Davis Lake
Integrated Aquatic Plant Management Plan

Prepared for the Davis Lake Landholders Association, Inc.

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Executive Summary

Davis Lake is an important recreational and residential lake located in rural Pend Oreille County north of Sacheen Lake and south of Cusick, WA on Highway 211. The lake is 150 surface acres and is deep, up to 150 feet. The lake is classified as oligo-mesotrophic and has a high quality natural wetland associated with it. It supports swimming, fishing, boating, nature observation and aesthetic enjoyment for the visitors and residents. There is a Fish and Wildlife access with a concrete boat ramp and a private Christian retreat (summer camp) located on the lake. In addition, there are approximately 45 summer cabins or residential homes located along the shoreline.

Eurasian watermilfoil was first found in Davis Lake in 1995 and has drawn much concern from the property owners association, the Davis Lake Landowners Association (DLLA). Much effort has been spent on trying to eliminate this invasive noxious aquatic plant. Previous control methods included installing a bottom barrier, hand-pulling and applying the aquatic herbicide, 2,4-D to surveyed areas with known infestations. The efforts to date have not been successful in eradicating the plant but have kept the levels of milfoil under control without deleterious effects to the beneficial uses of the lake.

This document shows the body of knowledge and development of a long range plan for eradicating or at least controlling milfoil levels is this lake. The various control strategies available are discussed and the action plan specific for Davis Lake has been developed. The resulting management plan can be summarized as follows:

Each spring, conduct a plant survey to determine the level of milfoil present in the shallow areas of the lake. Determine if hand-pulling, bottom barriers or herbicide treatment is appropriate for each area that the milfoil is found. Carry out the activity that has been defined for each area and then do a follow-up survey in late summer to determine the effectiveness of the control strategy. All permitting and environment regulations will be followed. Additional control methods by individual landowners may be noted through the DLLA in an effort to keep accurate records for future revisions to this document.

The cost of this control strategy will be through private donations and possibly public assistance through a grant proposal. Environmental and private concerns of the land owners will determine if changes are necessary. Future considerations for other control methods may be determined as some experimental methods or newer technologies become available.

Davis Lake
Integrated Aquatic Vegetation Management Plan

Introduction:

Davis Lake is a deep water lake located in rural Pend Oreille County. The lake is used for recreation by the summer and permanent residents of the Davis Lake residential community, by campers and visitors at Camp Spalding, and people using the public access, see Figure 1. While the lake is very deep and steep-sided, it also has areas of shallow water that supports submersed vegetation. This native vegetation did not interfere with recreation or other uses of the lake prior to the invasion of Eurasian watermilfoil (*Myriophyllum spicatum*). Milfoil was first identified in the lake in 1995 and by the next year the lake community reported that it was significantly interfering with recreational pursuits. The community determined that action needed to be taken. Using a small Washington Department of Ecology Aquatic Weeds grant and private contributions to fund the effort, milfoil was hand pulled, bottom barriers were installed, and the lake was treated with the selective herbicide 2,4-D. The infestation has proven difficult to control with the community resources. Significant milfoil remains, even after these efforts, and the lake community wishes to continue to use aquatic herbicides to keep milfoil from reaching infestation levels. This is particularly important since many children swim and boat in the lake at the summer camps at Camp Spalding.

Since the lake is being treated with aquatic herbicides under the Noxious Weed National Pollutant Discharge Elimination System (NPDES) permit, there is a need to develop an Integrated Aquatic Plant Management Plan (IAPMP) for long-term control of noxious aquatic plants. The permit provisions call for a site-specific plan to be developed after the second season of herbicide treatment under this permit. In addition to being a regulatory requirement, developing a plan allows community input, examines the best management options to achieve lake management goals, and educates the community about aquatic plant and lake issues.

I. Develop a Problem Statement

The state-listed noxious weed Eurasian Milfoil (*Myriophyllum spicatum*) was first discovered in Davis Lake in 1995. Although Davis Lake is very deep and steeply-sided in places, there are also shallow areas that allow for the establishment of milfoil. In lakes like Davis Lake which have generally high quality water with good clarity, milfoil can grow to 20 feet or more. While much of the lake is too deep to provide habitat for milfoil, the shallow areas tend to be where the houses are located, and milfoil causes the greatest impact there. There are also shallow areas around Camp Spalding. The lake community is concerned about the loss of recreation and aesthetics, and fears for the safety of swimmers. The actions taken by the lake group since milfoil's discovery have suppressed the growth of milfoil and kept it under control. However, without continual management, milfoil is likely to increase to infestation levels. The lake community desires to eradicate milfoil or, if this proves impossible, to maintain the infestation at low levels such that recreational activities like swimming, boating, and fishing may be enjoyed safely by the community during the summer months. Further, by controlling the growth of milfoil, this will help prevent milfoil from being transported out of Davis Lake on boat trailers. The community is small with few people to provide funding for management efforts. Therefore cost-effectiveness of the management methods is very much a consideration in developing a plan.

II. Describe Past Management Efforts (see Figure 2)

1995: Milfoil was discovered in Davis Lake in 1995 and was confirmed as Eurasian watermilfoil by DNA analysis performed by the University of Minnesota laboratory. At that time a preliminary boat survey of the littoral zone found two small, but well established milfoil beds along with scattered plants around the lake.

1998: The Davis Lake Landholder's Association, Inc. funded a survey and a hand pulling effort performed by Dave Lamb, an aquatic biologist with Resource Management, Inc. He determined that the area of infestation was moderate in front of a mix of summer and year-round homes at the north end of the lake and moderate to dense at the outlet. He also confirmed moderate infestations at the south end of the lake near Camp Spalding and in a nearby marshy area. The remaining milfoil infestation was generally light.

1999: The milfoil was treated with herbicide to remove milfoil.

2000: In 2000, Pend Oreille County was awarded a small grant ($5,000 total cost) to control the milfoil infestation on Davis Lake. Control methods included 2,4-D treatment, hand pulling, and installation of bottom barriers. At that time, engrossed Substitute Senate Bill 5424 allowed 2,4-D to be used to control a limited infestation of milfoil in lakes if the milfoil was limited to 20 percent or less of the lake's littoral zone. A community meeting was held on June 3, 2000 to discuss the anticipated herbicide application. Notice of the treatment was published in the Newport Miner on June 7 and June 14. The president of the lake association sent letters to member on June 5, 1999 and May 31, 2001 to inform them about the milfoil infestation and the proposed management actions.

The lake was treated with granular 2,4-D. On June 13, 2000, three-acres were treated with Navigate at the rate of 100 pounds per acre. A bottom barrier was installed in the outlet in 2002. A September 5 survey of the treated areas showed that only sparsely populated infestations were found in the treated sites, except that the infestation at the outlet remained dense and healthy. The patch in the marshy area at the south end of the lake that was not treated remained healthy.

2001: A court decision required that all pesticide applications be conducted under a National Pollutant Discharge Elimination System (NPDES) permit. Ecology informed their grant recipients that grant dollars could not be spent on any herbicide treatment until an NPDES permit was developed.

2002-2004: The Davis Lake Landholder's Association, Inc. used their own funds to continue treating the milfoil-infested areas with granular 2,4-D.

2004: Two acres were treated with granular 2,4-D.

III. Define Management Goals

The management goal for the Davis Lake Landholder's Association, Inc. is to continue to work toward the eradication of the state-listed noxious weed milfoil from Davis Lake. The Davis Lake Landholder's Association realizes that eradication may not be possible, but the intent is to control the growth and spread of milfoil to allow for safe swimming, boating, and fishing on the lake. The Davis Lake Landholder's Association is committed to carrying out its efforts to meet its goal in an environmentally sensitive way.

IV. List Water Body and Watershed Characteristics

Watershed Characteristics

The Davis Lake watershed is located entirely within Pend Oreille County, WA, in Water Resource Inventory Area #62. The watershed drainage area for Davis Lake is 17.8 square miles. The land use in the watershed (based on 1974 USGS data) is largely unproductive forest land. About four percent of the watershed was considered agricultural. Less than one percent of the watershed is suburban residential. An assessment of Davis Lake made in 1973 showed the number of near-shore homes at 45. (Data from the United State Geologic Survey (USGS) Information on Washington Lakes) Most of these homes are seasonally occupied summer cabins. There are 22 residents who live on the lake full time. There is also a religious retreat and summer camp facility located on the shore of the lake with both cabins and a 80 unit hotel.
Potential non-point pollutant sources include: residential runoff.

Waterbody Characteristics

Davis Lake is a deep 150-acre lake located in rural Pend Oreille County (Township 32N, Range 44E 31) in the Pend Oreille Basin. Davis Lake is a mountainous region (ecoregion is the Rocky Mountains) at an elevation of 2,178 feet. Davis Lake has one inlet – Davis Creek which flows into the southern end of the lake and one outlet – Davis Creek which flows from the north end of the lake. The outflowing Davis Creek eventually forms the Davis Slough which flows into the Pend Oreille River. The Pend Oreille River and its habitat has been severely altered by the construction of dams on the Columbia River and on the Pend Oreille River itself. Inflowing Davis Creek is formed when two tributaries (Deer Creek and an unnamed stream) which originate in the mountains converge to form Davis Creek.

Davis Lake has 2.7 miles of shoreline, the mean depth is 83 feet, the maximum depth is 150 feet, and the lake volume is 13,000 acre feet. Shallow areas at the south and southwest ends of the lake support macrophyte growth. Much of the lake is steep-sided with little habitat for plant growth. The lake level is natural, with no controlling structures. The entire eastern shoreline is sand and gravel road fill. Davis Lake is classified as oligo-mesotrophic by the Department of Ecology based on the relatively deep Secchi depths, the low chlorophyll concentrations and the moderate phosphorous concentrations detected in the water column. A search of the Department of Natural Resources site for the presence of high quality natural wetland shows that Davis Lake has quality wetlands associated with it.

Davis Lake supports significant public uses. The lake has public access at the north end of the lake though a Fish and Wildlife access which has a concrete boat ramp. The posted speed limit on the lake is 5 miles per hours. The lake is used for boating, fishing, swimming, nature

observation, and aesthetic enjoyment. There is a private Christian retreat, conference center, and summer camp (Camp Spalding and Clearwater Lodge) located on 485-acres at the south end of the lake. This facility sponsors summer activities including swimming and canoeing for youngsters and their families. It is used extensively for education, training, and enjoyment of the lake. Individual family residences are located at the north end of the lake.

Wetlands: A search of the Department of Natural Resources Natural Heritage Program website for the township and range of Davis Lake showed that high quality heritage wetlands were reported from this location. Staff at the Natural Heritage Program has been requested to search their database for the presence of any rare plants in Davis Lake (data pending).

Threatened and Endangered Species: Bull trout: A Stream Net map showed that bull trout were presumed to have once utilized Davis Creek, but are likely not present now. A report produced for Bonneville Power Administration in the 90's indicated that the bull trout production potential of the tributaries to the Pend Oreille River is limited. The report states that spawning habitat in most tributaries is of good quality; however the streams are high gradient and low order which are typically unproductive.

Water Rights: The list of property owners that have water rights will be obtained through the Pend Oreille County records and kept for future reference. The previous treatments have not had to supply drinking water to any residents and there have been no complaints from those who do use the water from the lake for irrigation.

Water Quality: The water quality data is from a study made by the USGS in 1973 and is attached to this plan. At that time emergent aquatic plants were found at the south end of the lake, but there were very few submersed species observed in the lake. The dissolved oxygen levels were high throughout the water column. Water quality data from 1973 indicate relatively good water quality with phosphorus levels of 17 ug/l at a depth of three feet and 16 ug/l at a depth of 131 feet. Results from sampling conducted by Ecology in 1995 are presented below:

LABORATORY RESULTS

Date	Strata	Turbidity (NTU)	Total Suspended Solids (mg/L)	Total Phosphorus Non-Volatile (ug/L)	Total Nitrogen (mg/L)	Color (Pt-Co)	Chlorophyll (ug/L)	Fecal Col. Bacteria (colonies/100 mL) Site 1	Site 2
STATION 1									
95/05/17	E		15		0.21		2.9	1	2
95/05/17	H		9		0.17				
95/08/23	E		14		0.22		0.5U	3	2
95/08/23	H		16		0.19				

E=epilimnion composite, H=hypolimnion composite. Remarks codes: U = Below detection limits; J = Estimate.

Ecology classifies Davis Lake as oligo-mesotrophic.

Wildlife Usage of the Waterbody: The following is a list of wildlife reported from the Sacheen Lake Plan written by Dave Lamb. Since Sacheen Lake is within a few miles of Davis Lake it is likely that the same wildlife found in those areas are also found in the Davis Lake area.

MAMMALS COMMON TO THE STUDY AREA:

Beaver	Red squirrel
Muskrat	Northern flying squirrel
Mink	Least chipmunk
Ermine	Yellow pine chipmunk
Long-tailed weasel	Black bear
Raccoon	White tailed deer
Porcupine	Coyote
Striped skunk	Washington ground squirrel
Snowshoe hare	

Also: Bats, Mice, Moles & Voles

MAMMALS SEEN INFREQUENTLY:

Moose	Mountain lion
Bobcat	

OTHER SPECIES SEEN IN STUDY AREA:

Frogs	Bull frogs	Toads	Turtles
Garter snakes	Rubber boas	Salamanders	Crawdads

BIRDS COMMON TO THE STUDY AREA:

Great Blue heron	Canada Goose
Red-necked grebe	Mallard
Wood duck	Canvasback
Green-winged teal	Pintail
Redhead	American coot
Common goldeneye	Bufflehead
Osprey	Red-tailed hawk
Coopers hawk	American kestrel
American Bald eagle	Great horned owl
Western gull	Killdeer
Belted kingfisher	Common nighthawk
Ruffed grouse	Spruce grouse
Blue grouse	Pileated woodpecker
Common flicker	Red-breasted nuthatch
Violet-green swallow	Tree swallow

Calliope hummingbird	Allens hummingbird
Red-winged blackbird	Yellow-headed blackbird
American crow	American robin
Steller's jay	Gray jay
Mountain chickadee	Black-capped chickadee
Oregon junco	American goldfinch
Varied thrush	Cedar waxwing
Western bluebird	Black-billed magpie
Western meadowlark	Winter wren
Sparrows	Evening grossbeak

Fish Usage of the Waterbody: The fish data from Davis Lake are taken from www.washingtonlakes.com

- Large mouth bass
- Bluegill
- Perch
- Crappie
- Kokanee
- Rainbow Trout
- Eastern Brook Trout

V. List the Beneficial Uses of the Water Body and Develop a Beneficial Use Map for the Water Body

Davis Lake is used by the community residents and the public for swimming, boating, and fishing. The lake has a speed limit of five miles per hour so water skiing is not allowed. Davis Lake has a Fish and Wildlife boat launch located on the northeast shore. The lake is enjoyed by residents for wildlife viewing and aesthetics. The lake provides habitat for waterfowl, warm water fish, trout, kokanee, and mammals.

VI. Map Aquatic Plants

Davis Lake has been surveyed by the private contractor prior to the herbicide treatment each year. During this survey, milfoil locations are delineated for treatment. In addition the Washington Department of Ecology has surveyed the lake for aquatic plants in 1994, 1996, and 1997. The lake supports a diverse native plant community, including two nonnative milfoils. Recently hybrid milfoils have been discovered in Washington. With three species of milfoil in Davis Lake, it is possible that hybrid milfoils may occur as well. No one is sure whether hybrids will be invasive or not or will vary depending on parentage.

Table 1 – List of plant species found in Davis Lake. The table is from the Department of Ecology's freshwater plant database.

species	date	DV[1]	source[2]	comment
Brasenia schreberi	8/2/1994	2	Ecology	at south end
"	8/12/1997	3	Ecology, P-O Co NWCB	

Ceratophyllum demersum	8/12/1997	2	"	
Chara sp.	8/2/1994	2	Ecology	
"	7/30/1996	2	"	
Elodea canadensis	8/2/1994	2	"	
"	7/30/1996	2	"	
"	8/12/1997	2	Ecology, P-O Co NWCB	
Juncus sp. or Eleocharis sp.	7/30/1996	2	Ecology	in rocky shallows
Megalodonta beckii	8/2/1994	2	"	in most areas with plants
"	7/30/1996	1	"	
"	8/12/1997	1	Ecology, P-O Co NWCB	mostly fragments
Myriophyllum sibiricum	8/2/1994	2	Ecology	
Myriophyllum sp.	8/2/1994	2	"	
"	7/30/1996	2	"	M. hippuroides?
Myriophyllum spicatum	7/30/1996	2	"	seen in 2 sample areas at N end, not dominant
"	8/12/1997	2	Ecology, P-O Co NWCB	dense patches at N end
Myriophyllum verticillatum	8/12/1997	2	"	at south end, blooming
Najas flexilis	8/2/1994	2	Ecology	
"	7/30/1996	2	"	
Nuphar polysepala	8/2/1994	2	"	thick at south end
"	7/30/1996	2	"	
"	8/12/1997	2	Ecology, P-O Co NWCB	mostly at south end
Potamogeton amplifolius	8/2/1994	2	Ecology	
"	7/30/1996	3	"	dominant submersed plant
"	8/12/1997	3	Ecology, P-O Co NWCB	
Potamogeton foliosus	8/2/1994	2	Ecology	
Potamogeton gramineus	8/2/1994	1	"	near summer camp
"	7/30/1996	1	"	
"	8/12/1997	3	Ecology, P-O Co NWCB	
Potamogeton pusillus	8/2/1994	2	Ecology	
Potamogeton robbinsii	8/2/1994	2	"	to 5 m deep
"	7/30/1996	1	"	
"	8/12/1997	2	Ecology, P-O Co NWCB	
Potamogeton zosteriformis	8/2/1994	2	Ecology	
"	8/12/1997	2	Ecology, P-O Co NWCB	
Potentilla palustris	7/30/1996	1	Ecology	
"	8/12/1997	1	Ecology, P-O Co NWCB	
Ruppia cirrhosa	8/2/1994	1	Ecology	
Schoenoplectus acutus	8/2/1994	2	"	in monospecific patches
Scirpus microcarpus	8/2/1994	1	"	patch along shore
Typha sp.	8/2/1994	2	"	
unknown plant	8/2/1994	2	"	
Utricularia sp.	7/30/1996	1	"	
Utricularia vulgaris	8/2/1994	2	"	seen in 2 areas
"	8/12/1997	2	Ecology, P-O Co NWCB	

1. "DV" (distribution value) is an estimate of density: 1 - few plants in only 1 or a few locations; 2 - few plants, but with a wide patchy distribution; 3 - plants growing in large patches, codominant with other plants; 4 - plants in nearly

monospecific patches, dominant; and 5 - thick growth covering the substrate at the exclusion of other species.
2. "Source" is the organization that provided the data. "Ecology" refers to the Washington State Department of Ecology.

Characterize Aquatic Plants: Native aquatic plants are not considered to be a problem by the Davis Lake community. Prior to the milfoil infestation, no aquatic plant control activities took place. The major problem species in Davis Lake – milfoil is characterized below:

Eurasian watermilfoil: Eurasian watermilfoil (*Myriophyllum spicatum*) is an attractive plant with feathery underwater foliage. Eurasian watermilfoil, hereafter called milfoil, originates from Europe and Asia, but was introduced to North America many years ago and is now found over much of the United States. Milfoil has been spread from lake to lake on boat trailers. Because it is widely distributed and difficult to control, milfoil is considered to be the most problematic plant in Washington. The introduction of milfoil can drastically alter a water body's ecology. Milfoil forms very dense mats of vegetation on the surface of the water. These mats interfere with recreational activities such as swimming, fishing, water skiing, and boating. The sheer mass of plants can cause flooding and the stagnant mats can create good habitat for mosquitoes. Milfoil mats can rob oxygen from the water by preventing the wind from mixing the oxygenated surface waters to deeper water. The dense mats of vegetation can also increase the sedimentation rate by trapping sediments. Milfoil also starts spring growth sooner than native aquatic plants and can shade out these beneficial plants. When milfoil invades new territory, typically the species diversity of aquatic plants declines. While some species of waterfowl will eat milfoil, it is not considered to be a good food source.

Milfoil reproduces extremely rapidly and can infest an entire lake within two years of introduction to the system. Although milfoil produces many seeds, Ecology staff does not believe that these seeds are important for milfoil reproduction in Washington waters. However, milfoil is able to reproduce very successfully and rapidly through the formation of plant fragments. In the late summer and fall the plants become brittle and naturally break apart. These fragments will float to other areas, sink, and start new plants. Milfoil will also grow from fragments created by boaters or other disturbances during any time of year. A new plant can start from a tiny piece of a milfoil plant. This is why milfoil can so easily be transported from lake to lake on boat trailers or fishing gear. Once established in its new home, water currents may carry milfoil fragments and start new colonies within the same waterbody or downstream.

Once milfoil becomes well-established within a waterbody, it is difficult or impossible to remove. In smaller waterbodies (350-acres or less), Ecology has had some limited success using the aquatic herbicide Sonar™ to remove milfoil. 2,4-D and triclopyr are selective herbicides also used to control pioneering milfoil infestations. Other control methods include: Harvesting, rotovation (underwater rototilling), installation of bottom barriers, diver hand pulling, diver dredging, and in some very limited situations the use of triploid (sterile) grass carp. Ecology is investigating other biological controls such as the milfoil weevil, but the milfoil weevil is still considered experimental. The management of milfoil costs the state and private individual's up-to-one million dollars per year (The information on milfoil is from the Washington Department of Ecology website http://www.ecy.wa.gov/programs/wq/plants/weeds/milfoil.html).

