved the Lake Sutherland Management District as provided for by RCW 36.61. Each parcel with lake access became subject to a $50/year/p assessment for 5 years. This was a major achievement in a number of ways, but most significantly because it created a secure, stable funding source for the milfoil program just as grant funding was exhausted.

CONTROL PROGRAM OVERVIEW
NOTE: The procedures and methods used to date are discussed in more detail elsewhere in this document. Sample forms or other materials developed over the course of the past six year are appended.

To better identify each area, plan control activities, and monitor progress, the lake has been divided into 21 sections. Sections were based on landowner interest, distinct geographic landmarks, or units that could be surveyed during a single dive. Each section is surveyed at least twice per year and more frequently where plants have previously been found. Known sites are marked with a numbered or lettered, painted stake. Small patches are hand-pulled; larger ones are barriered. Our current procedure for dense patches is to measure the site and wrap a corresponding length of thin landscape fabric onto a PVC pipe. The pipe is lowered by two divers who then roll the fabric out over the infested area. To weight the barrier, burlap bags, half filled with gravel, are dropped from the surface as the fabric is unrolled. In steep areas, the fabric is first secured with short lengths of rebar, which are then covered with a bag. After a barrier is in place, divers and others skimming at the surface collect fragments that may have been created when rolling out the fabric. A follow-up visit is scheduled within in a week or two to locate fragments, pull missed plants, ensure the barrier is properly secured, or to deal with any unanticipated problems. Our method of marking and documenting each site has not been consistent over the years, but is getting better. We hope to purchase an underwater com system that will allow direct communication between diver and surface support, which will allow accurate GPS/GIS mapping.

PROGRAM RESULTS
The program has grown every year. A dedicated steering committee with deep community ties, in addition to extraordinary support from a local dive shop, are to a large degree, what have made such a unique volunteer based program successful. Our program has matured and we are more organized. Divers are staying with the program, becoming more
experienced at distinguishing Eurasian watermilfoil from northern watermilfoil and other look alikes, while gaining skill with precision diving in shallow water. New recruits are attracted as word of our program gets out. Currently, three, day-long pull events are sponsored in June, July and August by various lake associations who provide a potluck for the volunteers (up to 50 people at each event). From mid May through October, additional ad hoc surveys, trainings, or special focus work days are scheduled every week, or even twice weekly, depending on volunteer availability and need.

The first pull at the end of 2000 consisted of 8 divers and several boaters who struggled with identification. We were barely able to organize two dives. In contrast, during 2006, we had 35 different divers and 53 different boaters who donated 1100 hours of time and the use of their equipment. Many folks volunteered for multiple days. Our 3 large pull events were scheduled and advertised through newsletters and brochures nearly a year in advance. There were 32 additional ad-hoc dive days.

All the hard work is paying off. More and more people are interested in getting involved. A lake community that became extremely divided over the issue of creating an LMD, has once again joined together while working against milfoil. The relationships that were forged over the milfoil issue, helped pave the way for the same group to unite over other issues. For example, some of the committee members worked to organize a fundraising campaign yielding over $10,000 for a lake cleanup necessary after storm damage blocked the lake outfall. The blockage contributed to a heightened water level that in turn threatened many docks and homes around the lake this winter. The storm, which occurred the previous winter, destroyed or damaged nearly one third of all docks, and caused one house to slide almost into the lake.

Most importantly, the program is working. I would estimate that there is now less than the equivalent of a city lot’s worth of Eurasian milfoil left scattered throughout the lake. People are heartened by the news that there is less milfoil than ever and that all the hard work is paying off. Otherwise, we would be suffering extreme burnout by now and the program would come grinding to a halt. The new barriers were key. They are easy to lay, which means it is easier to come up with the manpower needed for each project, and we can generate the capacity to cover all dense patches in any given year. The material physically prevents milfoil from growing from underneath and doesn’t just rely on blocking the light. The fabric breathes, letting out most gas buildup, but resists top-growth long enough that crews have time to make more frequent surveys and follow-up visits. Divers are able to spend more time and be more careful removing each and every plant.

We are cautiously optimistic about our chances of entirely eliminating Eurasian watermilfoil from Lake Sutherland. However, some surprising regrowth that occurred at the end of last season and some questions about possible animal vectors certainly gave us pause to reconsider that optimism this November. We are concerned that there is still a lot more work to be done. Many factors are out of our control such as the extreme
amount of boating traffic in the nearshore or shallows, which make it so difficult to keep new populations from popping up in unexpected places no matter how hard we try. In some cases, sites that appeared entirely clean showed new plants at the end of the year (November). There is always the possibility that Eurasian watermilfoil or other invasive plants will be introduced to the lake at any time.

Every year we assess our accomplishments and modify our approach based on what is working and what is not. Soon we hope to have eliminated the need for any barriers, and get down to the last, and often most difficult task, of finding and destroying each and every tiny plant before it can reproduce. Additionally, as the imminent threat of milfoil subsides, one of our most significant challenges will be to sustain public interest so that we don't lose support for the program on the eve of winning the battle.
2000-2001 Program Narrative

2000

August - The Department of Ecology discovers the presence of Eurasian water milfoil in Lake Sutherland. Ecology contacts the Clallam County Noxious Weed Control Board and encourages submission of an early infestation grant application.

September - $50,000 early infestation grant approved. Resource Management, Inc. is hired to survey the lake and help develop a preliminary control plan. Several large infestations are discovered in addition to a number of orphan populations. The company proposes handpulling the small sites and installing barriers over the larger ones.

