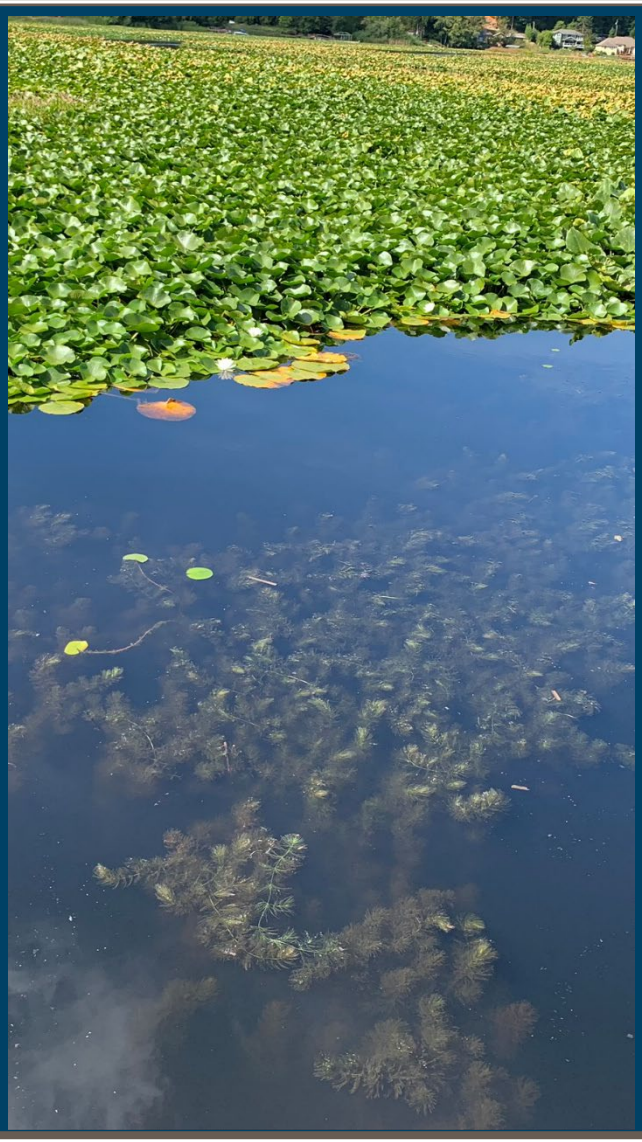
Welcome
Long Lake Steering Committee



Zoom Info:

- Please mute when not speaking
- Please “Raise your Hand” and wait to be called on to speak
- If you are calling in from a phone:
  - *6 Toggles between mute/unmute
  - *9 To "raise your hand“

TETRA TECH

Long Lake IAVMP Steering Committee: A Review of Management Options

Kitsap County

June 21, 2022

complex world | CLEAR SOLUTIONS™

Agenda

- Review management goals & priority plant species (5 min)
- Review all control options (10 min)
  - In-depth look at best options
- Management alternatives (45 min)
  - Review and discuss management options for each plant
  - Discuss committee recommendations on alternatives for community
- Education Plan Components (15 min)
- Estimated Cost Scenario and Funding Opportunities/Grants (15 min)
- Next Steps & Questions

Project Goal:

Reduce the distribution and density of invasive aquatic plants in Long Lake to support beneficial uses

- Improve recreation usability, safety, and navigability of lake
- Improve water quality and overall lake health/restore a balanced ecosystem
- Keep swimming areas & boat launches clear of plants
- Improve habitat for fish and other aquatic species
- Slow lake aging and the eutrophication process
- Eradicate small infestations of non-native invasive plant species, specifically curlyleaf pondweed
- Educate residents and lake users on the spread and prevention of invasive plant species and establishment in the lake
- Educate landowners on available, effective control options for fragrant waterlily that they can implement to support overall community plan
- Prevent the spread of invasive species to and from Long Lake
- Develop long-term, on-going funding sources for integrated adaptive plant management

Plant Specific Management Goals

- **Curlyleaf Pondweed**
  - Management Goal – Eradication
  - Eradicate small infestations and continue monitoring efforts to identify any new infestations within the lake
- **Brazilian Elodea**
  - Management Goal - Control
  - Reduce coverage and density to promote native plant growth
- **Fragrant Waterlily**
  - Management Goal – Control
  - Significantly reduce coverage and slow lake aging
  - Educate landowners on available, effective control options that they can implement near their shorelines to complement and support the overall community plan
- **Nuisance Native Pondweeds**
  - Management Goals – Control
  - Maintain and enhance a balanced aquatic habitat and recreational benefits