VII. Identify the Aquatic Plant Control Alternatives, Their Effectiveness, Environmental Impacts, Human Health Risks, and Costs

The information about the control methods was taken from the Washington Department of Ecology's Aquatic Plant Website at:
http://www.ecy.wa.gov/programs/wq/plants/management/index.html

No action
Taking no management action is not considered acceptable to the Davis Lake Community. Taking no action would mean that within a few years milfoil would dominate the shallow areas of the lake, displacing native species and interfering with swimming, boating, and fishing. It is necessary to continue management to ensure that milfoil will not reach the density and distribution that will impact the beneficial uses of Davis Lake.

The following sections describe each control method and then a decision is made whether each method is applicable to be used in Davis Lake to meet the goals of this plan.

Nutrient Reduction Alternative (information from the Spring Lake IAVMP Page 59)
"In lakes in watersheds with identifiable sources of excess nutrients, a program to reduce nutrients entering the lake could possibly be an effective method of controlling aquatic vegetation. Sources of excessive nutrients might include failing septic tanks, other accidental or planned wastewater effluent, or runoff from agricultural lands. If nutrient reductions were enacted as the primary method of weed control, extensive research would be necessary to determine the current nutrient budget for the lake and surrounding watershed, whether nutrient reduction would result in milfoil reduction, and to identify and mitigate the natural and human-mediated nutrient sources."

Suitability for Davis Lake
Adapted from the Spring Lake Plan - "Nutrient reduction measures are not likely to be an effective control on milfoil. Milfoil has the ability to live in various environmental conditions; it can withstand a broad range of aquatic environments, from oligotrophic to eutrophic waters, and it grows in water depths from as shallow as 0.5 meters to as deep as 8 meters. It also can grow in substrates ranging from poor, sandy sediment to highly organic soils and can survive in wide ranges of salinity, pH, and temperature conditions (Aiken et al., 1979; Nichols and Shaw, 1986; Smith Barko, 1990, as cited in Sheldon and Creed, 1995). While water quality improvements would likely result if each watershed resident reduced or eliminated sources of nutrient input to the lake, this would not be likely to be an effective primary method of controlling aquatic weeds. Nutrients in the sediments would be more likely to have an impact, since milfoil and other targeted aquatic weed species obtain more than 85% of their nutrients from the sediment (Jonathan Frodge, pers. comm. 2003). Such an effort would be beyond the scope of any project that could be undertaken at Davis Lake."

Manual Methods: Hand Pulling: Hand-pulling aquatic plants is similar to pulling weeds out of a garden. It involves removing entire plants (leaves, stems, and roots) from the area of concern and disposing of them in an area away from the shoreline. In water less than three feet deep no

specialized equipment is required, although a spade, trowel, or long knife may be needed if the sediment is packed or heavy. In deeper water, hand pulling is best accomplished by divers with SCUBA equipment and mesh bags for the collection of plant fragments. Sometimes divers use gold dredges as a disposal method for the pulled plants. These plants are sucked into a hose where they are deposited into a sieve in a support boat. The plants are retained and the water is returned to the water body. As long as the divers do not actually remove sediment, this activity is not considered dredging (which triggers a set of difficult to acquire permits). Using the dredge as a plant conveyance system can speed up the pulling process.

Some sites may not be suitable for hand pulling such as areas where deep flocculent sediments may cause a person hand pulling to sink deeply into the sediment. When hand pulling milfoil, special care must be taken to not create fragments and if fragments are present, to remove any fragments from the water immediately.

Cutting: Cutting differs from hand pulling in that plants are cut using a tool and the roots are not removed. Cutting is performed by standing on a dock or on shore and throwing a cutting tool into the water. A non-mechanical aquatic weed cutter is commercially available. Two single-sided stainless steel blades (razor sharp) forming a "V" shape are connected to a handle which is tied to a long rope. The cutter can be thrown about 20 - 30 feet into the water. As the cutter is pulled through the water, it cuts a 48-inch wide swath. Cut plants rise to the surface where they can be removed. The stainless steel blades that form the V are extremely sharp and great care must be taken with this implement. It should be stored in a secure area where children do not have access.

Raking: A sturdy rake makes a useful tool for removing aquatic plants. Attaching a rope to the rake allows removal of a greater area of weeds. Raking literally tears plants from the sediment, breaking some plants off and removing some roots as well. Specially designed aquatic plant rakes are available. Rakes can be equipped with floats to allow easier plant and fragment collection. The operator should pull towards the shore because a substantial weight of material can be collected in a short distance.

Manual methods create plant fragments. It's important to remove all fragments from the water to prevent them from re-rooting or drifting onshore. Fragments can root and form new plants. Plants and fragments can be composted or added directly to a garden.

Advantages

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

Disadvantages

- As plants regrow or recolonize the cleared area from fragments, the treatment may need to be repeated several times each summer.

- Because these methods are labor intensive, they may not be practical for large areas or for thick weed beds.
- Even with the best containment efforts, it is difficult to collect all plant fragments. Most aquatic plants can regrow from fragments.
- Some plants, like water lilies which have massive rhizomes, are difficult to remove by hand pulling.
- Pulling weeds and raking stirs up the sediment and makes it difficult to see remaining plants.
- Hand-pulling and raking disturbs bottom-dwelling animals.
- The V-shaped cutting tool is extremely sharp and must be only used with great care.

Permits
The Washington State Department of Fish and Wildlife requires a permit called a Hydraulic Project Approval for all activities taking place in the water including hand pulling, raking, and cutting of aquatic plants.

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

Suitability for Davis Lake: Hand pulling milfoil can be an effective method of removing individual plants after an herbicide treatment. However, due to expense and the time intensive nature of manual methods, sites suitable for hand pulling and bottom screening are limited to lakes or ponds only lightly infested with milfoil. To be cost-effective, generally the total amount of milfoil in the waterbody should be three-acres or less in area, if all the milfoil plants were grouped together in one location. If the infestation has advanced beyond this point, it is more effective to consider other eradication techniques such as aquatic herbicides.

A number of lake groups throughout Washington are using hand pulling to remove milfoil for early infestation projects or after 2,4-D treatment. Hand pulling could be an effective technique to use on individual milfoil plants that remain in Davis Lake. It does require very meticulous and conscientious divers to be used in lakes with good visibility. **Hand pulling is certainly an option for Davis Lake if the area and plant density are both small.** Hand pulling may be a very viable option after herbicide treatment has reduced milfoil populations to manageable levels. This is something that volunteers can do with little cost outlay.

Raking or cutting are not suitable techniques for the eradication of milfoil because too many fragments are produced and it is not possible to effectively remove all the fragments from the water column.

Environmental Manipulation Methods: Water Level Drawdown: Milfoil can sometimes effectively be controlled when waterbodies are dewatered by releasing water via a water level

control structure (dam or weir) or by pumping. The effectiveness of control is determined by several factors including the amount of the water body bottom exposed, duration of exposure, presence of springs, and the weather at the time of drawdown. The success or failure of drawdowns in controlling plants can be highly variable from lake to lake and from year to year within the same water body. The impacts of fluctuating water levels are severe on a natural water body so this activity rarely occurs solely for milfoil control in Washington.

Waterbodies suitable for water level drawdown are those with infestations of milfoil or other plants where drawdown occurs on a prolonged and regular basis. Because western Washington is so much wetter and milder than eastern Washington, drawdown is generally more successful in controlling eastern Washington milfoil populations. Since milfoil survives in deeper water, drawdowns will not eradicate milfoil from the waterbody. Generally waterbodies with fluctuating water levels such as reservoirs are highly perturbed systems. Factors to consider when evaluating water level drawdown as a possible control for milfoil include:

- Presence of an outlet structure or the means to lower the water level;
- Amount of waterbody bottom exposed at different water levels;
- Timing of water withdrawal and return;
- Climate;
- Potential impacts to surrounding wetlands/emergent plants;
- Sediment type;
- Shoreline development;
- Species dependent on near-shore habitat;
- Endangered species and/or rare plants; and
- Sensitive areas (critical habitat).
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Suitability of water level drawdown for Davis Lake: Davis Lake does not have a dam on it, so this is not considered and option at this time.

Installation of bottom barriers: Bottom barriers are semi-permanent materials that are laid over the top of plant beds and are analogous to using landscape fabric to suppress the growth of weeds in yards. In addition to controlling nuisance weeds around docks and in swimming beaches, bottom screening has become an important tool to help eradicate and contain early infestations of noxious weeds such as milfoil. Pioneering colonies that are too extensive to be hand pulled, can sometimes be covered with bottom screening material. For these projects, installers use burlap with rocks or burlap sandbags for anchors. By the time the material decomposes, the milfoil patches are dead as long as all plants were completely covered. Snohomish County staff reported native aquatic plants colonizing burlap areas that covered pioneering patches of milfoil. When using this technique for milfoil eradication projects, divers should recheck the barrier within a few weeks to make sure that all milfoil plants remain covered and that no new fragments have taken root nearby.

Bottom screens can be installed by the home owner or by a commercial plant control specialist. Installation is easier in early spring after ice out when plants before the plant start growing. Research has shown that much more gas is produced under bottom screens that are installed over the top of aquatic plants. The less plant material that is present before installing the screen, the

more successful the screen will be in staying in place. Bottom screens may also be attached to frames rather than placed directly onto the sediment. The frames may then be moved for control of a larger area.

Advantages

- Properly installed bottom screens can control up to 100 percent of aquatic plants.
- Screen materials are readily available and can be installed by homeowners or by divers.

Disadvantages

- Because bottom screens reduce habitat by covering the sediment, they are suitable only for localized control.
- For safety and performance reasons, bottom screens must be regularly inspected and maintained.
- Machinery, fishing gear, propeller backwash, or boat anchors may damage or dislodge bottom screens.
- Improperly anchored bottom screens may create safety hazards for boaters and swimmers.
- Swimmers may be injured by poorly maintained anchors used to pin bottom screens to the sediment.
- Some bottom screens are difficult to anchor on deep muck sediments.
- Bottom screens interfere with fish spawning and bottom-dwelling animals.
- Without regular maintenance aquatic plants may quickly colonize the bottom screen.

Permits

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

Costs

Barrier materials cost $0.22 to $1.25 per square foot. The cost of some commercial barriers includes an installation fee. Commercial installation costs vary depending on sediment characteristics and type of bottom screen selected. It costs up to about $750 to have 1,000 square feet of bottom screen installed.

Suitability of bottom barrier installation Davis Lake: **Bottom barriers are suitable for use in Davis Lake**. They can be installed by local residents to control plants around individual swimming areas or under boat docks. Barriers may also be installed in the camp swimming area to create a weed-free swimming area. Barriers could be used to control larger patches of milfoil remaining after herbicide treatment. Bottom barriers have been used in the past by the Davis Lake Community and may be reconsidered in the future if the areas of re-growing plants are defined and limited.

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

including:

- Battery operated weed cutters
- Portable, boat-mounted cutting units
- Specialized barge-like cutting machines

Cutting is generally performed during the summer when plants are near the surface. All cut plants must be removed from the water body and this can be difficult and time consuming since the cutting machines have no mechanism to collect the plants mechanically.

Harvesting: Mechanical harvesters are large machines which both cut and collect aquatic plants. Cut plants are removed from the water by a conveyor belt system and stored on the harvester until disposal. A barge may be stationed near the harvesting site for temporary plant storage or the harvester carries the cut weeds to shore. The shore station equipment is usually a shore conveyor that mates to the harvester and lifts the cut plants into a dump truck. Harvested weeds are disposed of in landfills, used as compost, or in reclaiming spent gravel pits or similar sites. Harvesting is usually performed in late spring, summer, and early fall when aquatic plants have reached or are close to the water's surface. Harvesters can cut and collect several acres per day depending on weed type, plant density, and storage capacity of the equipment. Harvesting speeds for typical machines range from 0.5 to 1.5 acres per hour. Depending on the equipment used, the plants are cut from five to ten feet below the water's surface in a swath 6 to 20 feet wide. Some modern harvesters can cut plants in a range of water depths. Because of machine size and high costs, harvesting is most efficient in lakes larger than a few acres. Harvesting can be an excellent way to create open areas of water for recreation and fishing access. Along with plants, harvesters also collect a large number of small fish and invertebrates. Amphibians and turtles have been known to be collected as well.

Rotovation: Rotovators use underwater rototiller-like blades to uproot milfoil plants. The rotating blades churn seven to nine inches deep into the lake or river bottom to dislodge plant root crowns that are generally buoyant. The plants and roots may then be removed from the water using a weed rake attachment to the rototiller head or by harvester or manual collection. In some waterbodies rotovation can be used year-round to control milfoil growth. However, it is most effective in the winter and spring when plants have died back. Summer and fall rotovation usually requires the plants to be cut first since the longer plants wrap around the rototiller head, slowing the rotovation process.

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

- Rotovation churns up the sediment causing water to become temporarily turbid with suspended sediments.
- Plant nutrients in the sediments, such as nitrogen and phosphorus, may be released into the water.
- Long-buried toxic materials in the sediment which may be present from land use activities such as boat building, storm water drainage, or combined sewage outfalls may be released into the water.
- Rotovation may interfere with fish spawning or migration.

- Where salmon runs are present, there is only a limited time window where rotovation is allowed to take place in Washington.
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For these reasons, the Washington Department of Ecology, the Washington Department of Fish and Wildlife, and other agencies require permits for rotovation. Although rotovation is used in British Columbia, Canada and on the Pend Oreille River in Washington, rotovation has not become a popular method of plant control in other areas.

Advantages

- Results in immediate open areas of water.
- Removing plants from the water removes the plant nutrients, such as nitrogen and phosphorus, from the system.
- Can be targeted to specific locations, protecting designated conservancy areas from treatment.
- The effects of rotovation can last for two growing seasons; harvesting and cutting may need to be repeated several times during summer.

Disadvantages

- Similar to mowing a lawn.
- Off-loading sites and disposal areas for cut plants must be available. On heavily developed shorelines, suitable off-loading sites may be few and require long trips by the harvester.
- Some large machinery is not easily maneuverable in shallow water or around docks or other obstructions.
- Many small fish and insects are often collected and killed by the harvester.
- Harvesting, cutting and rotovation creates plant fragments which may increase the spread of invasive plant species throughout the waterbody.
- Machines are expensive and require routine maintenance.
- Machinery may not be suitable for lakes with many bottom obstructions (stumps, logs) or for very shallow lakes (3-5 feet of water) with loose organic sediments
- Machinery brought into the waterbody from other locations need to be thoroughly cleaned and inspected before being allowed to launch. Otherwise new exotic species could be introduced to the waterbody.

Permits

Harvesting, cutting, and rotovation in Washington requires hydraulic approval from the Department of Fish and Wildlife. Some Shoreline Master Programs may also require permits for these activities. Check Thurston County before proceeding with a project involving heavy machinery.

Costs

Costs per acre vary with numbers of acres cut/harvested/rotovated, accessibility of disposal sites to the harvested areas, density and species of the plants, and whether a private contractor or public entity does the work. Private contractors generally charge $500 to $800 per acre for harvesting and prices can be as high as $2,000 per acre for rotovation (if you can even find a

contractor who has rotovator). The purchase price of harvesters ranges from $35,000 to $110,000. Rotovators sell for $250,000. Cutting machines sell for under $20,000.

Suitability of mechanical control methods for Davis Lake: Because the goal of the Davis Lake plan is eradication of milfoil these mechanical methods are not suitable for use in Davis Lake at this time. Mechanical methods are maintenance methods and are better suited for water bodies with nuisance weed problems (native plants that are growing in areas where they interfere with beneficial uses) or in large water bodies with advanced infestations of noxious weeds where eradication is not possible - such as Lake Washington and the Columbia and Pend Oreille Rivers.

Rotovation is best suited for milfoil control in very large water bodies with well established populations of milfoil where there is no chance of eradiation. Harvesting and cutting are suitable for lakes where the goal is maintaining open areas of water for recreational purposes. Because all of these methods produce thousands of fragments, mechanical methods should only be used in lakes with extensive infestations of milfoil where the creation of additional fragments would not cause further spread. None of the mechanical methods can eradicate milfoil.

Biological Control Methods: Grass carp: The grass carp, also known as the white amur, is a vegetarian fish native to the Amur River in Asia. Because this fish feeds on aquatic plants, it can be used as a biological tool to control aquatic plant growth. In some situations, sterile grass carp may be permitted for introduction into Washington waters. Permits are most readily obtained if the lake or pond is privately owned, has no inlet or outlet, and is fairly small. The objective of using grass carp to control aquatic plant growth is to end up with a lake that has about 20 to 40 percent plant cover, not a lake devoid of plants. In practice in Washington, grass carp often fail to control the plants or all the submersed plants are eliminated from the waterbody.

The Washington Department of Fish and Wildlife determines the appropriate stocking rate for each waterbody when they issue the grass carp stocking permit. Stocking rates for Washington lakes generally range from 9 up-to 25 eight- to eleven-inch fish per vegetated acre. This number will depend on the amount and type of plants in the lake as well as spring and summer water temperatures. However, Fish and Wildlife generally err on the side of stocking the least amount of grass carp as possible. To prevent stocked grass carp from migrating out of the lake and into streams and rivers, all inlets and outlets to the pond or lake must be screened. For this reason, residents on waterbodies that support a salmon or steelhead run are rarely allowed to stock grass carp into these systems.

The fish screens that were recently installed (2002) in the outlets for Campbell Lake and Erie Lake cost $22,000 to design, fabricate, and install. About $8,000 of this was for the engineering and design of the structures. The fish screen at Campbell Lake was designed to allow the passage of sea run cutthroat trout. A tube at the bottom of the screen allows adult trout to swim upstream. The tube contains a baffle that allows fish to move in only one direction. The juvenile trout are small enough to move through the grate.

Once grass carp are stocked in a lake, it may take from two to five years for them to control nuisance plants. Survival rates of the fish will vary depending on factors like presence of otters,

birds of prey, or fish disease. A lake will probably need restocking about every ten years. Success with grass carp in Washington has been variable. Sometimes the same stocking rate results in no control, control, or even complete elimination of all underwater plants. Bonar *et. al.* found that only 18 percent of 98 Washington lakes stocked with grass carp at a median level of 24 fish per vegetated acre had aquatic plants controlled to an intermediate level. In 39 percent of the lakes, all submersed plant species were eradicated. It has become the consensus among researchers and aquatic plant managers around the country that grass carp are an all or nothing control option. They should be stocked only in waterbodies where complete elimination of all submersed plant species can be tolerated.

Grass carp exhibit definite food preferences and some aquatic plant species will be consumed more readily than others. Pauley and Bonar performed experiments to evaluate the importance of 20 Pacific Northwest aquatic plant species as food items for grass carp. Grass carp did not remove plants in a preferred species-by-species sequence in multi-species plant communities. Instead they grazed simultaneously on palatable plants of similar preference before gradually switching to less preferred groups of plants. The relative preference of many plants was dependent upon what other plants were associated with them. The relative preference rank for the 20 aquatic plants tested was as follows: *Potamogeton crispus* (curly leaf pondweed) = *P. pectinatus* (sago pondweed) > *P. zosteriformes* (flat-stemmed pondweed) > *Chara* sp.(muskgrasses) = *Elodea canadensis* (American waterweed) = thin-leaved pondweeds *Potamogton* spp. > *Egeria densa* (Brazilian elodea) (large fish only) > *P. praelongus* (white-stemmed pondweed) = *Vallisneria americana* (water celery) > *Myriophyllum spicatum* (Eurasian watermilfoil) > *Ceratophyllum demersum* (coontail) >*Utricularia vulgaris* (bladderwort) > *Polygonium amphibium* (water smartweed) > *P. natans* (floating leaved pondweed) > *P. amplifolius* (big leaf pondweed) > *Brasenia schreberi* (watershield) = *Juncus* sp.(rush) > *Egeria densa* (Brazilian elodea) (fingerling fish only) > *Nyphaea* sp. (fragrant waterlily) > *Typha* sp. (cattail) > *Nuphar* sp. (spatterdock).

Generally in Washington, grass carp do not consume emergent wetland vegetation or water lilies even when the waterbody is heavily stocked or over stocked. A heavy stocking rate of triploid grass carp in Chambers Lake, Thurston County resulted in the loss of most submersed species, whereas the fragrant water lilies, bog bean, and spatterdock remained at pre-stocking levels. A stocking of 83,000 triploid grass carp into Silver Lake Washington resulted in the total eradication of all submersed species, including Eurasian watermilfoil, Brazilian elodea, and swollen bladderwort. However, the extensive wetlands surrounding Silver Lake have generally remained intact. In southern states, grass carp have been shown to consume some emergent vegetation.

Grass carp stocked into Washington lakes must be certified disease free and sterile. Sterile fish, called triploids because they have an extra chromosome, are created when the fish eggs are subjected to a temperature or pressure shock. Fish are verified sterile by collecting and testing a blood sample. Triploid fish have slightly larger blood cells and can be differentiated from diploid (fertile) fish by this characteristic. Grass carp imported into Washington must be tested to ensure that they are sterile.