October-November - Based on the cost of initial survey, there was concern about the ability of the grant to fund the work necessary to control Eurasian water milfoil in the long-term. The prospect of developing a local volunteer program that would reduce overall costs, raise public awareness, and generate community involvement that provides the long-term control necessary for success is considered. A small group of local divers is gathered to work in areas identified by the Resource Management, Inc. survey. However, by October and November, the *M. spicatum* is nearly impossible to distinguish from *M. sibericum*, especially for those with little training.

December - County Noxious Weed Control Coordinator learns to dive to better develop and direct a milfoil control program.

2001

(January-April) - Coordinator learning about milfoil ecology, and planning a volunteer based control program. Lake Sutherland has an abundant and healthy native vegetation population. Unlike other lakes that don’t contain native milfoil, Sutherland has at least one, and possibly, two native species, confounding accurate identification early and late in the year. Coordinator conducts monthly dives to determine when Eurasian watermilfoil is distinguishable. Around mid-April, Jenifer Parsons agrees to a snorkel survey to help identify *M. spicatum* sites. At that time, even Ms. Parsons is not certain. By late April, some *M. spicatum* is visible, but not all has emerged, especially young plants. This may be due to very cold water temperatures in early spring that delay growth. By mid June, many plants are noticeable, yet even by that date, not all have achieved enough growth to be readily visible, especially in heavily vegetated areas. Additionally, a significant algal bloom still cloaks many of the plants around this time.

March - Lake owners receive survey asking about water use, control options and to solicit involvement. From the survey, it is evident that quite a few people take water from the lake for various purposes. Predictably, there is a strong bias against the use of herbicides.
April—A well attended public meeting is held to discuss the problem, control methods, and to receive feedback. Jennifer Parsons is a featured speaker at this meeting. Several people volunteer to become the nucleus of a Lake Steering Committee.

May—A Milfoil Steering Committee is developed based on response to the survey and public input at the meeting. This was perhaps the most significant step undertaken in the program to date. Careful selection of key players broadened our community presence immensely and provided instant access to a tight-knit network of local residents who would bring their resources and contacts into play. With the help of the Coordinator, the committee explores technical aspects of laying barriers on the worst sites.

June—The Committee divides the lake up into 21 sections, either by geography, lake association, or merely friends or relatives who would be willing to be a contact person for a specific section. The county road department provides address markers that volunteers attached to docks around the lake, with the owner’s permission. Contact people commit to three surveys of their section during the course of the summer. The Weed Board arranges for equipment and survey/reporting packets that could be signed out from a local store. Equipment included skimming nets, dive flags, and goody bags, (mesh bags routinely used by divers for whatever they happen to collect). Packets were marked according to sections and contained maps with parcel information, a safety and identification guide, and survey sheets. The Coordinator provided training as requested and personally worked three sections.

Two local divers are hired to install 3 barriers in what appeared to be the source site. This provides a model for volunteers to lay future barriers. We used heavy duty burlap stitched into pre-measured dimensions and weighted with burlap bags filled with reject material (by the Sheriff Department’s chain gang). Burlap material was initially recommended by Ecology.

(July, August, September)—We begin semi-organized survey/pull events. Arlene Fullerton, an experienced milfoilier from Long Lake agrees to help train volunteers to identify and appropriately pull milfoil. Local residents provide lunch. Several new large patches since the previous fall, are identified during the first event. Similar volunteer based events are held in subsequent months. Volunteers lay three additional barriers in September, but were unable to obtain more burlap, due to the 911 Event.

October—Barrier Assessment already shows an accumulation of scum, sediment and milfoil plants becoming established on top.

November—Milfoil is no longer distinguishable. We added some additional bags to barriers where material was floating. We sent out a mass mailing to all landowners detailing program accomplishments.
ANNUAL CONCLUSIONS/RECOMMENDATIONS

2000
• Identification was nearly impossible given the time frame and nature of lake vegetation. We needed much more training and larger participation.
• Having the Coordinator become a diver proved to be absolutely critical for a clear understanding of the problem and therefore drives the ability to frame an effective solution.

2001
• Accurate surveys can’t begin before April and must end by November, in part because of presence of native milfoil.
• Burlap barriers were difficult to lay, given the nature of the material, depth of the infestations and multiple underwater obstructions.
• Filling the bags with reject material which contains sand, obscured visibility considerably when laying barriers.
• The difficulty of gathering enough resources to lay the barriers and the time for each installation was discouraging.
• We were just becoming aware of the scope of the problem and just starting to understand how fast milfoil was spreading.
• The strategy of adopt-a-section was ineffective because it yielded uneven results, something that milfoil used to its advantage.

2002 Conclusions
• Burlap is the perfect medium for milfoil growth.
• It is nearly impossible to completely remove any fragment that has become established on top of a burlap barrier.
• Burlap barriers decomposed within one year, which did not give us enough time to catch up with the milfoil.
• Insufficient resources in previous year led to poor follow-up needed to capitalize and maintain initial barriers.
• High level of boating activity is leading to very rapid spread in many places around the lake.
• Organization and participation is building with each year.

2003
• Greatly increased organization and efficiency by pre-scheduling year’s events.
• Committee members took on ever increasing role such as organizing potlucks and signing up boaters.
• Increased number of training opportunities and generally assessing equipment prior to main pull events is improving diver efficiency.
• Focused main pull events on largest infestations.
• Began thinking about forming a Lake Management District.