Overview of Management Options for Aquatic Plants

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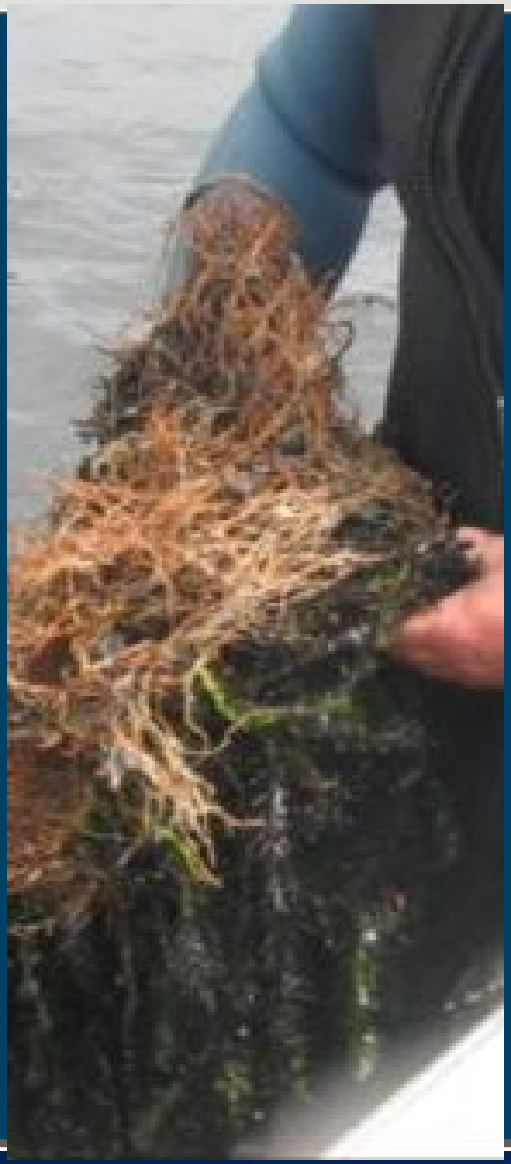
Type of Control	Method	Target Plant		
		Curlyleaf Pondweed (CLP)	Brazilian Elodea	Lilies
None	No action	X	X	X
Manual	Diver hand-pulling/cutting, Diver assisted suction harvesting (DASH), Landowner/resident hand-pulling cutting (Lilies)	X	X	X
Dredging	Mechanical dredging, diver dredging, hydraulic dredging	X	X	X
Mechanical	Harvesters, rotovation, weed cutters			X
Bottom Barrier	Burlap, geotextiles/plastic	X	X	X
Chemical	Aquatic herbicides	X	X	X
Biological	Insects, herbivorous fish (grass carp)	NA		

Permitting – Manual, Mechanical & Dredging

- **WDFW: Aquatic Plants and Fish, Rules for Aquatic Plant Removal and Control (AKA the pamphlet)**
  - Following WDFW pamphlet including its limitations, serves as the Hydraulic Project Approval (HPA) for some types of aquatic weed control and removal
  - Addresses physical and mechanical methods
  - Does NOT address grass carp, herbicides, or water column dye
- **Hydraulic Project Approval (HPA)**
  - Required for aquatic plant removal and control projects (outside of methods covered under the pamphlet)
  - Includes dredging, log placement, repositioning, or removal
- Application includes:
  - General plans and specs
  - Complete plans and specs for work under the ordinary high-water line
  - Complete plans and specs for fish protection
  - State Environmental Policy Act (SEPA) checklist
  - Typically takes WDFW 45 days to issue or deny HPA

Manual: Hand-pulling/Cutting



- <u>CLP, Brazilian Elodea, Fragrant waterlily</u>
- Applications & Advantages:
  - Small, easy to pull stands
  - All reproductive plant parts can be removed
  - Highly selective
  - For fragrant waterlily – repeated cutting over multiple years to reduce seed bank and stress rhizomes CUT FLOWERS & SEEDS
  - Minimal equipment costs (market labor costs for contractor)
- Disadvantages:
  - Time consuming
  - Must remove all plant parts
  - Market labor costs for contractor

Manual:
D.A.S.H. (Diver Assisted Suction Harvesting)