Because Washington does not allow fertile fish within the state, all grass carp are imported into Washington from out of state locations. Most grass carp farms are located in the southern United States where warmer weather allows for fast fish growth rates. Large shipments are transported in special trucks and small shipments arrive via air.
Here are some facts about grass carp:

Grass carp

- Are only distantly related to the undesirable European carp, and share few of its habits.
- Live for at least ten years and probably much longer in Washington waters.
- Will grow rapidly and reach at least ten pounds. They have been known to reach 40 pounds in the southern United States.
- Feed only on plants at the age they are stocked into Washington waters.
- Will not eat fish eggs, young fish or invertebrates, although baby grass carp are omnivorous.
- Feed from the top of the plant down so that mud is not stirred up. However, in ponds and lakes where grass carp have eliminated all submersed vegetation the water becomes turbid. Hungry fish will eat the organic material out of the sediments.
- Have definite taste preferences. Plants like Eurasian milfoil and coontail are not preferred. American waterweed and thin leaved pondweeds are preferred. Water lilies are rarely consumed in Washington waters.
- Are dormant during the winter. Intensive feeding starts when water temperatures reach 68° F.
- Are a river fish and have the desire to move from still waters into flowing waters.
- Are difficult to recapture if a waterbody has been overstocked.
- They may not feed in swimming areas, docks, boating areas, or other sites where there is heavy human activity.

Advantages

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

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

Permits
For Washington residents, a private fish stocking permit must be obtained from the Washington Department of Fish and Wildlife. Check with your Fish and Wildlife regional office to obtain a permit application. Also, if inlets or outlets need to be screened, a Hydraulic Project Approval application must be completed for the screening project.

Costs
In quantities of 10,000 or more, 8 to 12 inch sterile grass carp can be purchased for about $5.00 each for truck delivery. The cost of small air freighted orders will vary and is estimated at $10 to $20 per fish with shipping.

Milfoil Weevil: The milfoil weevil, *Euhrychiopsis lecontei*, has been associated with declines of milfoil (*Myriophyllum spicatum*) in the United States (e.g. Illinois, Minnesota, Vermont, and Wisconsin). Researchers in Vermont found that the milfoil weevil can negatively impact milfoil by suppressing the plants growth and reducing its buoyancy. In 1989, state biologists reported that Eurasian watermilfoil in Brownington Pond, Vermont had declined from approximately 10 hectares (in 1986) to less than 0.5 hectares. Researchers from Middlebury College, Vermont hypothesized that the milfoil weevil, which was present in Brownington Pond, played a role in reducing Eurasian watermilfoil. During 1990 through 1992, researchers monitored the populations of Eurasian watermilfoil and the milfoil weevil in Brownington Pond. They found that by 1991 Eurasian watermilfoil cover had increased to approximately 2.5 hectares (approximately 55-65 g/m^2) and then decreased to about 1 hectare (<15 g/m^2) in 1992. Weevil abundance began increasing in 1990 and peaked in June of 1992, where 3 - 4 weevils (adults and larvae) per stem were detected. These results supported the hypothesis that the milfoil weevil played a role in reducing Eurasian watermilfoil in Brownington Pond.

Another documented example where a crash of milfoil has been attributed to the milfoil weevil is in Cenaiko Lake, Minnesota. Researchers from the University of Minnesota reported a decline in the density of Eurasian watermilfoil from 123 g/m^2 in July of 1996 to 14 g/m^2 in September of 1996. Eurasian watermilfoil remained below 5 g/m^2 in 1997, then increased to 44 g/m^2 in June and July of 1998 and declined again to 12 g/m^2 in September of 1998. In contrast, researchers found that weevil abundance in Cenaiko Lake was 1.6 weevils (adults and larvae) per stem in July of 1996. Weevil abundance, however, decreased with declining densities of Eurasian watermilfoil in 1996 and by September 1997 weevils were undetectable. In September of 1998 weevil abundance had increased to >2 weevils per stem.

Based on observations made by researchers in Vermont, Ohio and Wisconsin it seems that having 2 weevils (or more) per stem is adequate to control Eurasian watermilfoil. However, as indicated by the study conducted in Cenaiko Lake, Minnesota, an abundance of 1.5 weevils per stem may be sufficient in some cases.

In Washington State, the milfoil weevil is present primarily in eastern Washington and occurs on both Eurasian and northern watermilfoil (*M. sibiricum*), the latter plant being native to the state. During the summer of 1999, researchers from the University of Washington determined the

abundance of the milfoil weevil in 11 lakes in Washington. They found, that weevil abundance ranged from undetectable levels to 0.3 weevils (adults and larvae) per stem. Fan Lake, Pend Oreille County had the greatest density per stem or 0.6 weevils (adults, larvae and eggs per stem). The weevils were present on northern watermilfoil. These abundance results are well below the recommendations made by other researchers in Minnesota, Ohio, Vermont, and Wisconsin of having at least 1.5 - 2.0 weevils per stem in order to control Eurasian watermilfoil.

To date, there have not been any documented declines of Eurasian watermilfoil in Washington State that can be attributed to the milfoil weevil, although researcher Robert Creed speculated that declines of Eurasian watermilfoil in Lake Osoyoos and the Okanogan River may have been caused by the milfoil weevil.

Researchers in Minnesota have suggested that sunfish predation may be limiting weevil densities in some lakes. The latter may be true for Washington State as sunfish populations are present in many lakes in the state, including those with weevils. In addition, other environmental factors that may be keeping weevil populations in check in Washington, but have yet to be studied, include over-wintering survival and habitat quality and quantity. Although the milfoil weevil shows potential as a biological control for milfoil more work is needed to determine which factors limit weevil densities and what lakes are suitable candidates for weevil treatments in order to implement a cost and control effective program. Recent work by Jenifer Parsons at the Department of Ecology supports the Minnesota research which shows that the presence of sunfish like bluegill, crappie, perch, and pumpkinseed limit weevils. At this stage, using weevils for milfoil control is still experimental.

Suitability of biological control methods for Davis Lake: Grass Carp: Grass carp graze preferentially on plants. Milfoil is not a highly preferred plant and grass carp are not recommended for the control of milfoil unless the eradication of all submersed species in a water body can be tolerated. Stocking grass carp into Davis Lake would require a grass carp stocking permit from Fish and Wildlife. Since Davis Lake has both an inlet and an outlet, these streams would have to be screened. Screening the inlet and outlet would also require routine maintenance to keep the inlet and outlet screens free of debris. It is highly unlikely that Fish and Wildlife would grant permission to stock grass carp. The lake has a wonderful and diverse native plant population that provides food and habitat to fish and wildlife. Many of the plants in Davis Lake are more palatable than milfoil and it is likely that stocking grass carp could have the opposite effect of actually removing native plants to open up more niches for milfoil to colonize.

Milfoil weevil: The use of the milfoil weevil to control milfoil populations is still experimental in Washington. Research seems to show that the presence of sunfish in the water body may not allow weevils to establish and flourish. Davis Lake has a warm water fish population and presence of these fish may not allow for the successful establishment of these weevils should they be stocked. Also biological controls will not generally eradicate their host plant. In a smaller lake like Davis Lake with a limited littoral zone, eradication of milfoil is possible. While not a practical solution for milfoil management at this time, the Davis Lake Community should follow the progress of this research. At some stage, it may become feasible to stock weevils into the lake. While weevils would not eradicate milfoil, they could feed on it and help keep it at low

levels.

Chemical Control Methods: Aquatic herbicides are chemicals specifically formulated for use in water to kill or control aquatic plants. Herbicides approved for aquatic use by the United States Environmental Protection Agency (EPA) have been reviewed and are considered compatible with the aquatic environment when used according to label directions. However, some individual states, including Washington, also impose additional constraints on their use.

Aquatic herbicides are sprayed directly onto floating or emergent aquatic plants or are applied to the water in either a liquid or pellet form. Systemic herbicides are capable of killing the entire plant. Contact herbicides cause the parts of the plant in contact with the herbicide to die back, leaving the roots alive and able to regrow. Non-selective, broad spectrum herbicides will generally affect all plants that they come in contact with. Selective herbicides will affect only some plants (often dicots - broad leafed plants like milfoil will be affected by selective herbicides whereas monocots like curly leaf pondweed may not be affected. Most aquatic plants are monocots.

Because of environmental risks from improper application, aquatic herbicide application in Washington state waters is regulated and has the following restrictions:

- Applicators must be licensed by the Washington State Department of Agriculture.
- Because of a March 2001 court decision (federal 9th Circuit District Court), coverage under a discharge permit called a National Pollutant Elimination System Discharge (NPDES) permit must be obtained before aquatic herbicides can be applied to the waters of the state.
- Notification and posting are required and there may be additional mitigations proposed to protect rare plants or threatened and endangered species.
- After the second year of treatment under the noxious weed permit, a site-specific IAPMP must be developed.

Ecology has developed a general NPDES permit for the management of noxious weeds growing in aquatic environments and a separate general permit for nuisance aquatic weeds (native plants) and algae control. For nuisance weeds (native species) and algae, applicators and the local sponsor of the project must obtain a NPDES permit from the Washington Department of Ecology before applying herbicides to Washington waterbodies. For noxious weed control, applicators and their sponsors can obtain coverage under the Washington Department of Agriculture NPDES permit for noxious weed control.

The Department of Ecology currently issues permits for seven aquatic herbicides (as of 2005 treatment season) for aquatic weed treatment for lakes, rivers, and streams. The chemicals that are permitted for use in 2005 are:

- Glyphosate - (Trade names for aquatic products with glyphosate as the active ingredient include: Rodeo®, AquaMaster®, and AquaPro®). This systemic broad spectrum herbicide is used to control floating-leaved plants like water lilies and shoreline plants like purple loosestrife. It is generally applied as a liquid to the leaves. Glyphosate does

not work on underwater plants such as milfoil. Although glyphosate is a broad spectrum, non-selective herbicide, a good applicator can somewhat selectively remove targeted plants by focusing the spray only on the plants to be removed. Plants can take several weeks to die and a repeat application is often necessary to remove plants that were missed during the first application.

- Fluridone – (Trade names for fluridone products include: Sonar® and Avast!®). Fluridone is a slow-acting systemic herbicide used to control milfoil and other underwater plants. It may be applied as a pellet or as a liquid. Fluridone can show good control of submersed plants where there is little water movement and an extended time for the treatment. Its use is most applicable to whole-lake or isolated bay treatments where dilution can be minimized. It is not effective for spot treatments of areas less than five acres. It is slow-acting and may take six to twelve weeks before the dying plants fall to the sediment and decompose. When used to manage milfoil in Washington, fluridone is applied several times during the spring/summer to maintain a low, but consistent concentration in the water. Although fluridone is considered to be a broad spectrum herbicide, when used at very low concentrations, it can be used to selectively remove milfoil. Some native aquatic plants are minimally affected by low concentrations of fluridone.

- 2,4-D – There are two formulations of 2,4-D approved for aquatic use. The granular formulation contains the low-volatile butoxy-ethyl-ester formulation of 2,4-D (Trade names include: AquaKleen® and Navigate®). The liquid formulation contains the dimethylamine salt of 2,4-D (Trade name - DMA*4IVM). 2,4-D is a relatively fast-acting, systemic, selective herbicide used for the control of milfoil and other broad-leaved species. Both the granular and liquid formulations can be effective for spot treatment of milfoil. 2,4-D has been shown to be selective to milfoil when used at the labeled rate, leaving native aquatic species relatively unaffected. When salmon are present, the amine formulation of 2,4-D should be used.

- Endothall - Dipotassium Salt – (Trade name Aquathol®) Endothall is a fast-acting non-selective contact herbicide which destroys the vegetative part of the plant but generally does not kill the roots. Endothall may be applied in a granular or liquid form. Typically endothall compounds are used primarily for short term (one season) control of a variety of aquatic plants. However, there has been some recent research that indicates that when used in low concentrations, endothall can be used to selectively remove exotic weeds; leaving some native species unaffected. Because it is fast acting, endothall can be used to treat smaller areas effectively.

- Diquat – (Trade name Reward®). Diquat is a fast-acting non-selective contact herbicide which destroys the vegetative part of the plant but does not kill the roots. It is applied as a liquid. Typically diquat is used primarily for short term (one season) control of a variety of submersed aquatic plants. It is very fast-acting and is suitable for spot treatment. However, turbid water or dense algal blooms can interfere with its effectiveness.

- Triclopyr - (Trade name Renovate3®). There are two formulations of triclopyr. It is the TEA formation of triclopyr that is registered for use in aquatic or riparian environments. Triclopyr, applied as a liquid, is a relatively fast-acting, systemic, selective herbicide used for the control of milfoil and other broad-leaved species such as purple loosestrife. Triclopyr can be effective for spot treatment of milfoil and is relatively selective to milfoil when used at the labeled rate. Many native aquatic species are unaffected by triclopyr.

- Imazapyr - (Trade name Habitat®). This systemic broad spectrum, slow-acting herbicide, applied as a liquid, is used to control emergent plants like spartina, reed canarygrass, and phragmites and floating-leaved plants like water lilies. Imazapyr does not work on underwater plants such as milfoil. Although imazapyr is a broad spectrum, non-selective herbicide, a good applicator can somewhat selectively remove targeted plants by focusing the spray only on the plants to be removed. Imazapyr was allowed for use in Washington in 2004.

Advantages

- Aquatic herbicide application can be less expensive than other aquatic plant control methods, especially when used in controlling wide-spread infestations of state-listed noxious aquatic weeds.
- Aquatic herbicides are easily applied around docks and underwater obstructions.
- Washington has had some success in eradicating milfoil, a state listed noxious weed, from some smaller lakes (350 acres or less) using fluridone products.
- 2,4-D and triclopyr have been shown to be effective in controlling smaller infestations (not lake-wide) of milfoil in Washington.

Disadvantages

- Some herbicides have swimming, drinking, fishing, irrigation, and water use restrictions (check the label and general permit).
- Herbicide use may have unwanted impacts to people who use the water and to the environment.
- Non-targeted plants as well as nuisance plants may be controlled or killed by some herbicides.
- Depending on the herbicide used, it may take several days to weeks or several treatments during a growing season before the herbicide controls or kills treated plants.
- Rapid-acting herbicides like endothall and diquat may cause low oxygen conditions to develop as plants decompose. Low oxygen can cause fish kills.
- To be most effective, generally herbicides must be applied to rapidly-growing plants.
- Some expertise in using herbicides is necessary in order to be successful and to avoid unwanted impacts.
- Many people have strong feelings against using chemicals in water. Find out what your neighbors think about chemical use before deciding to treat your water plants with herbicides.
- Some cities or counties may have policies forbidding or discouraging the use of aquatic herbicides. Check before hiring an aquatic herbicide applicator.

Permits

A NPDES permit is needed to apply any aquatic herbicide to waters of the state. Both the noxious aquatic weed and nuisance plant and algae NPDES permits require the development of integrated aquatic vegetation management plans before the third season of treatment

For noxious weed control, apply to the Washington Department of Agriculture for coverage under their NPDES permit each treatment season. There is no permit or application fee to obtain coverage under Agriculture's permit. However, the targeted weeds must be on the Washington's Noxious Weed List or on Agriculture's quarantine lists.

Ecology Noxious Weed Permitting Contacts

Statewide Contact (Olympia)	Kathy Hamel Phone: (360) 407-6562 E-mail: kham461@ecy.wa.gov

Costs of Herbicide Treatment

Approximate costs for one acre herbicide treatment:

- Glyphosate: $250
- Fluridone: $900 to $1,000
- Endothall: $650
- 2,4-D: $300 to $600
- Diquat: $300 to $400
-

These costs are estimates and will vary from site to site depending on treatment rates, water depths, number of acres treated, logistics of the site, travel time for the applicator, etc.

Suitability of aquatic herbicides for Davis Lake: Milfoil is very susceptible to aquatic herbicides. There are a couple herbicides that provide excellent control for spot treating milfoil. These are the selective, systemic herbicides 2,4-D and triclopyr. Triclopyr is the most expensive of these herbicides and because of costs will not be considered further for Davis Lake. The liquid formulation of 2,4-D is the least expensive (costs can be under $300 per acre). This formulation is more persistent in the water than the granular formulation of 2,4-D, but it appears to be more effective in controlling milfoil in Washington Lakes. The granular formulation of 2,4-D is more expensive ($600 per acre) and the treatment results have been variable for milfoil control. If people are obtaining drinking water from Davis Lake, the granular formulation is the better choice, simply because data from Washington Lakes shows that water concentrations are generally below the EPA drinking water standard with five days (generally less) after treatment. With the liquid formulation, the levels have remained above the drinking water standard for at least ten days. If drinking or irrigation water is not an issue for Davis Lake, the herbicide of choice would be the liquid formulation of 2,4-D. Not only is it less expensive, but it is also more effective in killing milfoil. It is also less toxic to fish.

Fluridone has potential for use in Davis Lake, but it is an expensive herbicide that is not selective. The concentration needs to be maintained at about 10 ppb for ten weeks or so to

achieve a good kill. The disadvantage is that this herbicide is not selective and many of the native species will be killed the year of treatment. These species will return from seeds, tubers, and other reproductive structures the year following treatment, but during the treatment year, the lake ecosystem will be disrupted. The milfoil infestation in Davis Lake is likely not at the level where a whole lake fluridone treatment is needed and the lake group cannot support the level of funding that would be needed for such a treatment.

Endothall and diquat will impact milfoil. They are contact herbicides which mean that they will remove the vegetation above the roots. Generally contact herbicides allow the plant to recover from the herbicide treatment. However, sometimes if the root system is not extensive, the plant is unable to re-grow. This may be especially true with young milfoil plants that have just started growth from fragments. Endothall is noted by the Army Corps of Engineer's Herbicide Use Guide to provide excellent control of milfoil and diquat is reported to provide excellent control of milfoil. Both diquat and endothall are suitable for use in Davis Lake, but may not be the best choice since these herbicides may not kill the entire plant and will also affect native plants.

Glyphosate and Imazapyr do not work on submersed plants and are not suitable for milfoil.

New Technologies: There are no applicable new technologies that have emerged for the control of aquatic plants. The Army Corps of Engineers is still researching host-specific pathogens. In the future a fungus may be useful for milfoil control, but this technology is still in the development phase and no products have been approved. There are no genetic engineering technologies for aquatic plant control. The only host-specific biological control for milfoil is the weevil. Although some efforts have been made to locate biological controls for milfoil within its native range, no suitable insects or pathogens have been identified.

VIII. Develop a Control Intensity Map for the Water Body

The action threshold for milfoil is set as zero plants. That means that action will be taken when milfoil is detected in Davis Lake. Native plants will not be deliberately controlled, except incidentally as milfoil is controlled. As milfoil populations are reduced, the Davis Lake Community will consider using hand pulling and installation of bottom barriers to control the remaining plants. Although this is a goal for the milfoil in Davis Lake, funding realities may not allow a zero action threshold to be achieved each year. When funding restricts action, then milfoil should be removed in the high use areas such as the areas adjacent to the residences and off the summer camp and retreat center. Ideally, all the milfoil in Davis Lake should be removed each year. As the plants fragment, each fragment has the capability to from new plants. Eventually much of the littoral zone of Davis Lake will come to be dominated by milfoil if continual removal is not maintained.

The action threshold for any plants, native or non-native should be set as zero plants in the camp swimming area during the summer months. Plants in the swimming area can be a safety hazard to swimmers.

IX. Choose the Best Combination of Options of Site-Specific Levels of Control

Using These Criteria and Develop an Action Strategy

The Davis Lake Community has been handicapped when developing an integrated aquatic plant management plan for Davis Lake because so few people actually live on the lake and the number of property owners is not large compared to other lakes. Most property owners have summer cabins that are only seasonally occupied. Many owners live out of state. This makes it difficult to form a steering committee, hold meetings, and raise money. One property owner has taken the lead in the milfoil eradication effort. It is due to his efforts that action has been taken to manage milfoil in Davis Lake. There is little interest in forming a self taxing district or lake management district for Davis Lake. Funds are raised each year though solicitation. Weeds in kids swimming areas can pose a liability to them). Because the lake group doesn't have a stable funding source the eradication effort has not been as consistent as necessary to achieve the plan goals. Also many of the more expensive control methods are not suitable because of lack of finances.

The following management methods are proposed to eradicate milfoil in Davis Lake:

Action Plan

- Survey the littoral zone of Davis Lake in the spring to locate and map any milfoil plants.
- Decide if the plant infestation can be done by hand-pulling, bottom barrier installation or if an herbicide treatment is necessary. This depends on the plant density for each location.
- For Herbicide Treatments: Contract with a state-licensed herbicide applicator and obtain NPDES coverage for herbicide application. Ensure that the applicator complies with all permit provisions. (This assumes that a sufficiently large number of plants are seen in scattered locations to necessitate an herbicide treatment). Do a follow-up survey after the treatment and possibly some hand-pulling to eliminate most if not all the milfoil plants.
- Time the application to coincide with rapidly growing plants and treat early in the season.
- Follow-up each year Davis Lake with additional surveys in the spring. When the number of milfoil plants drops to a reasonable number, the Davis Lake Community will consider using diver hand pulling and covering larger patches with bottom barrier to control these non-native plants. A goal should be to reduce reliance on herbicides.
- A second fall survey should be scheduled each year to evaluate the effectiveness of the year's control effort. The plan is adaptive and if the control efforts are not working as expected, the plan should be revisited and other control measure should be proposed.
- Consider installing bottom barriers in the camp swimming area or hiring high schools kids to hand pull all plants from the swimming area.
- Individual residents may use bottom barriers under their docks or in their individual

swimming areas. Raking, cutting, or hand pulling should only be conducted under supervision of the Davis Lake Landholders Association. If done improperly, these methods may increase the spread of milfoil.