2004
• Needed to establish long-term funding. An LMD was the best way to accomplish this.
• Handpulling was not keeping up.
• Developed new, improved fabric barrier at end of year
• Steering Committee was essential to passage of Lake Management District Assessment.
• Communication and local buy-in critical to sustaining long term program.

2005
• No survey is ever perfect.
• New barriers performing well
• New barriers must be closely monitored to make sure they do not shake free of weight and float.
• Follow-up, Follow-up, Follow-up-Must return at least three times to the same spot within a short period of time to really destroy plants.
• Barriers on steep ground were staked with rebar.
• Resistance to LMD formation is fading due to high program performance and focused program objectives.
• Continue to focus on community communication through newsletter.
• Improve efficacy monitoring.

2006
• Investigated the use and purchase of wireless surface to water communication, but cost may be prohibitive.
• In conjunction with above equipment, implement use of GPS/GIS capabilities for mapping and monitoring.
• Support a local Girl Scout project to photo document every structure around the lake to provide better surface landmarks of milfoil sites.
• Pre-schedule weekly dives, incorporating most flexible mix of times to accommodate greatest number of divers.
• Increase recruiting and organization for topside support.
• Increase the use of the Lake Newsletter to remind owners of the LMD purpose and mission, to formally recognize volunteer effort and to continue soliciting new citizen involvement.
• All known actual patches except one 10 X 20 section, were covered before the end of the year. Exceedingly bad weather and lack of supplies on the last day were the reason for ending activities.
• The LMD committee, although exclusively focused on milfoil, has been the means of building tremendous community support of often divisive groups. As an example, one committee member undertook permitting to clear outlet blockages that were contributed to severe flood damage to many cabins and docks last winter. He sent out a letter asking for donations to pay for a cleanup and has received over $10,000 to date.

2007
• Already beginning 2007 recruitment and setting up a work schedule. A considerable number of divers are already asking when we will start working milfoil.
• Local fly fishing group has expressed interest in helping with boat support this year.
• Still very interested in surface to diver com system to improve mapping.
SECTION TWO-CONTROL METHODS
**Surveys/Monitoring**

True lake-wide surveys are conducted at least twice a year. The first is conducted late May to early June, and helps set priorities for the season. Plants are either pulled as they are encountered or marked for a later work party. Even this late in the year, we found that not all *Myriophyllum spictum* plants have emerged yet. Further, it is often impossible to correctly distinguish *Myriophyllum spicatum* from *Myriophyllum sibiricum* any earlier. This is especially true when the plants are small or new. Older *M. spicatum* plants can often be identified by their habit, rather than morphological characteristics. Algal blooms often further obscure identification and do not occur within a uniform timeframe throughout the lake. Combined, these confounding factors make it easy to miss brand new orphan populations or small patches during this first survey.

Currently we mark sites with wooden stakes that have been pre-painted with white, or at least topped with florescent yellow or orange, and numbered or lettered on site. These colors were chosen for their visibility and longevity underwater. We have been somewhat haphazard in the past about how stakes were numbered, but we have tried to standardize to include the date (or year) and lake section number. The stakes are often readily visible from the surface and certainly evident to subsequent divers trying to find the location. The stakes are prepared in two different lengths depending on how silty or rocky the bottom is, or depending on site depth where a long stake will not pose a boating or swimming hazard. The longer stakes are preferred as they are visible later in the season as vegetation grows up.

The second survey is conducted at the conclusion of the season to find orphan plants that were missed, to discover areas that were, for some reason or another neglected, and check how well we did during the season. We try to use the most experienced divers for both surveys, because sometimes the most difficult challenge is finding the one plant in hundreds of square feet of dense vegetation, or because of algal blooms that occur at different times of the year. Staking then makes the spot easy to find for subsequent, possibly less experienced divers.

The location of sites from the surface has only been loosely tracked. This is in part because it is so difficult for the diver to communicate each and every plant he/she finds before moving on. It is also physically difficult to “bounce dive” which means to move frequently through varying depths, to talk with the surface support to report. We hope to
remedy this difficulty with a wireless underwater communication system that would make it easy for a boater to take GPS points based on information relayed by the diver while underwater. However, most of the divers in the program to date are well acquainted with what has been found in each area. The stakes still provide a simple, low tech way to document how many plants are being found in any given location. In some cases, stakes where no plants are now found show what has been eliminated over the years.

Survey/Monitoring

Supplies
1) Lathe (4 ft), by the bundle, or 1X2s, (8 ft.) which cost 92 cents each plus tax
2) Paint-rustoleum-prepainted with a white base, then topped with yellow or fluorescent pink.
3) Sharpie-used on site.

Hand Pulling

Used for individual plants, small sporadic infestations, and to clean around larger, denser patches that are barriered. Handpulling often occurs simultaneously with surveys and monitoring. The actual approach to each plant varies depending on size, location, and presence of other vegetation. Our hand pulling season is limited by a couple of factors, the presence of a native milfoil which makes identification difficult at certain times of the year, and water temperatures that drop below 50 degrees during the late fall until late spring. The cold water not only delays plant emergence and growth, but also hampers divers who must go gloveless to pull effectively. Hand-pulling is only effective when repeated frequently. No matter how good you are, if the area isn't checked several times within a short time frame plants are missed, regrow, or fragments sprout. New volunteers are trained throughout the season. We are very aware that divers who not very conscientious or are poorly trained, can end up spreading milfoil instead of eliminating it.

Procedures: Handpulling procedures have been described in other documents. Here are a few tips we give our volunteers.

Diver Training Tips-
• Survey from deep to shallow. Additionally, weight slightly heavier than usual to ease buoyancy control in shallow water. Proper weighting will make all the difference in the world!
• Pull from deep to shallow. Sediment tends to flow downhill on a slope.
• Stop and assess an area before pulling. Count how many plants you see, before you lose visibility. (make sure you find them all before you leave or return when visibility clears). It might be necessary to move other plants out of your way before beginning to pull. Do this as carefully as possible.

• Be as still as possible. Keep your fins overhead or behind you and as still as possible, to avoid making fragments or stirring up sediment. OR, settle firmly on the bottom and kneel, reach as many as you can before moving, working your way up a slope as you pull plants.

• Generally it is best to start from the top of the plant, finding and gathering all the stems and leaves as you move toward its roots. This can be very difficult when the plant is surrounded by lots of other vegetation. If the plant is large and brittle, break off and collect parts at a time so you can control the fragments.

• Follow the stem with your fingers to the roots, (you can wrap the plant on your hand as you go, if it is not too large). Often plants are visible quite a distance from where they’re actually rooted. DO NOT PULL, until you find the roots!

• Feel down in the sediment with your fingers to get all the roots you can.

• Hold the removed plant close to the ground and shake off as much sediment as possible, before putting in “goody” bag.

• Look through adjacent vegetation for milfoil pieces hiding amid other plants. (this is especially problematic later in the season).

• After you remove the last plant, rise in the water column and look all around the area again. It is likely that you missed a plant while you concentrated on another, or that you left pieces in other vegetation, or that fragments have settled or are floating in the water column. Be sure to push off gently with your hands and not your fins, to avoid clouding visibility.

• If visibility becomes poor, move to another area and return and search again.

• Each time you find a plant, you need to perform this review again. Don’t be in a hurry to move on. Coming at a site from a different direction, often reveals missed plants.

**Personnel/Equipment/Supplies**

*Personnel-* Safety is the highest priority! All divers must be SCUBA certified. Occasionally, snorkelers assist or scout in shallow areas. Several participants are CPR and Oxygen Administration Certified or otherwise trained in emergency response. A licensed, insured instructor is contracted to oversee the day long, lake wide pull events that are conducted three times per year. Additionally, the program coordinator is a dive control specialist (above dive master, sub-
instructor), who is certified to conduct dives with certified divers or teach new students under the supervision of a certified instructor. The program coordinator, who works with most of the divers on a regular basis is certified in all dive rescue response procedures and also insured. Contracting and insurance costs are paid for by the Lake Management District. **Clallam County does not assume ANY liability for divers under this program.**

- Nearly all who participate in the program are volunteers. Divers and snorkelers who are new to the program are taken on a predive to assess their equipment and skills. They are taught by a more experienced diver how to correctly distinguish Eurasian watermilfoil from northern watermilfoil and several other aquatic look-a likes. We model correct techniques and discuss best equipment configurations.

- Usually we arrange to have topside support, who can follow divers, skim fragments, collect pulled milfoil, provide fresh "goody" bags, survey stakes or other extra equipment, and note from above, where plants have been removed. Most importantly, topside support can be alert for potentially hazardous situations such as motorized boats entering an area where divers are active. Topside support carries a cell phone or radio in case of an emergency.

- In many cases it is necessary to arrange for a boat to transport divers and equipment to and from a site. Boaters always display dive flags to warn that divers are below. Generally, no one may have a running motor in an area where divers are working. Boaters must wait at a dock, at a safe distance from divers, or hand maneuver in and around the work area.
**Equipment/Supplies—Divers—**

1) **No gloves**—It is not possible to effectively hand pull while wearing gloves. (As the water temperature drops, divers may glove their bag holding hand and pull with the gloveless hand). This is because divers need maximum dexterity to gather and collect all the pieces in their hands. They need a sense of touch to feel their way along the correct stem to the roots. Additionally, at certain times of year, it is easiest to identify Eurasian watermilfoil by feeling the thickness of the stem or by the feel of the leaves.

2) **Dry Suit vs. Wet Suit**—For those of us who spend more than several hours in the water at a time, and because early and late control takes place when the water temperature is generally below 60 degrees it has been very helpful to use dry suits rather than wet suits. However, many volunteers, especially during July, August, and September when the water temperature can be over 70 degrees, were content with wet suits.

3) **Extra weight**—Divers are encouraged to weight a little bit heavy for easier buoyancy control in shallow water.

4) **Goody Bags**—Provided.

5) **Air-Tank fills are paid for by the program.**

6) **Beverages and snacks**—Often provided by the program—this can actually be a powerful incentive!

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**Equipment/Supplies—Boaters**

1) **Boat**—Properly licensed and maintained—(I keep my boat moored at the lake from April through November). Volunteers often bring other boats.

2) **Safety equipment**—personal floatation devices, dive flag, paddle, extra gas, cell phone or radio.