Permitting:
Aquatic herbicides: Application of aquatic herbicide requires a state-licensed applicator with an aquatic endorsement. Each year the applicator and/or Davis Lake Community must obtain coverage under the Noxious Weed NPDES permit. All permit provisions and conditions must be followed to be in compliance with this permit.

Bottom Barrier Installation and Hand Pulling: These activities require a permit called a Hydraulic Project Approval from the Department of Fish and Wildlife. The Department has a pamphlet called Aquatic Plants and Fish. If this pamphlet is obtained and all provisions are followed, it serves as the Hydraulic Project Approval for weed removal projects.

Costs:

Information about 2,4-D

2,4-D Granular Treatment:
The granular formulation of 2,4-D is 2,4-D butoxyethyl ester. The granules are generally applied at the labeled rate of 100-200 pounds per acre using bow-mounted centrifugal or blower-type spreaders. The granules are uniformly spread over the water above the milfoil beds and slightly beyond. The clay particles sink to the bottom or are caught up in the plants and the herbicide slowly releases from the clay over the next few days. A study conducted in Loon Lake Washington showed that milfoil was the only aquatic plant whose growth was statistically reduced by granular 2,4-D application (Parsons, et. al, 2001). In this study up to 98 percent of the milfoil biomass in the treatment plots was removed after the July treatment. Recent data collected from Washington lakes show that 2,4-D concentrations from granular applications remain very low; generally below irrigation (100 ppb) and drinking water (70 ppb) restrictions, even within the treatment areas. There is speculation that the granular formulations work best in dense milfoil beds where the granules get caught up by and release the herbicide into the plant canopy. In sparser milfoil beds, the liquid formulation may give better results since without the plant canopy to catch the granules; they may become buried in the sediment. A specimen label for Navigate™ can be seen at this website: http://www.appliedbiochemists.com/Navlb02.pdf. Navigate™ and AquaKleen™ are identical products.

2,4-D Liquid Treatment:
The liquid formulation of 2,4-D is the dimethylamine salt of 2,4-D. This formulation is applied using subsurface trailing hoses to give a water concentration of 2-4 ppm. The amount of gallons used per treatment depends on the water depth at the treatment sites. Concentrations of 2,4-D in Washington lakes after the application of the liquid formulation are generally higher than those found after treatment with granular 2,4-D with values well above the drinking water standard (70 ppb). However efficacy of milfoil removal appears greater when using the liquid formulation. In 2003, Spring Lake was treated with liquid 2,4-D for an established, but not widespread

infestation of milfoil (the lake was not considered early infestation). In 2004, no milfoil was detected in either the spring or the summer survey. A specimen label for DMA™4VM can be seen at this website: http://www.cdms.net/ldat/ld4JS000.pdf

General Impacts after treatment

A day to a few days after herbicide treatment, observers will see the growing tips of milfoil plants begin to twist. Over time these plants become brownish in appearance, leaves may fall off, and sometimes only bare stems will be left. The plants will eventually sink to the sediments usually within one to three weeks of treatment. Unless treatment takes place in extremely dense beds of milfoil, it is unlikely for low oxygen conditions to develop. Oxygen has been monitored after 2,4-D and triclopyr treatments for milfoil in Washington lakes and rivers and no significant oxygen sags have been seen. Results of spot treatment may be variable depending on water movement, size of treatment plot, density of milfoil, weather conditions, underwater springs, treatment timing, etc. However, most lakes report low efficacy to be in the 80 percent removal range. Spring Lake reported 100 percent removal of milfoil one year after treatment.

Follow-up

Follow-up is essential to ensure the success of eradication. Used alone, 2,4-D is not an eradication tool. Some plants typically survive the treatment and regrow, so these plants must be removed by other means. Even a few milfoil fragments can start a new infestation or boaters may reintroduce milfoil into the lake. Diver and surface inspections should continue at least twice a year during the growing season. Survey work should be as frequent as can be afforded since small milfoil plants or fragments may be easily overlooked especially within native plant beds. Often divers report finding two to three foot tall milfoil plants in areas that they had extensively searched only three weeks earlier. Surveys done in Minnesota indicated that, 2,4-D use by itself did not result in eradication of milfoil over the long-term (Crowell, 1999). Treated lakes for which there was no follow up survey work or treatment eventually ended up with milfoil throughout the littoral zone. There is some anecdotal evidence that repeated treatments may select for plants that are more resistant to 2,4-D. If this occurs and the plant population is too large to be hand removed, consider using another herbicide such as triclopyr. There is also some anecdotal evidence that milfoil may germinate from seeds in areas where water levels dropped and then returned. This may happen in low rainfall or low runoff years. It is important to check those areas when the water returns to remove any milfoil that may have germinated.

2,4-D Toxicology Data (The following toxicology data is from the 2003 Spring Lake IAVMP written by King County and the Spring Lake Community)

Human and general mammalian health

The oral LD50 for 2,4-D (acid) is 764 mg/kg and the dermal LD50 is >2000 mg/kg. This chemical has a low acute toxicity (from an LD50 standpoint, is less toxic than caffeine and slightly more toxic than aspirin). The RfD for 2,4-D (acid) is 0.01 mg/kg/d. Recent, state-of-the-art EPA studies continue to find that it is not considered a carcinogen or mutagen, nor does it cause birth defects. It has a relatively short persistence in water, since it tends to bind to organic matter in the sediments. The herbicide 2,4-D generally does not bioaccumulate to a great extent, and the small amounts which do accumulate are rapidly eliminated once exposure ceases (Washington State Department of Ecology, 2001b).

The risks to human health from exposure to aquatic 2,4-D applications were evaluated in terms of the most likely forms of contact between humans and the water to which the herbicide was applied. Ecology's Risk Assessment results indicate that 2,4-D should present little or no risk to the public from acute (one time) exposures via dermal contact with the sediment, dermal contact with water (swimming), or ingestion of fish (Washington State Department of Ecology, 2001b). Based on the low dermal absorption of the chemical, the dose of 2,4-D received from skin contact with treated water is not considered significant. Dose levels used in studies are often far beyond what an animal or human would experience as a result of an aquatic application. Many experiments have examined the potential for contact by the herbicide applicator, although these concentrations have little relevance to environmental exposure by those not directly involved with the herbicide application. Once the herbicide has entered the water, its concentration will quickly decline because of turbulence associated mixing and dilution, volatilization, and degradation by sunlight and secondarily by microorganisms (Felsot, 1998).

Results of chronic exposure assessments indicate that human health should not be adversely impacted by chronic 2,4-D exposure via ingestion of fish, ingestion of surface water while swimming, incidental ingestion of sediments, dermal contact with sediments, or dermal contact with water (Washington State Department of Ecology, 2001b). Pharmacokinetic investigations have demonstrated that 2,4-D is rapidly absorbed from the gastrointestinal tract and is quickly excreted. Animal toxicological investigations carried out at high doses showed a reduction in the ability of the kidneys to excrete the chemical, and resulted in some systemic toxicity. However, the high doses tested may not be relevant to the typical low dose human exposures resulting from labeled use. A review of the scientific and medical literature failed to provide any human case reports of systemic toxicity or poisoning following overexposure to these herbicide products when used according to label instructions (Washington State Department of Ecology, 2001b). The risks to mammalian pets and wildlife should be closely related to these reported human risks, especially since many of the toxicity experiments are carried out on test animals by necessity.

The potential hazard to pregnant women and to the reproductive health of both men and women was evaluated. The results of the 2,4-D developmental or teratology (birth defects) and multigenerational reproduction studies indicate that the chemical is not considered to be a reproductive hazard or cause birth defects (teratogen) when administered below maternally toxic doses (Washington State Department of Ecology, 2001b). A review of the histopathological sections of various 2,4-D subchronic and chronic studies provides further support that the chemical does not affect the reproductive organs, except in some higher dose groups beyond the potential level of incidental exposure after an aquatic weed application.

Evaluate the compatibility of the weed control strategy with fisheries, waterfowl, wildlife, wetlands, rare plants, endangered species, water rights, and the ecology of the water body.

Fish health
Lake Sacheen has been treated with 2,4-D for several years to manage a milfoil infestation. The fish biologist was queried by Dave Lamb about whether the treatments were having a detrimental impact on the fishery or fishing in Lake Sacheen. The biologist indicated that he saw little to no impact of the treatment on fish in that lake.

Based on laboratory data reported in the Department of Ecology's Risk Assessment of 2,4-D, 2,4-D DMA has a low acute toxicity to fish (LC50 =100 to 524 mg a.i./L for the rainbow trout and bluegill sunfish respectively). No Federally sensitive, threatened or endangered species were tested with 2,4-D DMA. However, it is likely that endangered salmonids would not exhibit higher toxic effects to 2,4-D DMA than those seen in rainbow trout. Since the maximum use rate of 2,4-D DMA would be no higher than the maximum labeled use rate (4.8 mg a.i./L) even the most sensitive fish species within the biota should not suffer adverse impacts from the effects of 2,4-D DMA. In conclusion, 2,4-D DMA will not effect fish or free-swimming invertebrate biota acutely or chronically when applied at typical use rates of 1.36 to 4.8 mg a.i./L (Washington State Dept. of Ecology, 2001b). However, more sensitive species of benthic invertebrates like glass shrimp may be affected by 2,4-D DMA, but 80 and 90% of the benthic species should be safe when exposed to 2,4-D DMA acutely or chronically at rates recommended on the label. Field work indicates that 2,4-D has no significant adverse impacts on fish, free-swimming invertebrates and benthic invertebrates, but well designed field studies are in short supply. According to the Department of Ecology's Risk Assessment of 2,4-D, in the United States, 2,4-D BEE is the most common herbicide used to control aquatic weeds. 2,4-D BEE, has a high laboratory acute toxicity to fish (LC50 = 0.3 to 5.6 mg a.i./L for rainbow trout fry and fathead minnow fingerlings, respectively). Formal risk assessment indicates that short-term exposure to 2,4-D BEE should cause adverse impact to fish since the risk quotient is above the acute level of concern of 0.01 (RQ = 0.1 ppm/0.3 ppm = 0.33). However, the low solubility of 2,4-D BEE and its rapid hydrolysis to 2,4-D acid means fish are more likely to be exposed to the much less toxic 2,4-D acid. 2,4-D acid has a toxicity similar to 2,4-D DMA to fish (LC50 = 20 mg to 358 mg a.i./L for the common carp and rainbow trout, respectively). In contrast, formal risk assessment with 2,4-D acid indicates that short-term exposure to 2,4-D BEE should not cause adverse impact to fish since the risk quotient is below the federal level of concern of 0.01 (RQ = 0.1 ppm/20 ppm = 0.005). To conclude, 2,4-D BEE will have no significant impact on the animal biota acutely or chronically when using applied rates recommended on the label (Washington State Dept. of Ecology, 2001b). Although laboratory data indicates that 2,4- D BEE may be toxic to fish, free-swimming invertebrates and benthic invertebrates, data indicates that its toxic potential is not realized under typical concentrations and conditions found in the field. This lack of field toxicity is likely due to the low solubility of 2,4-D BEE and its rapid hydrolysis to the practically non-toxic 2,4-D acid within a few hours to a day following the application.

Plants:
2,4-D is a selective herbicide and milfoil is particularly susceptible at a labeled rate of about 100 pounds per acre (granular product). At this rate impacts to other aquatic plant species are minimal, although impacts to yellow water lilies have been reported after the granular 2,4-D treatment in Newman Lake. Even if applied at higher rates there are only a few other aquatic plant species that are affected by 2,4-D. A study conducted in Loon Lake Washington showed

that Eurasian watermilfoil was the only aquatic plant whose growth was statistically reduced by the 2,4-D application (Parsons, et. al, 2001). In the Loon Lake study up to 98 percent of the Eurasian watermilfoil biomass in the treatment plots was removed after the July treatment.
A few days after the 2,4-D treatment, observers will see the growing tips of milfoil plants twist and look abnormal. These plants will sink to the sediments usually within one to two weeks of treatment. Unless treatment takes place in dense beds of milfoil, it is unlikely for low oxygen conditions to develop. Results of spot treatment may be variable depending on water movement, size of treatment plot, density of milfoil, weather conditions, underwater springs, etc.

Kokanee
There has been some concern about sub-lethal impacts to salmonids from herbicide use. The Department of Ecology has funded studies to determine the impacts of herbicides on the smoltification of coho and chinook salmon. Preliminary data from the University of Washington indicates that 2,4-D, used at much higher rates than proposed in this plan, does not interfere with the smoltification process. Ecology does not anticipate any impacts to kokanee from 2,4-D use.

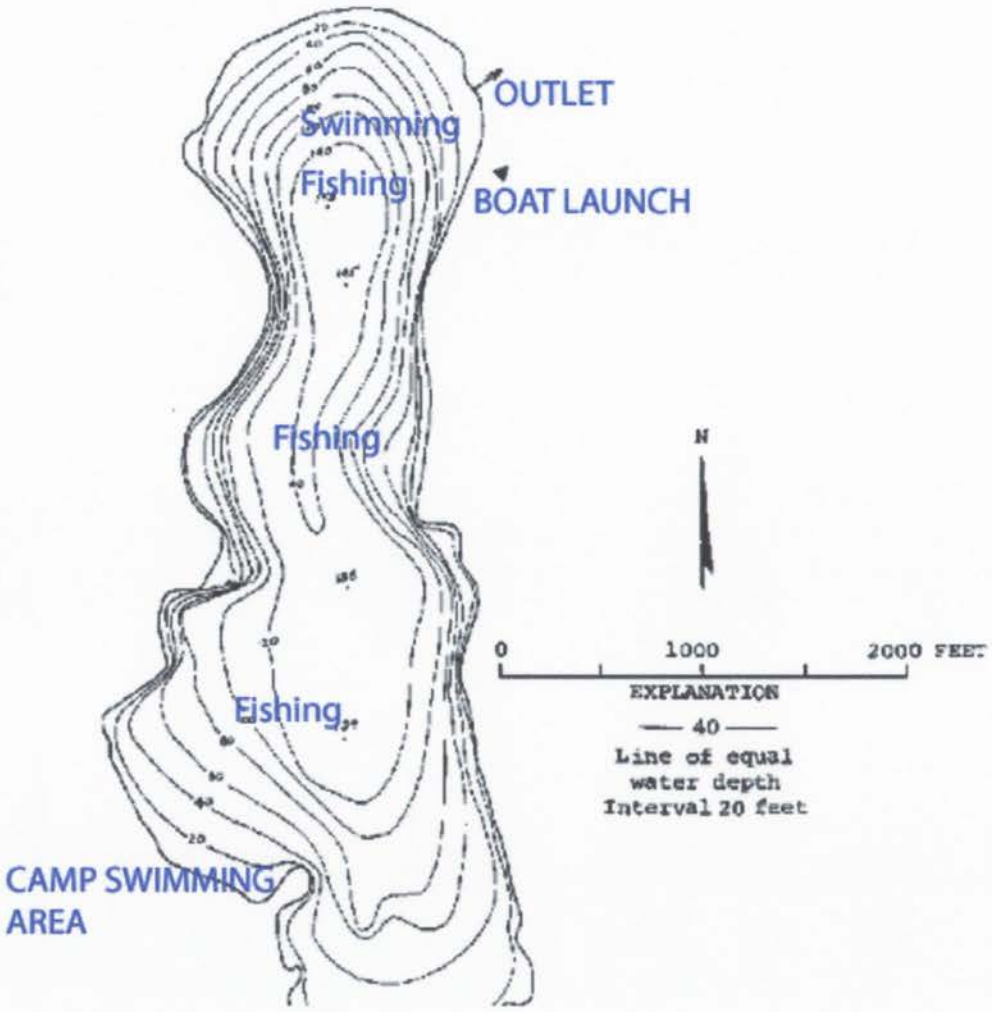
Special considerations:

- Water users must be identified prior to herbicide application. 2,4-D has irrigation restrictions and drinking water restrictions. Water within the treatment areas cannot be used for drinking until 2,4-D concentrations have declined to 70 ppb at the intake and water used for irrigation cannot be used until the concentrations are 100 ppb or less at the intake. The current 2,4-D labels do not allow for setback distances. If water users do not have other water sources, the project proponents must arrange for alternative water supply during the time that the herbicide is in the water.
- Ecology recommends that swimmers stay out of the treatment area for 24-hours after 2,4-D treatment.
- A state-certified applicator must be used to apply herbicides to the water.
- A permit called a National Pollutant Discharge Elimination System Permit (NPDES) permit is needed to treat water bodies with aquatic herbicides. All permit provisions must be followed to be in compliance with the permit. These provisions include notification of shoreline residents 10-21 days prior to treatment and posting the areas adjacent to treatment the day of treatment.

X. Public Involvement

After milfoil was discovered in Davis Lake in 1996, the Davis Lake Community was very involved in studying milfoil eradication methods and in communicating with the greater community. Public meetings and the landowners' association annual meetings and newsletters addressed the problem and the efforts at control were documented in the regional newspaper. Copies of these documents are found in the appendices.
Prior treatments have been performed without any hazardous impacts but the potential does exist for future treatments to cause problems. If this situation does arise, any mitigation will be accomplished after a thorough investigation of the incident by an independent source.

FIGURE 1: The depth contours of Davis Lake and the Uses of the Lake.



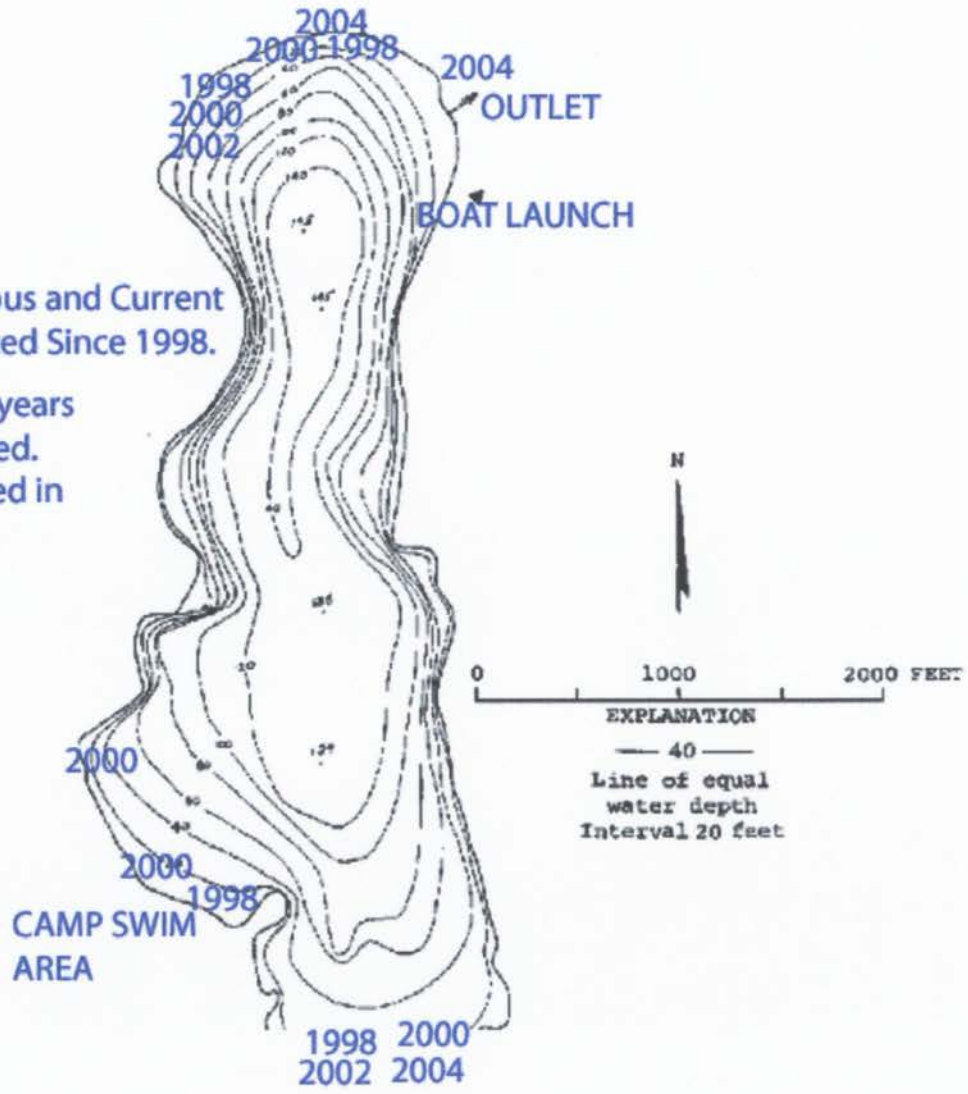


FIGURE 2: Locations of Previous and Current Milfoil From Surveys Conducted Since 1998.