3) **Extra equipment**—skimming nets, goody bags, 5 gallon buckets/garbage sacks, survey stakes, air tanks or additional dive equipment.
**Barriers**
Used to cover large or dense infestations

**Procedures:**
Our use of barriers has evolved over the past years. We began with heavy weight burlap that was lowered into place and anchored with burlap sand bags. Given the depths of some of the sites, this process was slow, entailed significant preparation and took lots of manpower and equipment. **Our current method is** to cut landscape fabric on site, wrap onto a PVC pipe, and roll out underwater. As the divers roll, each piece is anchored with burlap bags half filled with crushed rock. This process is much simpler, longer lasting and requires as few as three people, depending on the site. On sites with steep slopes or sometimes very shallow sites with lots of wave action, (both conditions frequently occur in our lake), we pinned the barrier with rebar and placed a gravel bag on top to prevent the bags from sliding down, the barrier from coming loose, and to prevent the rebar from presenting a swimming or boating hazard. Only our most experienced divers help lay barriers. A detailed list of materials and their cost as of 2006 follows a description of our old burlap barrier and new fabric barrier methods.
BARRIER- Burlap

**Preparation**

- **Survey:** A survey delineated a future barrier location. Initially we staked an area with lath stakes. Sometimes these spots were later marked with buoys that were visible from the surface to enable more accurate placement. Next we measured the area with a 100 foot roll out measuring tape. Based on these dimensions, barriers were prepared for the site.
- **Purchase materials:** This generally included ordering the burlap and sacks. Sacks came quickly, burlap, from California did not. It would arrive in very heavy bundles in excess of 70-100 lbs.
- **Prepare supplies:** To reduce the number of strips to be laid, burlap was precut, and stitched into appropriate sizes. (The biggest barrier laid was 50 ft X 30 ft, average was 20 X 15.) The piece was then folded, not rolled so that it could deployed from a boat deck or dock, a little at a time. The first barriers we laid were unmarked. Subsequent pieces were gridded with orange spray paint to show where bags needed to be placed and to help divers know where they were in relationship to the barrier.
- The bags were half filled with material (about 2 shovels full) and tied with string. Eventually, they had to be transported and stored at the lake.
- **Organize crew:** Volunteers needed anywhere from a couple of days to one week advance notice.
- **Transport supplies and crew to site:** Everything was pretty heavy. Most infestations had boat access only; there are only two publicly accessible boat launches on the lake. Often we used boats that were moored at the lake. However, most residents tend to launch their boats in June, (after school lets out), and remove them after Labor Day. We often needed boats outside this time frame, which considerably hampered our early barrier-laying projects under the old method of installation. Presently, I keep my own boat moored at Maple Grove until late in the season, often November.

**Installation**

- A *minimum* of four divers plus two boats with a total crew of four was required. For the larger pieces, we often gathered considerably more boats, divers, and topside support. Boats were equipped with dive flags, skim nets, extra goody bags and garbage sacks or buckets.
- The burlap was heavy and positively buoyant until it became waterlogged, then it was hard to maneuver. The trick was to lower it into position somewhere between when it was dry and when it was waterlogged. The burlap was deployed from either a dock or boat, depending on the site. Divers pulled the barrier out into position on the surface. Depending on weather conditions, (the wind often kicked up), the burlap was difficult to hold smooth. Because of this difficulty, and the length of time it took to sink on its own, we tended to pull the burlap underwater, beginning with the leading edge. Two divers would pull one edge to the bottom and anchor it with bags, while others would try to keep it centered over the infestation. The first divers would then begin to work their way towards the other two, pushing the barrier down as they went. The others would try to hold the barrier into position.
• Lots of divers were spooked by the poor visibility that generally ensued while trying to wrestle the burlap down. We tried to save on multiple installations and visibility problems by making single, large installations. While this reduced the number of potential seams, (and therefore the amount of overlap needed and which would have reduced coverage that each strip would provide), the sheer size of some of the barriers made it hard to get placement just right and made exact measurements particularly important.

• **COMMENTS:** Quick degradation of burlap led to very disappointing results of this material overall. Fragments easily grew through the top and were then virtually impossible to remove. Additionally, milfoil was not killed by the time the barrier degraded. It is possible that the burlap *incompletely* blocked light, allowing milfoil to persist underneath or merely that milfoil was able to die back, resprout and push through the mesh. We were uncertain of the exact process, merely that places that had been barriered with burlap often ended up producing the most lush growth of milfoil in the long term.
BARRIER-fabric

Preparation

- **Survey:** Because the new barriers are so much easier to install, smaller sized, (but dense) patches of milfoil were targeted than before. Survey preparation is often as simple as placing a stake to indicate the general location.

- **Purchase materials:** Most supplies were stocked and stored at the lake for use as the need arose. The roller is heavy duty PVC pipe, the gauge was chosen so it will sink, without being too heavy. (We experimented with other rollers with disastrous results). The pipe is made to be the exact width of the fabric roll. We found this made it much easier to maintain control of the pipe and fabric while unrolling it through a tangle of vegetation. We usually brought two pipes so that a second piece could be prepared while the divers were laying the first. The fabric material comes in 300 ft long rolls that are 12 ft 7 inches wide. It comes wrapped onto a heavy cardboard center. We never used a full roll on any given day. The remainder was always stored aboard the "Milfoil Princess" or at someone's house at the lake. Several hundred sacks at a time were filled at a county source, then transported and stored at the lake where they could be picked up as needed. We found that the bags did not need to be more than half full, at most ten pounds. This means they are not difficult to throw or carry. The bags need to be kept out of the elements, or the burlap will rot in short order. We are still not happy with the burlap bags for this reason, but have not yet developed an environmentally appropriate substitute. Rebar, small sledge hammers, pipes, scissors, measuring tapes and stakes were also stored on the boat. We also stocked skimming nets, garbage sacks, five gallon buckets (for fragments) dive flags, and goody bags. Little to no additional material preparation is necessary. It is all conducted on site as the need demands.

- **Organize crew:** Volunteers still need anywhere from a couple of days to one week advance notice. However, this new barrier material required far fewer people and equipment and generally, once materials were all on hand, it was pretty easy to get a crew together.

- **Transport supplies and crew to site:** Dive equipment, materials, and people are all pretty heavy. We tended to do several locations on any barrier day. Most sites required transporting everything by boat. My boat is heavy duty, and could often carry just about everything if we were only doing several small barriers. It was often nice to have a kayak or small boat that could be hand maneuvered to follow the divers. This boat could then ferry bags over open water and skim fragments. We generally unloaded materials and personnel on a dock or onto a clear space where the fabric roll could be laid out and measured.
Installation

- Installation can take as little as two divers, and one topside person. If the barrier is near a dock, a boat may not be necessary; supplies could be dispensed from land. Often, we needed a transport boat, and preferably an additional small boat, low hp or hand powered.

- Once on site, divers would swim the general area, deciding where to start and stop each strip, the direction in which they would be laid, how to handle obstructions, etc. They plan how they will signal each other for start and stop, who will do what, BEFORE leaving the surface. While this discussion takes place, a length of fabric is measured and wrapped onto the PVC pipe. Sometimes it was easier to wrap two short pieces on the same pipe and divers simply rolled to the end and started back the other direction without having to come up. Where there was a slope, divers always worked from shallow to deeper. It doesn’t work to roll across a slope, the fabric will simply slide sideways and it is pretty difficult to smoothly pull it back up into position.

- We generally estimated the number of bags for a barrier as three in a row, one row every six feet or body length. Before starting, bags were lined up on the dock or loaded onto the boat so that once the divers began, bags could be quickly thrown as the divers moved. The first edge is secured with bags before rolling begins. Divers try to stay over the fabric at all times to avoid kicking up extra sediment and making more fragments.
• When the divers come to the end of the material—one brings the pipe to the surface, the other begins to check that the material is properly secured. Both will call for additional bags as needed. If another strip is needed, the process is repeated. After the site is completely covered, the divers and top-support pick up any fragments.

• On rare occasions, the length was overestimated. In this case one of the divers would cut the fabric with a dive knife, while the other held the roll in place. In this way we are able to custom fit around pilings and other underwater obstructions.

Comments: This method has been very effective to date. However, it is unknown how long the material will last. The barriers need to be monitored to make sure they do not come free and cause a hazard.

Barrier Supplies/Specifications—burlap & fabric

1) Burlap—Heavy weight 10 oz burlap—10ft widths by up to 100 yds long. Longer pieces may not be continuous. Arrives rolled on itself, no core.

Cost: $540 plus tax (there did not appear to be a separate cost for shipping) for 150 ft.

Purchased from: CSI Synthetics
3500 S.E. Columbia Way
Vancouver WA 98661

Rationale: Originally chosen for barrier material because it was biodegradable. This turned out to be a poor option. This specific company was chosen because it provided the largest width heavy weight burlap to be found anywhere. This was intended to reduce the number of pieces that needed to be laid and the amount of stitching to produce the right size piece. Both these considerations were designed to reduce outright coverage loss inherent with overlap required to prevent milfoil growing between strips.

2) Burlap bags—string tie—sometimes came with two strings, often one. Small size.

Cost: 50 cent/bag plus tax and shipping. 2005 Shipping cost: $38.84 for 200 bags.
Purchased from The Bag Lady, Inc.
1124 Valley Ave. E.
Puyallup WA 98372

Rationale: Biodegradable. Readily available, but not easy to hand fill. Not perfectly satisfied; have yet to come up with a better option.

3) Bag fill
1) reject rock material composed of sand and gravel
2) crushed rock-1/2 in. minus. Both obtained from county pit.
Rationale: Readily available. Reject material was inexpensive, but significantly clouds visibility when dropped into water. For this reason, we have switched to the crushed rock. Far superior results.

4) Woven landscape fabric-Typar Premium Landscape Fabric, spun polypropylene, 3 1/2 oz/yd². Rolls 151 inches by 300 ft. (See ATTACHMENT ??? for full specifications)
Cost:$261.89 plus tax per roll (probably could have been found elsewhere more cheaply, but this was convenient)
Purchased from: Clallam Cooperative Association, Inc.
Po Box 608
Sequim WA 98362

5) Rollers-PVC conduit-2 1/2 in. diameter by 10ft. cost: $9.51 plus tax
   PVC coupling-2 1/2 in. cost: $1.80 plus tax
   All purpose cement-small can cost: $3.80 plus tax
Purchased from: Thurman Supply
1807 East Front Street
Port Angeles, WA 98362

6) Cutting equipment-Sharp scissors, knife, dive knife

7) Measuring equipment-100 ft roll measuring tape(s)-useful to have two, one for divers, one on surface to measure fabric.

8) Rebar-straight-2 ft X 1/4 in. Cost: 50 cent/ea purchased at Home Depot
We are considering L shaped rebar to pin fabric in the future.
SECTION THREE—VOLUNTEER EVENTS
Day Long Pull Events

Recruitment
Steering committee members assist with boater recruitment and potluck arrangements in advance. The local dive shop and the program coordinator recruit most of the divers throughout the season. Several days before an event, the Committee meets to discuss event arrangements and gaps.