The dates are shown for the years when surveys were conducted. Chemical treatments occurred in 2000, 2001, 2002 and 2004.

96/97 Newsletters

SHOP TALK

Last and First Meeting

The 13th of July Davis Lake Landholders Association Inc. held its pot luck luncheon and last annual meeting for 1995/1996 year. This was held at the Cusick Fair Grounds. The Association and members elected three new board members and Roberta Decker as secretary.

The first board meeting for the new 1996/1997 year took place after the luncheon and last meeting of the year at the Cusick Fair Grounds. The new board elected the following.
Dave Cox, President, Gene Fitzpatrick, Vice president, Ray Decker, Treasurer.
Three year term: Vicki Vaughn, Gene Fitzpatrick, and Ray Decker.
Two year term: Bettie Perry, Virginia Snow, and Harold Lepoidevin.
One year term: Nadine Geile, Dave Cox, and Leroy Erlwein.

GRANT

By Gene Fitzpatrick

The Davis lake Landowners Association has applied for a grant from the Department of Ecology to do a watershed study. The Association's request is being sponsored by the Pend Oreille County Conservation District. The request was submitted in February, however we will not know if we will receive the grant until this summer. If we are successful in getting this grant the study will begin in 1998. The goal of this study is to develop some basic scientific data about Davis lake and the surrounding watershed. After the study is completed, we will have a baseline of information to start work on the problems facing the lake.

Writing a grant request is a specialty and without training and experience, the members of the Association Board of Directors felt that obtaining professional help was necessary. With the help from the Conservation District, who agreed to share in the cost, we were able to secure Shelly Gilmore of Resource Planning Unlimited. Shelly has worked in the Pend Oreille area before and was able to put together a grant request on short notice. The grant is for $43,040. If the grant is awarded the Association is asked to provide volunteers who will donate their time. Volunteers will be asked to collect water samples and other items for analysis on a regular basis for a number of months. The Association and volunteers will also need to participate in a watershed awareness campaign that spreads the word on how to keep the watershed healthy.

The Association Board is hopeful we will obtain this grant. If we are unsuccessful we will need to look at other sources of money. Loan programs are available, however, since we are a small group with limited resources this is not a preferred option. Without some assistance we can only work piecemeal at the problems facing the lake. Each action we take to solve a specific problem helps, but without an overall plan we are not as effective or efficient as we could be if we receive the grant.

If you would like any information on the grant call Bettie Perry or Gene Fitzpatrick since they have been working with Shelly Gilmore and the Conservation District.

97/98 Newsletter

SHOP TALK

By Gene Fitzpatrick, President

Since our annual meeting last July the Association has been quite busy. The Board of Trustees has taken on several projects to make the lake a better place. A recap of our three main projects is as follows:

Water Quality

Our biggest project is controlling the Milfoil weed that is in the lake. We have been working on this problem for quite some time. As you know, last spring we submitted a grant request to the Dept. of Ecology to do a watershed study and provide some money for weed control. Unfortunately, our request was not funded. Since this route wasn't available we decided to see what we could do on our own. We had the county Weed Board do a survey in the fall to see how far the milfoil had spread. A preliminary estimate is that 1,000 square feet of the lake is infested with the weed. We were able to find a local water resources firm that has experience in milfoil control that has agreed to help us. The Board of Trustees reviewed and accepted the contract in April and we plan to begin the milfoil control program in June of this year. First a hydraulics permit from the Department of Fish and Wildlife is necessary. We were approved on April 30,1998. Second, the firm will do a survey by boat and with divers to see if the 1,000 sq. ft. estimate is accurate. Once the survey is completed we can begin the third part. In the third phase divers will be used to place bottom barriers (tarps) over large weed beds and hand pull in other areas. This will be a two-three day process.

The Association cannot afford this project on its own and Camp Spalding has agreed to help pay for of the project. In addition we will be asking others (individuals and firms) in the Davis lake area to help with this project.

Estimated cost of the project:

1000, Sq. ft. $1,600.00 for bottom barriers; $450.00 for survey by divers; $900.00 for picking weeds in selected areas. Estimated cost: $2,950.00. The cost will increase if the infested area has increased.

Abandoned Properties

The Board of Trustees, on behalf of the association members, has been in regular contact with the County Health Dept. and the Pubic Works Dept. to get two unsafe properties cleaned up. Some progress has been made, but the process the county officials must follow is a lengthy one.

Boat Launch

The Board of Trustees has agreed to participate in the *Adopt a Launch* program through the Dept of Fish and Wildlife. This is modeled after the Dept. of Transportation's program where groups take responsibility for a section of the road and periodically clean up the litter. The Association would do the same thing at the launch and we are just waiting for the paperwork to come from Olympia. Also, the Dept. of Fish and Wildlife has agreed to our request to improve the toilets at the launch and work will begin this summer. We will also get new signs and have talked with them on getting new trees and shrubs planted to improve the barrier between the launch and houses.

If you have any questions or comments about these three projects feel free to call me or stop by and see me. I can be reached at 892-4572 at work, or at 447-3311 at the lake.

Davis Lake Landholders Association Inc; Newsletter
1998/1999

Volume 4

Bettie E. Perry - Editor

Annual Meeting and Potluck Picnic

Come one, come all, lets have some fun!!!

Mark your calendar for Saturday, July 24,1999. Annual meeting to follow picnic. This will take place under the pavilion at the Cusick Fairgrounds starting at 12 noon.
Bring your favorite potluck dish, or dishes, your own place setting, glass, or cup. One does not have to be a member of the association to attend, so come and join the fun with your friends and neighbors.

ALUMINUM CANS

1998 aluminum can drive brought in $60.78. If you do not save, or don't want to carry your aluminum cans from the lake to home, please drop them off at Gene Fitzpatrick's , 161 Davis Plat Rd; or Virginia Snow's place. There is a large barrel at each place for you to deposit your cans. Each barrel is marked and your aluminum can donations are appreciated.

PRAYER FOR THE DAY

Dear God,
So far today, I've done all right.
I haven't gossiped and I haven't lost my temper.
I haven't been grumpy, nasty, or selfish.
But in a few minutes, God, I am going to get out of bed and that is when I'm going to need a lot of help.
Amen

SHOP TALK

Presidents Report
The Davis Lake Landholders Association has been very busy in 1998. Here is a recap of our activities:

1) Milfoil:
We started our control program in an attempt to beat back this weed. The generosity of the residents of the lake along with a donation by Camp Spalding funded last summers work. This year we will begin the second round of work. In October, I wrote you asking for a donation to allow us to place in a bottom barrier and have the divers weed selected areas. To those who already sent in their donation. Thank you. To those who have not sent in their 1999 donation, please do so by June 15th.

June 15, 1999

Dear Davis Lake Neighbor:

This letter is to inform you that our 1999 Milfoil control program is underway. We have revised our plans for controlling the weed due to a change in state law that occurred in May of this year. Instead of placing a bottom barrier over a portion of the weed patch and using divers to hand pick the weed, we will use a chemical called "Navigate" to control the weed. This letter along with the attached notification form is being sent to the landholders around Davis Lake and creek as part of the notification process.

The Board of Trustees of the Davis Lake Landholders Association has been working on the milfoil problem for several years. Our options have been limited due to government restrictions and little money. The trustees have reviewed the weed control options available and felt that using "Navigate" is the best alternative. The chemical is more effective in controlling this weed and the cost is lower than barriers. This summer, Sacheen and Liberty Lakes will be treated with "Navigate" to control the weed. Last year, the chemical was used in Loon Lake with good results.

As with any chemical, the application has to be in a safe and sound manner. Resource Management, Inc. (RMI) is a respected natural resources firm will be doing the work. Their staff has the training and experience to do this job.

"Navigate" is designed to control milfoil and other plants. The risk to the fish and other wildlife is low. There are temporary restrictions (two - five days) on using the water for drinking and irrigation. The water will be sampled and tested after the chemical is used. Included with this letter is a fact sheet about "Navigate".

We are scheduled to treat the lake during the week of July12-16, 1999. Notices and signs will be posted to inform lake users.

If you have any questions or concerns, please contact me. I can be reached at (509) 838-0136. I will be also hosting a informational meeting at my home at 161 Davis Lake Plat Road on June 30, 1999 at 7:00 pm. Dave Lamb from RMI will be also be there to answer questions. Please bring a lawn chair to the meeting.

Weed control is expensive and we need your financial assistance since we receive zero in government funding. Please send your donation to DLLA, 19 East 28th, Spokane, WA 99203.

If we work together we can keep Davis Lake a nice place for all of us to enjoy.

Sincerely,

Gene Fitzpatrick

Gene Fitzpatrick, President, Davis Lake Landholders Association

NAVIGATE FACT SHEET - TECHNICAL SERVICE REPORT NO. 140-398

EPA Reg. No. 264-109-8959 EPA Est. No. 33560-TN-1

BASIC FACTS

a. NAVIGATE is a granular formulation containing 27.6% active ingredients. The active ingredient is the butoxyethyl ester of 2,4-Dichlorophenoxyacetic Acid (2,4-D).
b. NAVIGATE selectively controls some of the most troublesome aquatic plants such as watermilfoil, coontail, water stargrass and spatterdock.
c. NAVIGATE readily sinks to the bottom around plants where it is most effective.
d. NAVIGATE provides gradual release and systemic action for complete kill of entire plant.

APPLICATION RATE

Apply NAVIGATE at the rate of 100-200 pounds per surface acre (1-2 lbs. per 430 sq.ft.). Application should be made on smooth surface infested with weeds so granules will settle to the bottom around roots and stems.

METHOD OF APPLICATION

Granules may be applied with a dry fertilizer spreader or broadcast in the treatment area.

CONTAINER SIZE

NAVIGATE is available in 50 pound bags.

ADVANTAGES

a. NAVIGATE controls a large number of nuisance aquatic plants.
b. NAVIGATE controls weed for up to 1 or 2 years.
c. NAVIGATE has a low toxicity to fish and other aquatic organisms.
d. NAVIGATE can be used to spot treat along shorelines and beaches and around docks.

RESTRICTIONS

Restrictions vary from state to state. Contact your local fish and game agency in order to determine what restrictions may exist on fishing, swimming, irrigation, stock watering and water used for domestic purposes.

98/99 NEWLETTER

SHOP TALK

Presidents Report
By: Gene Fitzpatrick

Last year (1999) was a busy year for the trustees of the Davis Lake Landholder Association. First on agenda was the Washington Lakes Protective Association (WLPA) Conference which was held in Spokane. I attended the two day conference and became informed on a number of issues facing lakes in the Northwest and met some very dedicated people who work tirelessly to keep lakes clean and a fun place to swim, boat, fish and live.

In July, we completed another round in the milfoil control project. A change in government regulations allowed us to use a chemical called Navigate. This treatment method is much cheaper than using divers to hand weed. We applied Navigate in the housing area and outlet on the north end of the lake and by Camp Spalding. The application of the chemical went well and we were even on TV. We have also spent time researching a Fish Net Pen project and doing the paperwork for a grant from the Department of Ecology to fund additional milfoil control.

This year (2000) will be busy. As of the writing of this letter we will be doing another milfoil treatment in mid- June using the chemical Navigate. The treatment area will be the housing area and outlet on the north end. Resource Management, Inc. is the firm we have used for several years and they will performing most of the work. We hope to get started on the net pen project and I encourage you to read the detailed article on this project that is in the newsletter.

This year we have the opportunity to hold our Annual Meeting for Davis Lake residents at Camp Spalding on June 3rd. Please come and enjoy the great food and visit with your neighbors. We will be having a guest speaker from the Pend O' Reille Conservation District this year. The Conservation District has started a comprehensive study of the Davis Lake Watershed and this is a great opportunity to find out about the natural environment of our area. My thanks to Andy Sonneland, Director of Camp Spalding for squeezing us in during a busy season. With our annual meeting early in the summer, we plan to have an end of the summer potluck. Look for the notice on your door later this year.

I would like to thank all my fellow trustees for their time and dedication in working on lake issues. Roberta Decker and Bettie Perry get special thanks for their work on the grant and newsletter which takes time to prepare.

If you have any questions or comments about what the Association is doing or other items at the lake please feel free to contact me. I can be reached at (509) 892-4572 during the day or (509) 838-0136 or (509) 447-3311 in the evening. If you prefer, stop by my place at 161 Davis Lake Road.

SEE YOU AT THE LAKE!

Milfoil

By: Gene Fitzpatrick

Our work continues. Last summer we did a chemical application in July. The area's of heavy growth were stressed, but the plant did not die as hoped. In the area's of lighter infestation we knocked back the weed. If was an

interesting project. If you noticed the painted milk jugs which we used as marker buoys you saw that a large portion of the lake was treated. We have scheduled another chemical application again this year in mid June. If you have any questions about what will be done, please attend the Annual Meeting on June 3rd at Camp Spalding to get your questions answered. Resource Management, Inc. a respected natural resources firm who has worked with us for several years on our milfoil problem will be doing the treatment again this year.

In 1999 the Association received its first ever government assistance to control milfoil. The Pend O'Reille County Commissioners granted us $500 out of their thin budget. We appreciated it very much. Prior to receiving this small grant, the entire weed control project ($5,000+) was funded by individual donation and money raised through garage sales and can recycling.

This milfoil control project is like all weed control projects. We have to work it every year for it to be effective. This costs money, so in January of 2000 we submitted a grant request to the Department of Ecology for $5,000 under the Early Infestation Program. We were denied by the department since they felt the request did not meet the program criteria. They did offer to help us write a weed control plan that we could submit for funding, but there were no guarantees.

I appealed the decision of the Department of Ecology and upon appeal our grant request was approved. As of this writing we are waiting for the Department of Ecology to send the send the paperwork to the Pend O'Reille County Weed Board who will oversee the grant process. I am not sure of all the steps we need to go through to get the funds or when they will be received, but it will be worth the effort. This grant is on a share basis, and the state will fund 85% of the $5,000 and the Association the remaining 15%.

With the funds we have on hand today and with the grant money we will receive we should be able to fund our milfoil control program until 2003. The money will last this long only if we continue to use a chemical to control the milfoil. If we need to go to another method or we find that the weed has spread and has infested a wider area we will need additional funds. We plan to do another underwater survey in 2001 to determine the effectiveness of the chemical treatment and to assess if the weed has spread.

It is very important to all the residents of this lake that we control this weed. A milfoil choked lake ruins shore activity and swimming, degrades the fishery and lowers the value of your property.

Adopt - A - Launch

The Association is teaming up with the Department of Fish & Wildlife for another year in this program. This is our third year. This program is modeled after the highway program where groups or individuals take a little time to clean the roadside. Under the Adopt - A- Launch program we take a few minutes each week and clean the boat launch area. Why? Well, the department has limited resources. They have one crew that covers fishing and boat access areas in the eastern district. With limited coverage, it is not possible for the department to clean our boat launch as often as they would like to in the summer. This year, they will get to our launch once every two

allowing us to use the facility. Russ Fletcher from the Pend O'Reille Conservation District was our guest speaker. Russ brought us up to date on what the district is doing and planted the seed for our greenbelt project. The folks at the Conservation District do a lot of good work throughout the county and have been very helpful on our project.

If you have any questions about what the Association is doing or you have ideas or comments, please contact me. I can be reached at 892-4572 (work) 838-0136 (home). If you prefer, please stop by and see me at 161 Davis Lake Road.

See you at the lake!

Milfoil Project

We are making progress in controlling this noxious weed! In June of 2000 we did another application of the chemical Navigate. The chemical was applied in the outlet, by Camp Spalding, at Logan's Cabin on the south end and in part of the housing area on the north end. The chemical was very effective on the large weed patches in the housing area and down by the camp. In September we had the divers up to do another underwater mapping. Our thanks to Joyce Fluaitt for driving the boat and assisting the divers.

This June we will again apply the chemical in three areas. They are 1) a small area at the north end, 2) a patch between the rock island and camp and 3) at the south end of the lake by the marsh. Signs will go up and notices placed on docks just before the treatment. The areas where the chemical is spread will be marked with buoy's. The buoys and signs will stay up for 3-4 days.

The chemical is not harmful to fish, wildlife, plants or humans. Dave Lamb who has a chemical applicators license will do the treatment. He has worked with us for several years and is very familiar with our situation.

In the outlet we are trying a different method to clear the weeds. We have hand pulled, raked and tried the chemical. To date, we have not been able to beat back the weed in this area. This year we will install a "Bottom Barrier". This is a large plastic tarp that is put in place by scuba divers and held with sacks of gravel. The barrier will be in place for several months in order to smother the plants. We are trying the barrier in order to open up part of the channel. The weeds are so thick in the outlet, the water flow is slowed and all the garbage that flows into the outlet gets caught up in the weeds. It will take some time, but we need to open a channel.

The Greenbelt at Davis Lake

Our lake is a nice place and we are going to make it even nicer. How? By planting over 900 trees and bushes along the east shore between the lake and the highway guardrail. The paperwork is done, the permits obtained, the plants have been purchased. Now we need you for a few hours on April 21st (Saturday morning at 9am).

North Idaho man faces child mol

SECTION B

Saturday, May 26, 2001
The Spokesman-Review
Spokane, Wash./Coeur d'Alene, Idaho

THE R

To contact the City Desk, dial (509) 459-5400; Fa

Court decision bloc

BACKGROUND

Spill killed Oregon fish

The permit requirement stems from a federal lawsuit filed after water treated with an aquatic herbicide overflowed from an irrigation system into Oregon's Bear Creek. The 1996 spill killed more than 90,000 juvenile steelhead. The herbicide is banned in fish-bearing waters.

Two environmental groups sued, saying that irrigators lacked permits required under the Clean Water Act of 1972. Judge Ann Aiken threw out the suit, saying that the permits weren't required unless the EPA specifically noted such a need on the pesticides' labels.

That decision was reversed in March by the 9th Circuit Court of Appeals in California.

By Dan Hansen
Staff writer

Aquatic herbicide, pesticide use requires federal permits

A legal decision is clouding plans to continue using pesticides in the battle against lake-choking weeds.

The decision affects not only lake-restoration work, but irrigation and mosquito-control districts, oyster farmers and anyone else who uses aquatic herbicides or insecticides.

The 9th U.S. Circuit Court of Appeals has determined that users of the chemicals must have federal permits. But agencies won't be prepared to issue those permits until next year, at the earliest.

The ruling applies in Washington, Idaho and any other Western state. Some legal scholars predict courts in other regions eventually will reach the same conclusion.

Case comes to an end

Pesticides: Mosquito districts say they have to use chemicals

Continued from B1

other northeastern Washington lakes are in limbo. Twelve acres of milfoil in Liberty Lake will be poisoned "unless our attorney says we'd better not," said Lee Mellish, general manager of the Liberty Lake Water and Sewer District.

"If we let 12 acres of milfoil go this year, next year we might have 20 acres or 50," Mellish said. "It's a serious problem."

Irrigators and mosquito districts say they have no choice but to risk lawsuits.

Mosquitoes can spread encephalitis, which causes brain-swelling that can lead to convulsions or comas. West Nile virus, another ailment carried by mosquitoes, killed seven people in New York last year, and is spreading west.

"Some people may not like the word 'chemical,' but they certainly don't want a mosquito bite."

some Idaho irrigation districts, and he's advised them to use the least-harsh herbicides until the issue is settled.

"The risk (of a lawsuit) is there. How real it is, is hard to say," he said.

The permit requirement stems from a federal lawsuit filed after water treated with an aquatic herbicide overflowed from an irrigation system into Oregon's Bear Creek. The 1996 spill killed more than 90,000 juvenile steelhead. The herbicide is banned in fish-bearing waters.

Two environmental groups sued in federal district court, saying that irrigators lacked permits required under the Clean Water Act of 1972.

The government has never required National Pollutant Discharge Elimination System permits for pesticide applications. Normally, NPDES permits are required only for persistent water polluters, like sewage treatment

hearings and conduct the required studies, said Kathleen Emmett, who's designing a process for Ecology. Then, the process can be appealed by anyone who doesn't think it's stringent enough.

Emmett said the state is considering writing one NPDES permit that would cover all aquatic pesticide users. They wouldn't have to get individual permits, other than those

"To Ho... President Wa...

Washington's Coffin and interpretive signage courtesy of *The Mount Vernon Ladies' Association*

The Miner - Paper Newport, WA. August 19,1998 - Wednesday

Davis Lake landholders combat milfoil

By Robert Chaney Sr.
Features Editor

DAVIS LAKE Divers from the Olympia based Resource Management Group and the Washington State Lake Protection Association spent three days last week hand pulling Eurasian Milfoil on Davis Lake and, according to Davis Lake Landholders Association Trustee Bettie Perry, the venture was very successful.

The divers plan to return in for two more days on Aug. 31 and Sept. 1, to hand pull more of the weed on the lake.

The Davis Lake Landholders Association identified last year that there was a problem with Eurasian Milfoil on the lake and began taking measures to combat the problem.

The Association, according to president Gene Fitzpatrick, has been working for some time to address the problem. First the association made people aware of the weed and what they can do to help.

The weed is not native to North America and if left unchecked, it could choke the shallow sections of the lake and degrade fishing, boating, swimming and other fun activities.

See **MILFOIL** on page 12

MILFOIL:

Continued from front page

Second, the association applied for a Washington state grant to help with the milfoil problem and to study the Davis Lake watershed.