Team Schedule
The day before an event a team schedule is finalized. The schedule names all team members, assigns a morning and an afternoon lake section, and provides instructions about which end to start on, what to expect or look for or anything of special concern. Teams are assembled based on sign-up, experience, and compatibility. The ideal team consists of 2 divers, a motorized boat operator to transport dive team and equipment, and at least one non-motorized boat operator to skim fragments, collect pulled milfoil, provide clean goody bags, document activity, and protect divers from boating hazards. No matter how organized we are, there are always last minute changes to this schedule!

In addition to divers and boater, other volunteers help with set up, clean up, event paperwork, lunch arrangements and last minute details. It is this kind of support that makes the day run smoothly.
Sign-in
All volunteers sign in at the beginning of the event. Each is required to sign out at the end of the day. Based on whether they were divers or boaters/other, volunteers receive a packet containing a liability waiver, safety procedures, pull information and team schedule. Volunteers sign waivers acknowledging that they have read and understood the safety procedures (by signing at the bottom). These documents are collected and filed.

Orientation
Begins with introductions, then team members are assembled. Each volunteer is given a dive schedule which details where to go and any special instructions. We discuss how the lake has been sectioned and how to identify each section. We review safety procedures and phone numbers, milfoil pulling and reporting instructions, and the time to come back for lunch. Teams are then directed to collect all necessary equipment and begin their assignments. All divers should have already attended at least one training session and had their equipment approved.
Team Supplies
Each team receives a section packet marked with the section number where they are scheduled to dive. The packet is marked with the emergency cell number at the main staging area. Section Packets contain laminated map of entire lake, laminated map of specific section, milfoil identification sheet, safety and dive tips, survey sheet, erasable marker for marking on maps, pen, aquatic permit, and milfoil brochure with season long calendars.

Safety procedures
Volunteers were given a safety sheet that they were required to review, sign and return for documentation. The sheet included information about team member roles, emergency procedures and phone numbers.

Equipment
- 2 walkie talkies wrapped in plastic ziplock bags (batteries are changed after every event)
- At least 1 fine meshed, skim net—either long handled or short depending on the type of boat or preference of handler
- Garbage sacks and bucket
- Dive flag (attached to boat tending divers)
- 2 goody bags (to collect milfoil)
- Stakes (to mark new infestations)
Break
At lunch, divers return to report, eat, and prepare gear for afternoon dive. Lunch is provided by various home owners associations or other individuals.

The program coordinator makes sure to speak with each team to listen to reports, take care of any concerns and fine tune afternoon assignments.

Some take the opportunity to rest.
Wrap-up
Teams sign out at the end of the day and return equipment.

Everyone who participates receives a certificate of appreciation and a Milfoil Marauder pin. Divers additionally receive a certificate that they have completed an Introduction to Non-native Freshwater Plant Species Class. Those volunteers who participate in two day long events in one season also receive Weed Warrior mugs. Those who participate in all three day long events receive Weed Warrior T-shirts. People really love the T-shirts and work hard to get them.

Milfoil that has been collected is disposed of in dumpsters.
SECTION FOUR-LMD INFORMATION
In the spring of 2004, the Steering Committee met to discuss the future of the milfoil control program and financing options. Grant funding was nearly exhausted and there was no money available in the County's general fund. No other grant opportunities were available to sustain the current, low cost volunteer program. Forming a Lake Management District at Lake Sutherland appeared to be the only viable, stable funding option to allow control efforts to continue.

Committee members wanted to be able to use remaining grant funds to cover the costs to get an LMD established. To that end, we began the long process outlined in Chapter 36.61 of the Revised Code of Washington. We are extremely grateful to Thurston County for producing the very useful the manual titled "Forming a Lake Management District: Guidelines and Policies for Thurston County". We used many of the forms as templates.

Some residents were concerned that forming the LMD to fund milfoil control would be just the beginning of increased government interference and regulation. Although the Committee crafted a bare bones budget, many property owners feared escalating assessments. Therefore the scope of the LMD was very strictly limited to milfoil control activities. Additionally, the original Steering Committee decided to seek only a five year LMD term, although ten years is allowed. After five years, property owners would get another opportunity to see if we were doing exactly as we promised.

We are just beginning our third year of operations out of the five authorized under the current LMD.

**Timeline**

- June 1-A packet containing a letter of explanation, a 2004 milfoil activity calendar, contact information for all committee members, a petition to create an LMD, an LMD formation process sheet, and an LMD fact sheet was sent to all lake landowners.
- June 22-Having received enough petition signatures, the Board of Clallam Commissioners (BOCC) passes a resolution to initiate the LMD process and sets a hearing date. The Departments of Ecology, Fish and Wildlife and Natural Resources and the Office of Financial Management are notified of the hearing in writing.
- July 8-All landowners are notified of the LMD public hearing on July 27. The BOCC publishes the notice twice in the Peninsula Daily News, our paper of record.
• July 27-At a crowded hearing, Kathy Hamel, the leading state expert, answers questions and testifies about milfoil in Lake Sutherland. The BOCC finds that forming a LMD is in the public interest and the proposed assessment is feasible. Ballots and ballot instructions are sent to each landowner. Ballots must be returned by August 27.