The grant was denied and the association board of trustees felt they couldn't wait any longer to deal with the increasing problem.

They researched several methods of controlling the weed, obtained a permit from the Washington State Department of Fish and Wildlife and began control of the milfoil this month.

The association also retained Resource Management Group, which has a regional office in Medical Lake, to do the work. The firm did a similar project on Sacheen Lake.

Dave Lamb, who heads up the Medical Lake office, began meeting with the association in June.

The estimated infestation of the weed was thought to be when the association brought in divers and did a survey by boat, the infestation was actually estimated at one to two acres.

In the third phase, the divers will be used to place bottom barriers (tarps) over large weed beds and hand pull other areas.

Last week the management group was out at the lake trying to cut back some of the weed manually. They spent three days at the lake cutting the weed.

The cost of the project was estimated at $2,950; $1,600 for 1,000 square feet of bottom barriers, $450 for the survey by the divers and $900 for picking the weed in selected areas.

However Fitzpatrick said on Tuesday, that when the final two dives are made, the association will have spent about $5,000 to date.

"We are a small organization and, while we don't have a lot of money to spend, we will try fund this; at the same time we will continue to control the milfoil as best we can," said Fitzpatrick.

The Association called for its members to make contributions to help combat the problem because of the high cost of weed removal. The fund raising effort response was very successful, Perry said. But the problem is not a one-time fix and the association will need to continue to raise funds to offset the costs.

Perry added that Camp Spalding donated $1,500 to the project.

The association will continue to accept donations for the eradication of the weed. If anyone wants to donate, they can send contributions to Davis Lake Landholders Association c/o Gene Fitzpatrick, 19 E. 28th Avenue, Spokane, WA 99203.

high standards we place on law enforcement he will suffer immensely," Clark said on Tuesday.

Clark went on to say that although the original allegation, out the community, Clark added that this decision had nothing to do with friendship. "It has everything to do with treating people with dignity, justice and fairness. To oper-

let the chief of police and the people of Newport down," wrote Schadler. "I want you to know that a lot of things that were in

See **RESIGNS** on page 16

Sacheen, Davis milfoil attacked

SACHEEN LAKE — Eurasian Water Milfoil in Davis and Sacheen lakes will be treated the week of July 12-16, said Sharon Sorby, Pend Oreille County weed control coordinator.

Resource Management, Inc., the same contractor that treated Diamond Lake last month, will spray milfoil infestations in both lakes with the aquatic chemical Navigate. This is part of a regional project approved by the State Legislature last winter. Some state funding is available, but the remainder of the money had to be raised by property owner associations at the two lakes.

The associations recently sought cost-sharing from the county, but Sorby turned them down, explaining that cost-sharing funds are very limited and are only approved for relatively small land-based infestations of noxious weeds.

Unlike the somewhat experimental chemical used at Diamond Lake, Navigate is a chemical approved for certain aquatic uses.

Eurasian milfoil is a non-native plant which has virtually no natural enemies to control it. If left unchecked, it will choke bays and beaches and degrade fishing, boating, swimming and other activities.

Eurasian milfoil was first discovered in the Pend Oreille River over a decade ago, and has been the subject of various control efforts. Lake year, milfoil was discovered in the Pend Oreille River in Idaho, upstream from Albeni Falls Dam, and also in a number of lakes in the region, including Loon, Diamond, Sacheen and Davis.

Sorby said Eurasian milfoil recently has been identified in Nile and Ledbetter lakes.

GREAT VIEW -- J mother Maryanne, go by during the G

Tra

By Mike Denuty
News Editor

NEWPORT — Tr organized by the L Oldtown Rotary Cl judged a succes, bu peat will be in a slig ferent format, s Geddes, Rotary spok

"We learned that do it and that there i interest in the comm the rides," Geddes s

He said the club anticipate doing a train rides this year, b possibly like to have two weekends next

Weather didn't a hamper the opera though space in the was at a premium d morning trip.

The biggest object that the ride, with s in Priest River and S was simply too long

Judge fines attorney in dog appeal

By Robert Chaney, Sr.
Staff Reporter

NEWPORT — Pend Oreille County Superior Court Judge Larry Kristianson did something last Thursday that he has never done before, sanction an attorney.

Kristianson imposed fines of $1,000 on Charles Dorn for his failure to obey a court order. Dorn, attorney for Swen and Jeanette Bergman, failed to have his brief in the case filed by May 15, as was ordered by Kristianson on April 1.

The Bergmans are appealing a 1997 District Court conviction on 16 counts of animal cruelty.

Dorn offered several excuses for his inattentiveness but said the failure to meet the deadline was "plainly and completely" his fault.

Kristianson denied the state's motion to dismiss on the grounds that the Bergmans had voluntarily and intelligently waived their right to an appeal because of the lack of activity in the case.

"I ruled in April that this was not a just reason to dismiss and this brief reads very similar to the one filed then so there will be no dismissal," said Kristianson.

County prosecutor Tom Metzger agreed that a Washington Supreme Court ruling wouldn't allow such a ruling.

A new briefing schedule was set with oral arguments in the appeal scheduled for Sept. 16.

The state must file a response to Dorn's brief by Aug. 13.

NEWPORT MINER
7/7/1999

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DAVIS LAKE — Granular herbicide treatments to attack pioneer colonies of Eurasian Water Milfoil in Davis Lake is proposed for Monday, June 12, according to a notice from the Davis Lake Landholders Association.

SCUBA survey by Resource Management Inc., in June 1998, showed milfoil in the northwest corner of the lake, along with smaller infestations on the east, west and south sides. At that time, the infestations covered an estimated three acres.

The association recently received $5,000 in grant money for the project from the state Department of Ecology's Early Infestation program (Senate Bill 5424).

The herbicide selected for this project is known either as Navigate or Aquakleen, uses the active agent 2,4-D as approved by the Environmental Protection Agency and Senate Bill 5424.

The chemical has been determined to be very effective against Eurasian milfoil, while not harmful to aquatic plants or fish according to state officials. This chemical can kill plants completely, not just defoliate the top portion leaving the root to regrow which is the case with other retreatments.

The grant is on a share basis with the state funding 85 percent of the $5,000 and the Landholders Association providing the remaining 15 percent. In 1999, Pend Oreille commissioners granted Davis Lake $500 with all previous milfoil control funds ($5,000) raised through individual donations, association-sponsored garage sales and can recycling.

The Pend Oreille County Weed Board will oversee the grant process.

For more information, call Gene Fitzpatrick of the landholders association at 509-838-1036 or Dave Lamb from RMI at 509-299-6306.

A number of water use restrictions are recommended in the treated areas, which will be marked by buoys and shoreline notices. The restrictions are as follows:

- Do not use treated water for irrigation, agricultural sprays, watering dairy animals or domestic uses.
- There is no fishing or swimming restriction due to this application.
- However, swimming is not recommended for persons who have sensitivities to organic phenoxy compounds.

Water testing may be performed to determine when all water use restrictions will be lifted. Shoreline notices and buoys will be removed to indicate the end of restrictions. It is expected that water use restrictions will be in force for two to four days.

...last week.

...all... the tax to be used for a variety of purposes.

...Your
Radio On. . . The Sequel"

SHOW ONLY:

June 2 & 9 • 7:30 p.m.

June 4 • 2 p.m.

$8 Adults • $6 Seniors & Students • $5 Under 12
Tickets at door

DINNER SHOW:

June 3 & 10 • 6 p.m.

$16 Advanced tickets at
Pulfords Floral or Owens Grocery

Presented by Northwoods Performing Arts
at the Circle Moon Theatre South of Lake Sacheen

NEWPORT MINER
5/31/2000

RMI Resource Management, Inc.
Eastern Washington Office
8711 South Rocky Lane • Medical Lake, WA 99022 • (509) 299-6306 • Fax (509) 299-6307

June 8, 1998

Mr. Gene Fitzpatrick, President
Davis Lake Landowners Association
19 East 28th Avenue
Spokane, WA 99203

Dear Mr. Fitzpatrick:

Following the completion of the Milfoil (*Myriophyllum spicatum*) survey last week, I am writing to provide you with a summary of our findings and some thoughts on controlling the growth of this aquatic weed. Basically, even though we found a considerable amount of Milfoil I feel that the infestation is still in a "pioneering" stage and will continue to expand its coverage of the near-shore areas of the lake.

It appears that the existing Milfoil beds extend from generally the three to the eight foot depths in most of the soft sediment areas of the lake. Along the north end of the lake Milfoil plants were seen to the 15 foot depth. The primary Milfoil areas that we observed were along the north end (especially the west end), the Camp Spalding waterfront and along the south end. There were two additional areas near the southwest corner where the Department of Ecology saw Milfoil plants in 1997 and we did not, most likely because they were narrow bands right near the shore. We estimate that the areas of "dense" growth (where there was little space between the Milfoil plants) were about 24,000 square feet along the north end, 4,000 square feet at Camp Spaulding and 1,000 square feet at the south end. Areas with "moderate" to "sparse" growth covered approximately 20,000 square feet throughout the lake. The total infestation, therefore, is between one and two acres.

Your options for Milfoil control at this point are somewhat limited because of the dispersed extent of the Milfoil growth and the cost of the currently available control techniques. Complete eradication would be possible using a chemical treatment with the aquatic herbicide Sonar AS (a liquid formulation of active ingredient fluridone) but the overall cost would be around $180,000. Sonar is the only product currently allowed for use in Washington State that can achieve this result while not impacting fish or native aquatic plants and not restricting the use of treated water for fishing, swimming or domestic uses. A typical whole-lake treatment with Sonar (as was performed at Sacheen Lake) would involve periodic re-applications to maintain the target dosage for an eight to ten week period, typically during April, May and June.

There are a number of options for spot treatments on limited areas. These options are more maintenance in nature because they will not preclude re-infestation from untreated areas of the lake. Chemical treatments, using Sonar SRP (a slow-release pellet formulation) or Aquathol (a granular formulation of active ingredient endothall) might

have utility but these would have to be evaluated on a case by case basis. There are other chemical products which may be approved in Washington in the next year or two which are better suited to spot treatments, but water use restrictions will likely remain an issue with these.

Perhaps the best options that you have at this time are hand removal or bottom barriers. As we have discussed, and you reiterated in your March 11, 1998 letter to me, diver time for hand removal would cost $900 per day. I estimate that divers could clear Milfoil from between 1,000 and 3,000 square feet of lake bottom a day depending on the density of plants. Again, the collected Milfoil will be brought to the shore for disposal by the landowners.

Bottom barriers can be installed for $1,600 for a 30' x 50' sheet (depending on the number and size of areas to be covered). This includes re-usable material (barrier and bags of pea gravel for anchoring) plus initial labor, and sales tax. Since you have received a Hydraulic Project Approval from the Department of Fish and Wildlife for bottom barrier placement, you are aware that the barrier material must be removed within two years of placement. This would likely be necessary anyway to prevent Milfoil from growing on top of the barrier. Our cost for bottom barrier placement does not include removal.

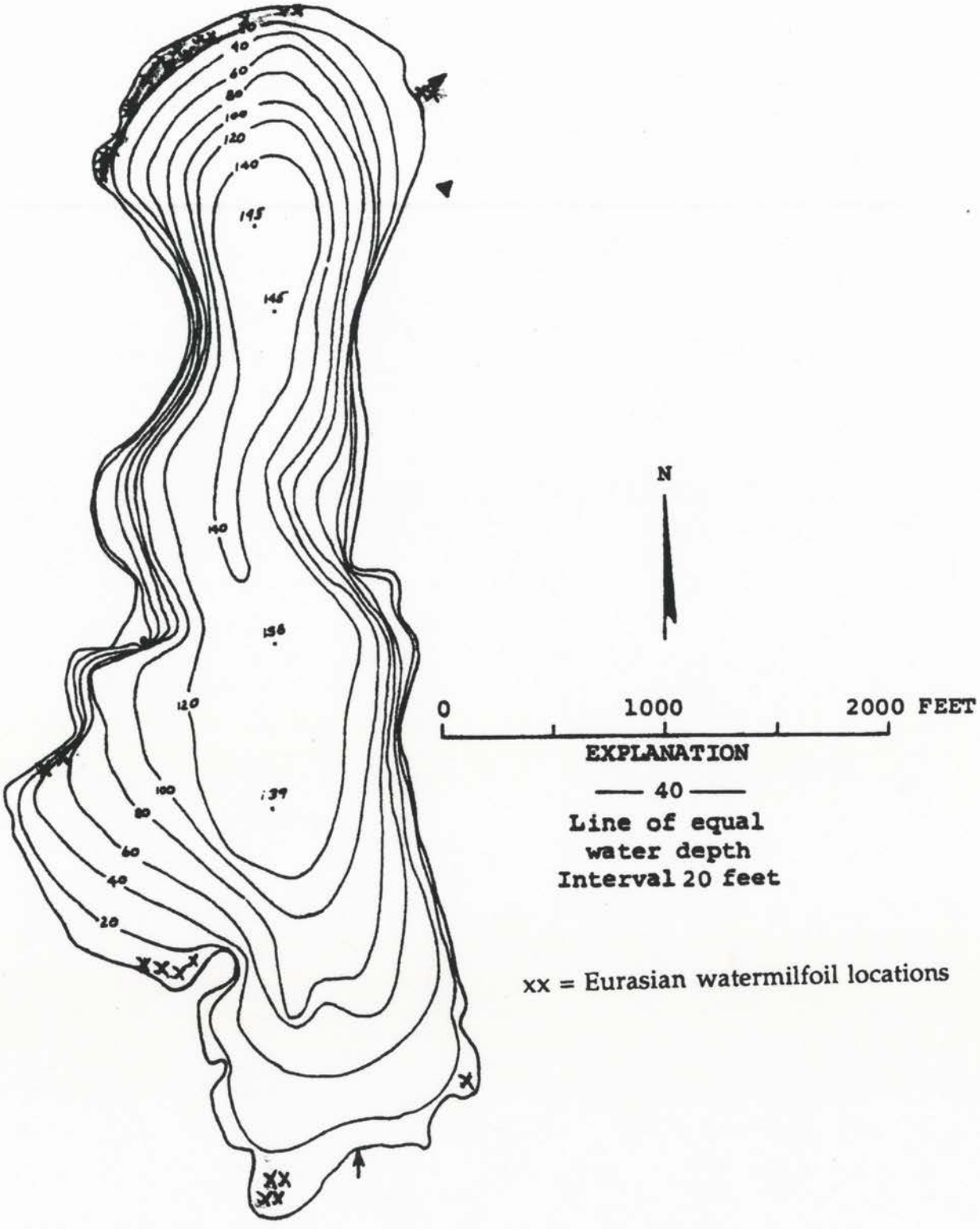
I should point out that there are various weed cutting devices available for lake homeowner use. I would not recommend these in Davis Lake unless an effective means of collecting the cut fragments can be found; otherwise the spread and reinfestation of Milfoil will be exacerbated.

I know that this survey did not turn up a pretty picture or happy ending for Davis Lake but I applaud your group, including the folks at Camp Spaulding, for taking the initiative to deal with this problem. I am looking forward to meeting with your group on July 11 and discussing your options for control of this pest plant. If you have questions regarding the survey or the Milfoil control options in the mean time, feel free to contact me.

Sincerely,

David S. Lamb
Aquatic Biologist

cc: Sharon Sorby, Pend Oreille County Noxious Weed Control Board



Davis Lake, Pend Oreille County, Eurasian watermilfoil locations map.
Survey conducted by RMI June, 1998 using SCUBA techniques.
Estimated total areal coverage of Eurasian watermilfoil is approximately three acres.

July 1, 1999

County Commissioner's
Pend O'Reille County
Newport, Washington

Dear Commissioners:

The Davis Lake Landholders Association is very appreciative of the $500.00 grant you approved for our milfoil control program. This donation gives our organization a major financial lift. We have been financing our program through private donations, raffles and recycling of aluminum cans. The taxpayers money will be used in the most effective manner. We are working with a respected natural resources firm who has the experience and skills to ensure that our weed control program is safe and sound. Davis Lake has brought many hours of fun to the residents of the county and we intend to keep the lake a nice place for all to enjoy.

Thank you for your support.

Sincerely,

Gene Fitzpatrick, President
Davis Lake Landholders Association

Association Trustees
LeRoy Erlwein
Dave Cox
Vicki Vaughn
Harold Lepoidevin
Virginia Snow
Nadine Geile
Betty Perry
Ray Decker

Resource Management, Inc. Eastern Washington Office
8711 South Rocky Lane • Medical Lake, WA 99022 • (509) 299-6306 • Fax (509) 299-6307

December 3, 1999

Mr. Gene Fitzpatrick, President
Davis Lake Landowners Association
19 East 28th Avenue
Spokane, WA 99203

Subject: Davis Lake year 2000 Milfoil controls proposal

Dear Mr. Fitzpatrick:

I am writing to provide you with a proposal to continue with Milfoil (*Myriophyllum spicatum*) control efforts in the year 2000. Following a recent visit to the north end of the lake, as well as conversations with yourself and Andy Sonneland, I would say that the herbicide treatments performed this past summer were effective in knocking back the Milfoil infestation considerably. However, Milfoil plants do still remain in both the treated and untreated areas. Therefore, I recommend that further treatments be performed in the coming year. These treatments should focus on the use of the 2,4-D herbicide but may include bottom barrier placement in the outlet area if desired.

Prior to performing any treatments in 2000, I recommend that a diver survey be conducted. This will allow us to focus the treatments where they are needed. As with the survey performed in June 1998, I will use two experienced SCUBA divers (myself included) which will be towed behind a motorized boat using underwater "sleds". We can use a volunteer boat and operator if available, which will defray the cost as indicated below. Due to the lack of suitable aquatic plant habitat along the east side of the lake, we will focus out efforts on the north, west and south shorelines. Following completion of this survey, which will be scheduled around the middle of May, I will prepare a map showing the distribution and relative density of the Milfoil and present this to you with a final treatment recommendation. The cost for this diver survey will be $525 (plus tax) if we use RMI's boat and $475 (plus tax) if you can provide one. We will need a volunteer operator for about four hours in any case.

A preliminary recommendation for treatment would be to apply granular 2,4-D (Navigate or AquaKleen) to approximately 1.3 acres along the north end, the outlet area, the north end of Camp Spalding's bay (under the cross) and the southwest corner of the lake. The unit price for these areas will be $430 per acre. In front of the Camp buildings and swim area where Milfoil is mixed with *Brasenia* I anticipate treating about 0.8 acres. The unit cost of this will be $530 per acre. The treatments will be performed by the middle of June.

As we have discussed, the treatment of the Milfoil in the outlet area with herbicide is problematic because of the flow through that area. I have included this in the herbicide recommendation, however, because I feel it is worth one more try and since it is a relatively small area. We can make a final decision about this following completion of the survey this spring. If the herbicide again proves to be ineffective or if you wish not to use herbicide there, you might consider having us place some bottom barrier in that area. The cost to install one 30 x 50 foot sheet of barrier, which should cover the dense patch of Milfoil in the middle of the "channel", would be $1,100 (plus tax). Note that this is a lower cost than quoted previously and it reflects the fact that the sand bags needed to secure the barrier are already on site. Additional sheets installed at the same time will cost approximately the same depending on the number and size of areas to be covered.

RMI will provide all labor (certified and licensed as appropriate), equipment and materials necessary to perform the survey and treatments described above. RMI will also provide notices of the herbicide treatment which can be placed on docks in the treated areas, and will place large notices at the five public access points (including Camp Spalding and the WDFW boat launch). The Davis Lake Landowners Association will be responsible for providing and placing buoys and dock notices around the herbicide treated areas. The Landowners Association will also be responsible for the required 21 day Agency and landowner notice for the 2,4-D treatment, for collecting and analyzing water samples for any desired 2,4-D analyses and for obtaining a Hydraulic Project approval for bottom barrier placement.

If you are in agreement with this proposal to perform a pre-treatment diver survey and for the unit prices stated herein, please sign below and return one copy of this letter to me as notice to proceed. A final decision on areas to be treated with herbicide and/or bottom barrier will be made following the survey. Payment will be due within 30 days of receipt of invoices which will follow completion of the survey and any desired treatment work.

Thank you for the opportunity to be of service. I will look forward to receiving your notice to proceed.

Sincerely,

David S. Lamb
Aquatic Biologist

cc: Andy Sonneland, Camp Spalding

APPROVED BY:

Name: _____

Title/Affiliation: _____

Date: _____

TO: TERRY McNABB

FROM: GENE FITZPATRICK 360 754-4561

SUBJECT: DAVIS LAKE

DATE: JUNE 1, 2001

ATTACHED YOU WILL FIND THE PAPERWORK FROM DAVE LAMB ON THE WORK THAT WOULD BE DONE THIS YEAR. SINCE GRANT MONEY CANNOT BE USED FOR THE CHEMICAL TREATMENT, THE DAVIS LAKE LANDHOLDERS ASSOCIATION WILL PAY FOR THIS WITH ITS OWN MONEY. I AM ASSUMING THE COST WILL BE THE SAME.

THE BARRIER WILL BE PAID FOR OUT OF THE GRANT. WERE YOU PLANNING TO INSTALL IT IN JUNE ALSO.?