• July 28-The Steering Committee sends out a packet with a letter about the upcoming vote, a FAQ sheet, and another LMD process sheet, (so landowners can see where we are in the process).

• August 27-County officials count ballots and issue a press release that the vote has passed 56.4% to 43.6%.

• September 13-The BOCC reviews the proposed ordinance for Lake Sutherland Management District 2 and sets a public hearing date. One unusual stipulation that the Coordinator felt was absolutely essential was to officially appoint and recognize a volunteer steering committee to represent lake owners from geographic areas around the lake. Although ten seats are asked for to accommodate the number that have already been serving, the Commissioners will only allow a seven seat committee.

• October 19-Ordinance 763 is adopted by the BOCC, and sets a hearing date for objections to the roll of rates and charges. A hearing notice is published in the Peninsula Daily News.

• November 15-Each landowner is notified that the ordinance has been adopted and that a hearing has been set to consider objections. Landowners are provided with instructions and a form for objections.

• November 16-BOCC pass resolution setting a hearing date for objections to the roll of rates and charges

• November 30-The Commissioners solicit volunteer applications to serve on the Lake Sutherland Steering Committee.

• December 7-BOCC considers holds a hearing to consider objections and adopts roll of parcels.

• December 14-A copy of the roll is submitted to the County Treasurer.

• December 22-The BOCC sends a letter to all those who objected to being placed on the LMD the roll. For those who were not present, the letter informs them of the hearing decision.

• December 29-Each landowner whose property will be subject to an assessment under LMD 2 is sent a notice to that effect.

• February 15-BOCC officially appoints seven committee members and three alternates to the Steering Committee to serve until 2009, at which time the current LMD will expire.

• February 28-The Steering Committee meets officially, adopts by-laws, and elects officers. Each is given a binder containing laws relating to the formation of an LMD, copies of all resolutions and ordinances related to the creation of LMD 2, a copy of the by-laws, a copy of county policy relating to volunteer boards, the proposed 2005 budget, and contact information for all steering committee members.
Appendix A – Program Development

- Early infestation Grant
- Bathymetric map of Lake Sutherland
- 2004 Lake Sutherland milfoil infestation map
- Permission Form to use Fisher Cover Campsite (2000)
- Thank you letters to K.O Erickson Trust & County Sheriff’s Department (2000)
- Packet containing letter announcing public meeting, lake use survey, and milfoil flyer (2001)
- Sample permission form to place section signs on docks
- Sample memo to original Steering Committee (2001)
- Sample minutes (2001)
- Landowner letter with fall progress report (2001)
- Volunteer thank you letter (2001)
- Landowner letter announcing public meeting and control calendar
- Volunteer flyer (2001)
- Completed survey sheets (2002)
- Sample milfoil brochure (2006)
Appendix B—Volunteer Events

- Sample sign-in sheet
- Sample boater/other volunteer packet-agreement, safety sheet, time sheet
- Sample diver packet-liability release agreement, safety sheet, time sheet
- Sample Team Schedule
- Survey /ID tip sheet
- Survey sheet
- Weed Warrior certificate
- Diver training certificate
- Cover of Aquatic permit
- Sample section map
- Sample whole lake map
Appendix C - Media

- Photo Peninsula Daily News, (article, missing) 2001
- “Sutherland residents fight pesky water weed”-(PDN 2003)
- “Sutherland residents may tax selves over lake pest, Lake: Source probed” (PDN, 2004)
- Letters to the editor (PDN, 2004) Save Lake Sutherland, For Milfoil district
- “State against herbicide use in Sutherland-Lake milfoil control grant expires soon” (PDN, 2004)
- Letters to editor (PDN, 2004) Milfoil Issues, Milfoil Vote
- “Water district goes to vote” (PDN 2004)
- “Sutherland residents OK tax district” (PDN, 2004)
- Clallam approves lake district to tackle weed (PDN, 2004)
Appendix D—Lake Sutherland Management District

- Cover sheet to Thurston County LMD manual “Forming a Lake Management District”
- Letter and packet to landowners containing LMD petition, process, and flyer
- Resolution declaring intent to establish LMD and hold public hearing
- Letter and hearing notice to landowners about intent to begin LMD process (also notices as required to DOE, OFM, WDF&W, and DNR)
- Supplemental information prepared for public hearing
- Map of LMD boundary
- Resolution to submit establishment of LMD to vote of property owners
- Sample ballot and ballot instructions
- Letter, FAQ sheet, and LMD process flyer from Lake Sutherland Steering Committee to all landowners—a blank request form for more information included
- Sample of response to request form
- Press release from BOCC that vote has passed
- Copy of County Ordinance 763—Lake Sutherland Management District 2 and attachment A—map
- Notice of election results and hearing date for roll objections, also objection form
- Sample of published public notice
- Resolution calling for hearing for roll objections
- Resolution confirming and approving roll of rates and charges
- Sample landowner notice for objection hearing
- Summary of submitted objections and staff evaluations
- Letter from BOCC in regard to decision to landowner objection
- Notice of confirmation of assessment roll
Appendix E—Lake Sutherland Management
District Steering Committee

- Applications for LSMDSC (10)
- Minutes from first official LSMDSC (2005)
- By-Laws of the LSMDSC
- Weed Board letter to BOCC requesting start-up fund transfer
- Sample Agenda (Jan-2006)
- Sample Agenda (May-2006)
- Newsletters 1,2,3,4 (2005-2006)