I HAVE SOME BAGS FILLED WITH GRAVEL AT MY PLACE. THESE WERE USED AT SACHEEN LAKE A FEW YRS AGO. DAVE BROUGHT THEM TO ME TWO YEARS AGO. I WILL INSPECT THEM THIS WEEKEND TO DETERMINE THEIR CONDITION. THE BARRIER INSTALL CAN BE DELAYED IF NEED BE.

IS THERE SOME PAPERWORK FOR ME TO FILL OUT FOR THE BARRIER?

I WILL ASSIST ON TREATMENT DAY BY PUTTING UP NOTICES, ETC.

KYLE SENT ME THE PAPERWORK FOR AN NPDS PERMIT. I WILL GET STARTED ON IT.

THANKS.

4/9 - Call Terry @ Aqua. Still on for June to set date in early May.
4/10 - Called Sharon @ Weed. They will do permit & contract Aqua on paperwork
6/18 No grant $ for chemical. Need to use own funds.

AquaTechnex
8711 S. Rocky Lane
Medical Lake, WA 99022
Tel: 509-299-6306
Fax: 509-299-6307
Web Site: www.aquatechnex.com

February 14, 2001

Ms. Sharon Sorby, Coordinator
Pend Oreille County Noxious Weed Control Board
PO Box 5085
Newport, WA 99156

Subject: Davis Lake Eurasian Watermilfoil Eradication Project

Dear Ms. Sorby:

I am writing to provide you with a recommendation for Eurasian watermilfoil control activities for Davis Lake for the coming season. This work will be the continuation of survey and control efforts funded through the Department of Ecology's Aquatic Weeds Management Fund.

As you are aware, Resource Management, Inc. (RMI), now AquaTechnex, has performed Milfoil controls at Davis Lake in 1998, 1999 and 2000 under contract with the Davis Lake Landholders Association. This work has included diver surveys, diver hand removal and 2,4-D herbicide applications. Due to the limitation on funds that the DLLA was able to raise for these efforts, the focus has been on control of the infestation in the high use areas; that is primarily the north end of the lake and along part of the Camp Spalding property. While the treatments have been very effective in reducing the growth to below problem levels, there is ongoing reinfestation from the south end of the lake such that the benefit from these treatments can only be considered short term.

The first work performed under the AWMF grant was the diver survey performed September 5, 2000. The findings of this survey are summarized on the enclosed map. The Milfoil growth seen at the north end is very sparse, occasional plants with few native plants. At the south end the Milfoil is moderately dense and mixed with dense pondweeds, Coontail and Brasenia. There is sparse to moderate growth in the Camp Spalding bay and the outlet has a small area of dense growth.

Based on these survey results, I recommend an early season 2,4-D application to all known infested areas except near the outlet; the total to be treated would be 2.5 acres. The cost of this would be $450 per acre for a total of $1,125 (before sales tax). AquaTechnex will provide all labor (certified and licensed as appropriate), equipment and materials necessary to perform this treatment. We will also provide a treatment notice which can be copied and placed on docks in the treated areas by DLLA and/or the Weed Board. We will also provide large notices for placement at the public access points (including Camp Spalding and the WDFW boat launch) and we will place buoys around the herbicide treated areas. The Davis Lake Landowners Association or the Weed Board will be responsible for the required 21 day Agency and landowner notice for the 2,4-D treatment and for collecting and analyzing water samples for 2,4-D analyses if desired. We will be in touch with you to determine the actual treatment date which will be somewhat contingent on the water temperature reaching 60 °F.

For the outlet area (the lake side of the Highway 211 bridge) I recommend a combination of bottom barrier placement and diver hand removal. The 2,4-D application in this area last year had little apparent effect, most likely due to the water movement through this area. I believe that one 30' x 50' sheet of Texel barrier will cover the dense growth in the center of this area and approximately five hours of diver time (two divers) should allow most of the near-shore growth to be removed. The process of laying out the bottom barrier would be to spread out the full

sheet at the WDFW boat launch and roll it up on a light-weight PVC pipe so that it can be transported by boat to the application area. The divers will then roll the material out over the Milfoil growth and secure it with nylon bags of sand. Note that the Department of Ecology prefers the use of burlap for the barrier material and for the sand bags because it degrades and does not need to be removed. Due to the difficulty in effectively placing numerous narrow strips of burlap or in sewing them together before installation, I believe that the Texel / nylon bag option represents a more effective and reusable choice. The cost of the barrier installation and diver hand removal work as outlined will be $1,600 (plus tax). The cost of barrier and bag removal will be $500. The barrier should be installed early in the season, probably in June, and would require that a WDFW Hydraulic Project approval be applied for by DLLA or the Weed Board. The barrier removal would be during the summer of 2002.

I also recommend that a diver survey be performed during mid-summer (late July or August) to determine the effectiveness of the 2,4-D treatment and also the status of the bottom barrier. The cost of this effort will be $525 (plus tax) and we will need a YMCA or Weed Board volunteer to assist with the operation of the boat.. From this survey I will again generate a Milfoil map which I will make available to you for review and discussion and I will also prepare a recommendation for late season treatments, if warranted. Late season treatment would most likely be further 2,4-D application and would be billed at the unit cost of $450 per acre.

If you are in agreement with this recommendation and the prices stated herein, please sign below and return one copy of this letter to me as notice to proceed. Payment will be due within 30 days of receipt of invoices which will follow completion of the various aspects of the work.

Thank you for the opportunity to be of service. I will look forward to receiving your notice to proceed.

Sincerely,

David S. Lamb
Aquatic Biologist

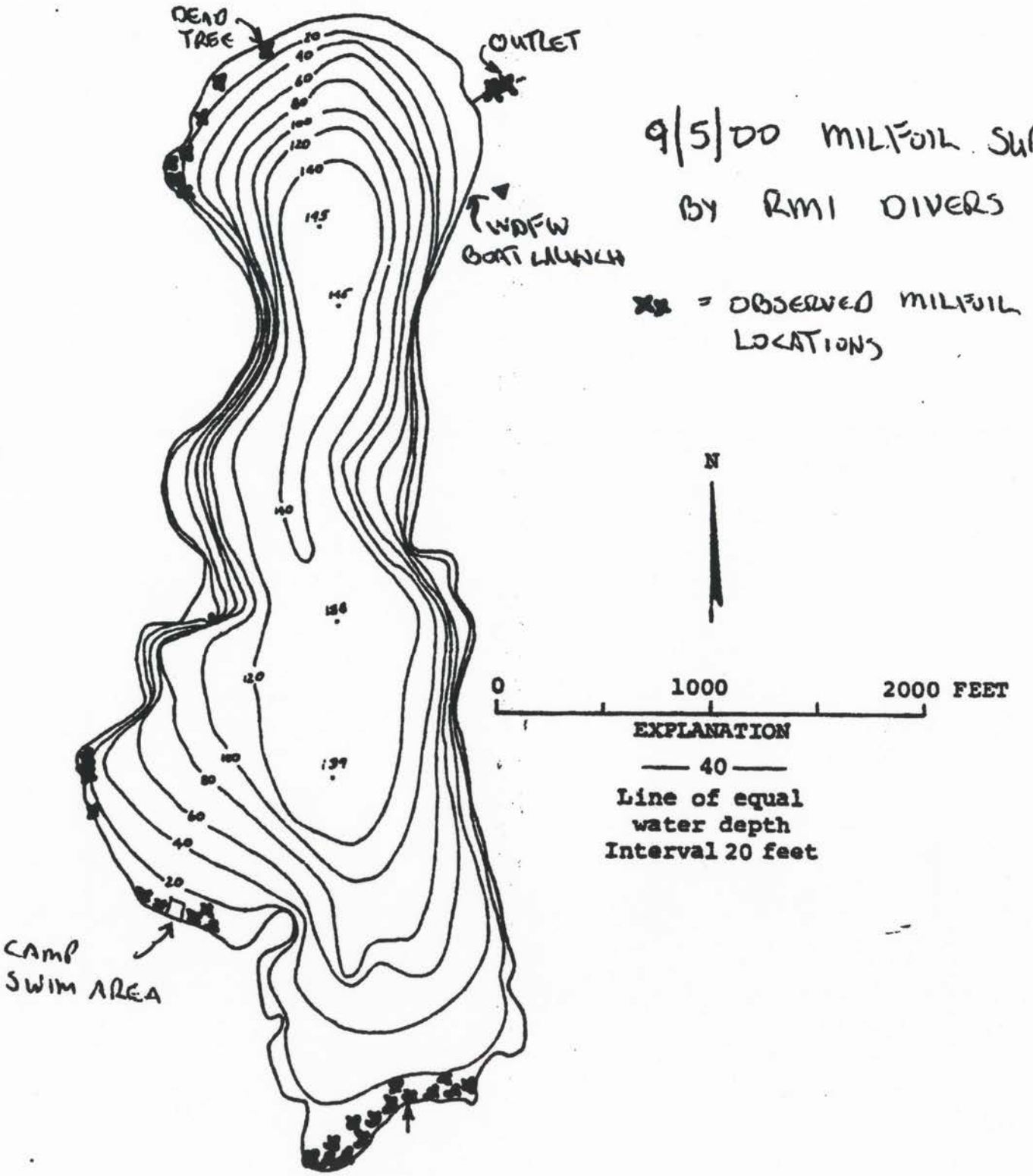
cc: Gene Fitzpatrick, DLLA
Kathy Hamel, WDOE

APPROVED BY:

Name: _____

Title/Affiliation: _____

Date: _____



Davis Lake, Pend Oreille County. From Washington Department of Game, January 1949.

May 30, 2001

Dear Neighbor:
Another round of Eurasian Milfoil weed control is to occur this June. We are using a respected natural resources firm to do the work between June 20th and the end of the month. We will be applying the chemical "Navigate" which we have used successfully in the past. It is effective in controlling the weed. Three acres will be treated this year. The treated areas will be marked with buoys. There are no restrictions on water use. Notices will be place around the lake on the day of the treatment. If you have any questions, please call me at (509) 892-4572.

Gene Fitzpatrick, President
Davis Lake Landholders Association

TO: AQUATECHNEX

FROM: GENE FITZPATRICK

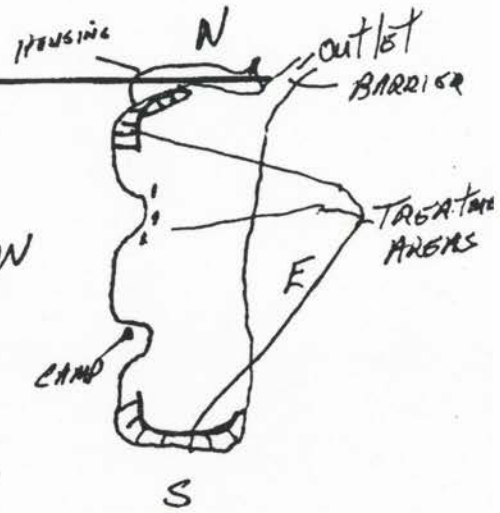
6 PAGE FAX INCLUDING THIS PAGE

JUNE 1, 2001

8:10 AM

AquaTechnex

P.O. Box 118
Centralia, WA 98531
Tel: 360-330-0152
Fax: 360-330-0174
Web Site: www.aquatechnex.com



Facsimile Cover Sheet

Date: ~~May 3, 2002~~ 5/11/02

FROM

To: Gene Fitzpatrick

Fax: 509-838-0136

Pages (including cover) 11

TO

From: David VanderMeulen, Kyle Langan

Comments:

Proposal for Eurasian watermilfoil control in Davis Lake in 2002

THIS IS A GOOD PROPOSAL, BUT WE CANNOT AFORD IT. WE ARE A POOR LAKE ASSOCIATION. WE HAVE $1,900 IN SAVINGS & WHATS LEFT OF OUR GRANT (ESTIMATE $3,500). WE HAVE TO STRETCH THIS MONEY TO COVER SEVERAL YEARS. IT WOULD BETTER FOR US TO NOT SURVEY THIS YEAR. $1,600 IN SURVEY COSTS KILLS OUR BUDGET. WE WOULD LIKE TO DO A TREATMENT ON THE SOUTH END, NORTH WEST SECTION OF THE HOUSING AREA AND IN SPOTS ALONG THE WEST SHORE. THE CAMP AREA WE WONT BE ABLE TO DO, AS THE CAMP IS OPEN & THE CAMP DIRECTOR IS LEARY OF HAVING A CHEMICAL TREATMENT IN HIS BUSY SEASON. THE BARRIER INSTAL IS OK. HAND PICKING MAY NOT BE FEASIBLE. LAST YEAR YOU TREATED IN JUNE & INSTALLED IN SEPT. IF WE COULD DO IT AGAIN (JUNE & SEPT) THIS MAY BE THE BEST PLAN. PLEASE CALL ME AT (509) 892-4572. I AM OUT OF THE OFFICE BUT WILL GET MY MESSAGES.

THANKS

May 3, 2002

Mr. Gene Fitzpatrick, President
Davis Lake Landowners Association
19 East 28th Avenue
Spokane, WA 99203

Dear Mr. Fitzpatrick,

I am writing to provide you with a recommendation for Eurasian watermilfoil (EWM) control activities for Davis Lake in the summer of 2002. This work will be a continuation of survey and control efforts funded through the Department of Ecology's (DOE) Aquatic Weeds Management Fund.

As you are aware, AquaTechnex (formerly Resources Management, Inc.) has performed EWM controls at Davis Lake for the past several years. The Davis Lake Landholders Association has been instrumental in working with AquaTechnex to control EWM in Davis Lake. This prior work has included diver surveys, diver hand removal, bottom barrier installation, and 2,4-D herbicide applications. Based on prior work conducted in Davis Lake, we would continue to focus on the high use areas infested with EWM. These areas are located primarily in the north end of the lake and in waters adjacent to the Camp Spaulding property. While prior treatments have been very effective in reducing growth of EWM to below problem levels, there is ongoing reinfestation from the south end of the lake such that the benefit from prior and current treatments can only be considered short term.

As with any lake that we anticipate applying plant control methods, we recommend that a diver survey be conducted. This will allow us to focus the treatments where they are most needed in an effort to ensure greater efficacy of the treatment. An experienced SCUBA diver that will be towed behind a motorized boat using an underwater "sled" would perform this survey. As before, we would focus our efforts on the north, west, and east shorelines, with a cursory examination along the east shoreline due to lack of suitable aquatic plant habitat. This survey would take place in the third or fourth week in May; after which we would prepare a map indicating the distribution and relative density of the EWM infestation and propose final treatment recommendations. The cost for this diver survey would be $715 (plus tax).

A preliminary recommendation for treatment would be to apply granular 2,4-D (Navigate or AquaKleen) to approximately 2.5 acres along the north end, the north end of Camp Spaulding's bay (under the cross) and the southwest corner of the lake, excluding the area around the outlet in which bottom barriers will be utilized. The unit cost to apply herbicide in these areas is $550 per acre for a total of $1375 (plus tax). These treatments will be performed in mid to late June. Total areas to be treated may be different than above depending on the preliminary diver survey. Additionally, the earliest date that the DOE will be issuing NPDES permits is June 15 (see enclosed Newsletter for update on herbicide permits).

AquaTechnex will provide all labor (certified and licensed as appropriate), equipment and materials necessary to perform this treatment. We will also provide a treatment notice that can be copied and placed on docks in the treated areas by DLLA and/or the County Weed Board. We will also provide large notices for placement at the public access points (including Camp Spaulding and the WDFW boat launch). The DLLA will be responsible for buoy placement around the treatment areas. The DLLA or the County Weed Board will be responsible the required Agency and landowner notices for the 2,4-D treatment (see NPDES Draft requirements in fax). As the NPDES permitting process is not yet finalized, we ask representatives of the DLLA to work closely with AquaTechnex as changes occur

prior to the issuance of the actual permit in mid June. We are committed to informing you of any changes in cost due to new/revised requirements in the upcoming NPDES permit and working with you to ensure all requirements are met prior to treatment.

Last summer (2001) you purchased two bottom barriers and had one barrier installed in the outlet area by AquaTechnex personnel. The cost to install the second bottom barrier in the outlet area would be $677 (plus tax) and includes preparation of a hydraulic project application. This cost reflects the fact that the bottom barrier has already been purchased and the sand bags needed to secure the barrier are already on site. Furthermore, the use of divers to hand pick the EWM in the near-shore areas not covered by the bottom barrier is recommended at an additional cost of $525.

Lastly, we recommend that a diver survey be performed during mid summer (late July or August) to determine the effectiveness of the 2,4-D treatment and the status of the bottom barrier(s). The cost of this effort will be $715 (plus tax). From this survey an EWM map will be generated and presented to the DLLA for review and discussion, followed by recommendations for potential late-season control efforts if warranted.

If you are in agreement with this recommendation and the prices stated herein, please sign below and return one copy of this letter to AquaTechnex as a notice to proceed. Payment will be due within 30 days of receipt of invoices which will follow completion of the various aspects of the work.

Thank you for the opportunity to be of service. I look forward to receiving your notice to proceed.

Sincerely

David VanderMeulen
Water Resources Specialist

APPROVED BY:

Name: _____

Title / Affiliation: _____

Date: _____

2003

NO TREATMENT. COMPLETED.

AQUATECHNIQUES CALLED TO INFORM OF DELAY DUE TO ISSUES INVOLVING SALMON IN WESTERN WASHINGTON/OREGON.

DISCUSSED OPTIONS OF NO TREATMENT OR LATE SUMMER TREATMENT AS WAS DONE IN 2002.

DECIDED ON A "NO TREATMENT" AS THE LATE SUMMER WORK OF 2002 WAS NOT THAT EFFECTIVE

AquaTechnex

P.O. Box 118
Centralia, WA 98531
Tel: 360-330-0152
Fax: 360-330-0174
Web Site: www.aquatechnex.com

Mr. Gene Fitzpatrick, President
Davis Lake Landowners Association
19 East 28th Avenue
Spokane, WA 99203

Dear Mr. Fitzpatrick,

Thank you for your request to receive Eurasian watermilfoil control at Davis Lake in 2004. As in the past we understand your budget constraints and will recommend that the Davis Lake Landowners provide volunteer workers to minimize cost with regards to notification requirements and surveying. We will require a copy of all lake front addresses the notices are delivered to and any treatment maps you can provide.

From our phone conversation you requested to receive 2 acres of control and our not sure what the camp will request. Unless told otherwise, we will not treat the Camp area until we receive notice from you or the director of the Camp. We will perform this treatment as early as possible in 2004 to provide maximum control. However, it is required we are in the near area to provide control at Davis Lake. AquaTechnex will notify shoreline homeowner prior to the treatment by posting treatment notices at shoreline homes (docks) on the day of treatment. AquaTechnex will also provide posting at the WDFW public boat launch with required larger signs. This posting on the day of treatment will not add additional cost to the job and needs to be performed by AquaTechnex personnel for liability reasons. The cost of the herbicide treatment will be $550 per acre and likely will be close to $1100.00 (plus tax). It is possible that the cost will be more if Camp Spalding request control. Please be aware that while prior treatments have been very effective in reducing growth of EWM to below problem levels, without total eradication of EWM from the lake there will be ongoing reinfestation of treated areas such that the benefit from prior and current treatments can only be considered short term.

If you are in agreement with this recommendation and the prices stated herein, please sign below and return one copy of this letter to AquaTechnex as a notice to proceed. Payment will be due within 30 days of receipt of invoices which will follow completion of the various aspects of the work.

Thank you for the opportunity to be of service. I look forward to receiving your notice to proceed.

Regards,

Kyle Langan
Aquatic Specialist

APPROVED BY:

Name: EUGENE PAUL FITZPATRICK

Title / Affiliation: PRESIDENT - DAVIS LAKE LANDHOLDERS ASSOCIATION

Date: APRIL 6, 2004

HERBICIDE APPLICATION
RESIDENTIAL AND BUSINESS NOTICE

Davis Lake will be treated with aquatic herbicide(s) on/or between the 22nd June to the 2nd of July 2004.

Attached is a map of the area(s) to receive treatment.

Notices will be posted at the shoreline just prior to treatment. They will also be posted at all boat launches on the waterbody within 1.5 mile of the herbicide treatment area.

The herbicide(s) and active ingredient(s) to be used are: Aquakleen or DMA 4 IVM (active ingredient 2,4-D)

Please obey the following use restrictions within the marked treatment areas: Do not use treated water for irrigation or agricultural purposes until herbicide levels drop below 0.1 ppm . Do not use treated water for domestic purposes until the herbicide levels drop below 0.07 ppm. This generally occurs within 72 hours or sooner. The lake will be sampled. If you wish to know when this level has been reached you can email us at terry@aquatechnex.com.

Herbicides to be used, their water restrictions, and the dates and locations of treatment(s) scheduled for the remainder of the season are: Navigate: Do not use treated water for irrigation or agricultural purposes until herbicide levels drop below 0.1 ppm . Do not use treated water for domestic purposes until the herbicide levels drop below 0.07 ppm. This generally occurs within 72 hours or sooner. The lake will be sampled. If you wish to know when this level has been reached you can email us at terry@aquatechnex.com. Additional treatments may be made, as necessary, every two weeks after the initial treatment within the treatment area(s) until the permit expires.

For more information contact the Applicator at:
AquaTechnex, LLC.
www.aquatechnex.com
360-330-0152

This herbicide treatment is regulated under a permit issued by the Department of Ecology, Water Quality Program and administered by the Washington Department of Agriculture. These herbicides have been approved for this purpose by EPA and the State Department of Agriculture.

AquaTechnex

P.O. Box 118
Centralia, WA 98531
Phone 360-330-0152
Fax 360-330-0174
www.aquatechnex.com

Facsimile Cover Sheet

Date: June 13, 2004

To: ADAM Gene Fitzpatrick
Fax: (509) 838-0136
Pages 3 (including cover)

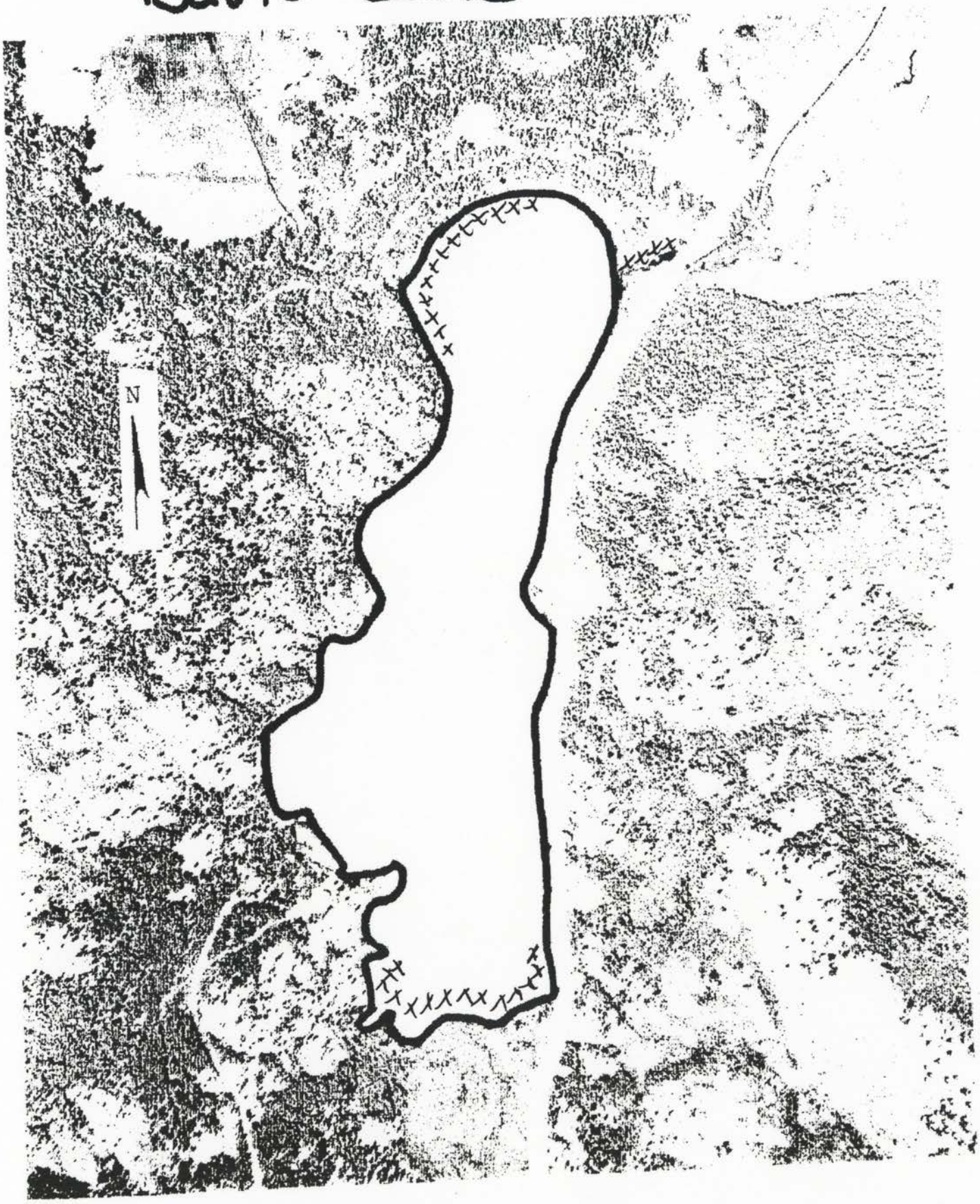
Re: Included is the Public Notice to be distributed to the lake residence. The treatment areas have not been indicated on the map. Please indicate potential treatment areas and fax back to us at (360) 330-0174. Thank you.

Sincerely,

ADAM
Adam Kleven
Aquatic Biologist
Adam@aquatechnex.com

TREATMENT AREA MARK'D WITH X
(HOUSING AREA ON THE N, FAR SOUTH END
= OUTLET

Davis Lake



NAVIGATE®

A SELECTIVE HERBICIDE FOR CONTROLLING CERTAIN UNWANTED AQUATIC PLANTS

ACTIVE INGREDIENTS:	
Butoxyethyl ester, 2,4-Dichlorophenoxyacetic acid, ...	**27.6%**
INERT INGREDIENTS:	**72.4%**
TOTAL	**100.0%**

*Isomer specific by AOAC Method, Equivalent to 2,4-Dichlorophenoxyacetic Acid 19%

EPA Reg. No. 228-378-8959 **EPA Est. No. 228-IL-1**

KEEP OUT OF REACH OF CHILDREN

CAUTION

For Chemical Emergency, Spill, Leak, Fire, Exposure or Accident call Chemtrec Day or Night 1-800-424-9300

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Harmful if swallowed, absorbed through skin, or inhaled. Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust. When handling this product, wear chemical resistant gloves. Wash thoroughly with soap and water after handling. When mixing, loading, or applying this product or repairing or cleaning equipment used with this product, wear eye protection (face shield or safety glasses), chemical resistant gloves, long-sleeved shirt, long pants, socks and shoes. It is recommended that safety glasses include front, brow and temple protection. Wash hands, face and arms with soap and water as soon as possible after mixing, loading, or applying this product. Wash hands, face and hands with soap and water before eating, smoking or drinking. Wash hands and arms before using toilet. After work, remove all clothing and shower using soap and water. Do not reuse clothing worn during the previous day's mixing and loading or application of this product without cleaning first. Clothing must be kept and washed separately from other household laundry. Remove saturated clothing as soon as possible and shower.

STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. If person is unconscious, do not give anything by mouth and do not induce vomiting.
IF ON SKIN: Wash with plenty of soap and water. Get medical attention.
IF INHALED: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention.
IF IN EYES: Flush eyes with plenty of water. Call a physician if irritation persists.

ENVIRONMENTAL HAZARDS

This product is toxic to fish. Drift or runoff may adversely affect fish and non-target plants. Do not apply to water except as specified on this label. Do not contaminate water when disposing of equipment washwaters. Unless an approved assay indicates the 2,4-D concentration is 100 ppb (0.1 ppm) or less, or, only growing crops and non-crop areas labeled for direct treatment with 2,4-D will be affected, do not use water from treated areas for irrigating plants or mixing sprays for agricultural or ornamental plants. Unless an approved assay indicates the 2,4-D concentration is 70 ppb (0.07 ppm) or less, do not use water from treated areas for potable water (drinking water).

Clean spreader equipment thoroughly before using it for any other purposes. Vapors from this product may injure susceptible plants.

Most cases of ground water contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing/loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of ground water supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent ground water contamination.

STORAGE AND DISPOSAL

STORAGE

Always use original container to store pesticides in a secure warehouse or building. Do not store near seeds, fertilizers, insecticides or fungicides. Do not stack more than two pallets high. Do not contaminate water, food or feed by storage or disposal. It is recommended that a SARA Title III emergency response plan be created for storage facilities. Do not transport in passenger compartment of any vehicle.

PESTICIDE DISPOSAL

Pesticide wastes are toxic. If container is damaged or if pesticide has leaked, clean up spilled material. Improper disposal of excess pesticide is a violation of Federal law and may contaminate ground water. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL

Do not reuse empty bag. Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If bag is burned, stay out of smoke.

MANUFACTURED FOR:

applied biochemists
Milwaukee, WI 53022
1-800-558-5106

www.appliedbiochemists.com

SEE ADDITIONAL PRECAUTIONS AND DIRECTIONS ON BACK

NAVIGATE is a trademark of Applied Biochemists

NET WT. 50 LBS. (22.68 KG)

13529

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.
READ THIS ENTIRE LABEL BEFORE USING THIS PRODUCT

GENERAL PRECAUTIONS AND RESTRICTIONS

Do not use in or near a greenhouse.

OXYGEN RATIO

Fish breathe oxygen in the water and a water-oxygen ratio must be maintained. Decaying weeds use up oxygen, but during the period when NAVIGATE® should be used, the weed mass is fairly sparse and the weed decomposition rate is slow enough so that the water-oxygen ratio is not disturbed by treating the entire area at one time.

If treatments must be applied later in the season when the weed mass is dense and repeat treatments are needed spread granules in lanes, leaving buffer strips which can then be treated when vegetation in treated lanes has disintegrated. During the growing season, weeds decompose in a 2 to 3 week period following treatment.

Buffer lanes should be 50 to 100 feet wide. Treated lanes should be as wide as the buffer strips. (See illustration below)

WATER pH

Best results are generally obtained if the water to be treated has a pH less than 8. A pH of 8 or higher may reduce weed control. If regrowth occurs within a period of 6 to 8 weeks, a second application may be needed.

PERMIT TO USE CHEMICALS IN WATER

In many states, permits are required to control weeds by chemical means in public water. If permits are required, they may be obtained from the Chief, Fish Division, State Department of Conservation or the State Department of Public Health.

GENERAL INFORMATION

NAVIGATE® is formulated on special heat treated attaclay granules that resist rapid decomposition in water, sink quickly to lake or pond bottoms and release the weed killing chemical in the critical root zone area. This product is designed to selectively control the weeds listed on the label. While certain other weeds may be suppressed, control may be incomplete. Reduced control may occur in lakes where water replacement comes from bottom springs.

WHEN TO APPLY

For best results, spread NAVIGATE® in the spring and early summer, during the time weeds start to grow. If desired, this timing can be checked by sampling the lake bottom in areas heavily infested with weeds the year before. If treatments are delayed until weeds form a dense mat or reach the surface, two treatments may be necessary. Make the second treatment when weeds show signs of recovery. Treatments made after September may be less effective depending upon water temperatures and weed growth. Occasionally, a second application will be necessary if heavy regrowth occurs or weeds reinfest from untreated areas.

HOW TO APPLY

FOR LARGE AREAS: Use a fertilizer spreader or mechanical seeder such as the Gerber or Gandy or other equipment capable of uniformly applying this product. Before spreading any chemical, calibrate your method of application to be sure of spreading the proper amount. When using boats and power equipment, you must determine the proper combination of (1) boat speed (2) rate of delivery from the spreader, and (3) width of swath covered by the granules.

FOR SMALL AREAS: (Around Docks or Isolated Patches of Weeds): Use a portable spreader such as the Cyclone seeder or other equipment capable of uniformly applying this product. Estimate or measure out the area you want to treat. Weight out the amount of material needed and spread this uniformly over the area. More uniform coverage is obtained by dividing the required amount in two and covering the area twice, applying the second half at right angles to the first.

Use the following formula to calibrate your spreader's delivery in pounds of **NAVIGATE** PER MINUTE:

$$\frac{\text{Miles per hour X spreader width X pounds per acre}}{495} = \text{pounds per minute}$$

Example: To apply 100 pounds of **NAVIGATE** per acre using a spreader that covers a 20 foot swath from a boat traveling at 4 miles per hour, set the spreader to deliver 16 pounds of **NAVIGATE** granules per minute.

$$\frac{4 \text{ mph} \times 20 \text{ feet} \times 100 \text{ Lbs./A}}{495} = 16 \text{ Lbs/Min.}$$

AMOUNTS TO USE

Rates of application vary with resistance of weed species to the chemical, density of weed mass at time of treatment, stage of growth, water depth, and rate of water flow through the treated area. Use the higher rate for dense weeds, when water is more than 8 feet deep and where there is a large volume turnover.

	NAVIGATE POUNDS PER ACRE	NAVIGATE POUNDS PER 2000 SQ. FT.
SUSCEPTIBLE WEEDS		
Water Milfoil (Myriophyllum spp.) Water stargrass (Heteranthera dubia)	100 TO 200	5
SLIGHTLY TO MODERATELY RESISTANT WEEDS		
Bladderwort (Utricularia spp.) White water Lily (Nymphaea spp.) Yellow water lily (Nuphar spp.) Or spatterdock* Water shield (Brasenia spp.) Water chestnut (Trapa natans) Coontail* (Ceratophyllum Demersum)	150 to 200	7-1/2 to 10
*Repeat treatments may be needed		

LIMITED WARRANTY AND DISCLAIMER

The manufacturer warrants that this material conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use and Buyer assumes all risk of any use contrary to such directions. SELLER MAKES NO OTHER WARRANTY EXPRESSED OR IMPLIED AS TO FITNESS OR MERCHANTABILITY, AND NO AGENT OF SELLER IS AUTHORIZED TO DO SO EXCEPT IN WRITING WITH SPECIFIC REFERENCE TO THIS WARRANTY. In no event shall the Seller's liability for any breach of warranty exceed the purchase price of the material as to which a claim is made.

Material Safety Data Sheet

EMERGENCY

FOR CHEMICAL EMERGENCY: SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CALL
CHEMTREC - DAY or NIGHT - (800) 424-9300

Product Name: **AB NAVIGATE** EPA Reg. No. 228-378-8959

SECTION I - GENERAL INFORMATION

Manufacturer's Name: APPLIED BIOCHEMISTS
W175 N11163 Stonewood Drive
Suite 234
Germantown, WI 53022-4799
(800) 558-5106

Trade Name & Synonyms: **AB NAVIGATE**
Chemical Name & Synonyms: 2,4-D: 2,4-DICHLOROPHENOXYACETIC ACID, BUTOXYETHYL ESTER
Generic Description: AQUATIC HERBICIDE
Formula: $C_{12}H_{18}Cl_2O_4$
D.O.T. Proper Shipping Name: Not Regulated
U.N. or N.A. Identification #: Not Regulated
D.O.T. Hazard Class: Not Applicable
D.O.T. Emergency Response Guide: Not Assigned

Hazardous Mat'ls ID System Values (HMIS):	Health -1	Flammability -1	Reactivity -0	Personal Protection -F
Nat'l Fire Protection Assn. (NFPA 704M):	Health -1	Flammability -1	Reactivity -0	Specific Hazard: None

SECTION II - HAZARDOUS INGREDIENTS

Hazardous Component(s)	CAS#	PEL	TLV
2,4-Dichlorophenoxyacetate Acid, Butoxyethyl Ester	1929-73-3	10 mg/m^3	10 mg/m^3
Crystalline Silica	14808-60-7	0.1 mg/m^3	0.1 mg/^{3}

Ingredients listed in this section have been determined to be hazardous as defined in 29 CFR 1910.1200. Materials determined to be health hazards are listed if they comprise 1% or more of the composition. Materials identified as carcinogens are listed if they comprise 0.1% or more of the composition. Information on proprietary materials is available as provided in 29 CFR 1910.1200 (i) (1).

SECTION III - PHYSICAL DATA

Boiling Point (F):	NOT KNOWN	Specific Gravity (water = 1):	NOT KNOWN
Vapor Pressure (mm Hg):	NOT KNOWN	% Volatile (by Volume):	NOT DETERMINED
Vapor Density (air = 1):	NOT KNOWN	Evaporation Rate:(Ether = 1)	< 1
Melting Point (F):	NOT KNOWN		
Solubility in Water:	INSOLUBLE		

Appearance & Odor: GRAY/TAN GRANULES WITH MILD PHENOLIC ODOR.

SECTION IV - FIRE & EXPLOSION DATA

Flash Point (F): NOT FLAMMABLE Method:
Extinguishing Media: CO_2, WATER, DRY CHEMICAL OR FOAM TO FIGHT FIRES IN WHICH THIS PRODUCT IS INVOLVED.
Special Fire Fighting Procedures: WEAR APPROVED SELF-CONTAINED BREATHING APPARATUS. DIKE TO PREVENT CONTAMINATION OF WATER SOURCES.
Unusual Fire & Explosion Hazards: THERMAL DECOMPOSITION PRODUCTS INCLUDE OXIDES OF CARBON, SULFUR DIOXIDES AND HYDROCHLORIC ACID.

SECTION V - REACTIVITY DATA

Stability - _____Unstable __X__Stable
Conditions to Avoid: NONE KNOWN
Incompatibility (Materials to Avoid): ACIDS, BASES, OXIDIZERS.
Hazardous Decomposition Products: THERMAL DECOMPOSITION PRODUCTS INCLUDE OXIDES OF CARBON, SULFUR DIOXIDES AND HYDROCHLORIC ACID.
Hazardous Polymerization: _____Will Occur __X__Will Not Occur
Conditions to Avoid: NONE

AB NAVIGATE

SECTION VI - HEALTH HAZARD DATA

Acute Health Hazards: $LD_{50(Rat)}$ >2000 mg/Kg

Chronic Health Hazards: THIS PRODUCT CONTAINS CLAY. IARC HAS CLASSIFIED CRYSTALLINE SILICA (A COMPONENT OF CLAY) AS A PROBABLE HUMAN CARCINOGEN. PROLONGED CONTACT MAY CAUSE LIVER DAMAGE, KIDNEY DAMAGE, CHRONIC MUSCLE DAMAGE.

Signs & Symptoms of Exposure: EYE CONTACT MAY CAUSE TEARING AND REDNESS. MAY CAUSE SLIGHT SKIN IRRITATION. INHALATION OF DUST MAY CAUSE IRRITATION TO RESPIRATORY TRACT. INGESTION MAY CAUSE NAUSEA, VOMITING, ABDOMINAL PAIN, MUSCLE WEAKNESS MYOTONIA, AND A FALL IN BLOOD PRESSURE.

Medical Conditions Generally Aggravated by Exposure: MAY AGGRAVATE EXISTING CHRONIC RESPIRATORY PROBLEMS SUCH AS ASTHMA, EMPHYSEMA, OR BRONCHITIS; CONTACT MAY IRRITATE SKIN DISEASE.

Chemical Listed as Carcinogen or Potential Carcinogen by:

National Toxicology Program:	Yes:	No: ✓
I.A.R.C. Monographs:	Yes:	No: ✓
O.S.H.A.	Yes:	No: ✓

Emergency & First Aid Procedures: FOR PRINCIPLE ROUTE OF ENTRY, SEE APPROPRIATE EMERGENCY PROCEDURES BELOW.
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Route of Entry:

- **Inhalation:** REMOVE TO FRESH AIR, CONTACT A PHYSICIAN IF NECESSARY.
- **Eyes:** FLUSH WITH FRESH WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.
- **Skin:** WASH SKIN WITH PLENTY OF SOAP AND WATER. WASH CLOTHES THOROUGHLY BEFORE REUSE.
- **Ingestion:** DRINK 2-3 GLASSES OF MILK OR WATER, INDUCE VOMITING. CALL A PHYSICIAN.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled: SWEEP UP AND PLACE IN APPROVED CONTAINERS.DO NOT FLUSH AREA WITH WATER AS IT CAN CAUSE CONTAMINATION OF SEWER SYSTEM.

Waste Disposal Methods: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. 100 LBS. RESULTS IN A REPORTABLE QUANTITY AS SPECIFIED BY D.O.T.

SECTION VIII - SPECIAL PROTECTION AND CONTROL MEASURES

Respiratory Protection (Specify Type): NOT REQUIRED

Ventilation - Local Exhaust: MECHANICAL — Special Exhaust: STAND DOWN WIND WHEN USING.

Mechanical Exhaust: — Other Exhaust:

Protective Equipment - Gloves: PLASTIC OR CHEMICAL RESISTANT

Eye Protection: SAFETY GLASSES OR CHEMICAL GOGGLES

Other Protective Equipment: PROTECTIVE CLOTHING

Work or Hygienic Practices: USE SAFE CHEMICAL HANDLING PROCEDURES SUITABLE FOR THE HAZARDS PRESENTED BY THIS MATERIAL.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage: DO NOT SWALLOW, BREATH DUST, STORE NEAR FOOD, CONTAMINATE WATER FOOD OR FEED, APPLY TO WATERS USED FOR IRRIGATION, AGRICULTURAL SPRAYS, WATERING DAIRY ANIMALS OR DOMESTIC WATER SUPPLIES.

Other Precautions: AVOID DRIFT TO SUSCEPTIBLE PLANTS. AVOID GETTING INTO EYES, ON SKIN OR CLOTHING. **KEEP OUT OF REACH OF CHILDREN**

THESE DATA ARE OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS A PRODUCT SPECIFICATION. NO WARRANTY, EITHER EXPRESSED OR IMPLIED, IS HEREBY MADE. THE RECOMMENDED INDUSTRIAL HYGIENE AND SAFE HANDLING PROCEDURES ARE BELIEVED TO BE GENERALLY APPLICABLE. HOWEVER, EACH USER SHOULD REVIEW THESE RECOMMENDATIONS IN THE SPECIFIC CONTEXT OF THE INTENDED USE AND DETERMINE WHETHER THEY ARE APPROPRIATE.

DJK

Date of Last Revision: 9/30/99