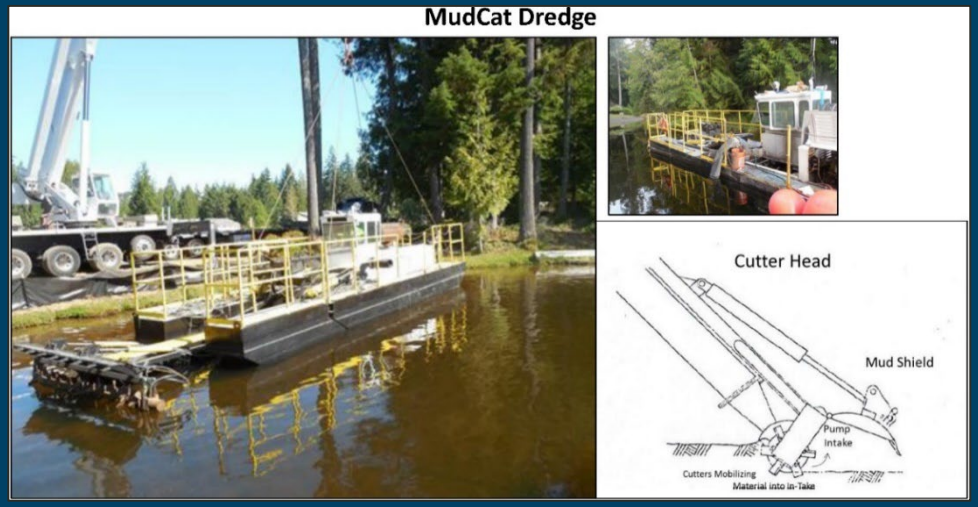

Chicaugon Lake Property Owners Association

- <u>CLP, Brazilian Elodea, Fragrant waterlily</u>
- Applications & Advantages:
  - Entire plant can be removed
  - Can be species specific in good visibility
  - Plants can be removed around obstacles (e.g., logs and docks)
- Disadvantages:
  - Relatively high cost compared to herbicides
  - Relatively small area can be covered in a season – Time consuming
  - Contractor availability
  - For lily control – rhizomes must be cut make it very labor intensive


Higgins Lake Foundation

Hydraulic Dredging

- <u>All plants</u>
- Aggressive control option
- Applications & Advantages:
  - Removes sediment and plants
  - Increases channel and lake depth
- Disadvantages:
  - **EXPENSIVE**
  - Permitting
  - Approximately 2 acres of upland area needed per acre of removed sediment to 3 ft
  - Submersed objects



Mechanical: Harvester, Weed Cutters

- Fragrant waterlily
- Variety of types of equipment
- Applications & Advantages:
  - Clears channels
  - Cover large areas quickly
- Disadvantages:
  - Make sure no EWM present to avoid spreading fragments
  - Equipment may not be locally available
  - Obstacles such as logs, shallow water, docks
  - Requires frequent operation, similar to mowing your yard
  - Does not enhance WQ and may accelerate eutrophication


Photo: Aquarius Ecosystems


Photo: Foster's Pond Corp.

Mechanical: Handheld Weed Cutters

- Fragrant waterlily
- Variety of types of equipment
- Applications & Advantages:
  - Can be operated by landowners from shoreline or dock
  - Inexpensive
- Disadvantages:
  - Covers only a small area
  - Requires frequent operation, similar to mowing your yard


Photo: The Pond Guy – Jenlis Weed Razr Aquatic Weed Cutter


Photo: Pond & Garden Depot


Photo: The Pond Guy

Bottom Barriers

- Advantages
  - Can eradicate small areas of nuisance vegetation
  - Applicable to docks and swimming areas
  - Can be installed by landowners in shallow areas

- Disadvantages
  - Potential boat prop damage
  - Only small areas
  - Maintenance requirements can be high
  - Cover no more than 50% of the length of the applicant's shoreline or no more than 10 linear feet for boating and swimming areas

Permitting & Licensing - Chemical

- **Aquatic Herbicide Licensing**
  - Only aquatic formulations of herbicides can be used in or near water
  - All aquatic formulations are “Restricted Use” in WA state
  - Can only be purchased and applied by a licensed herbicide applicator with an aquatic endorsement
- **Aquatic Plant and Algae Management General Permit (APAM Permit)**
  - In-water and shoreline (roadsides, dikes/levees, and ditch banks) noxious weeds, native nuisance plants, and algae
  - Must have this permit for treatment of plants in water or on shoreline
  - Permitting process will include public comment
  - Permit requires notification to lake residents

Overview of Potential Aquatic Herbicides

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Aquatic Herbicide	Target Plant		
	Curlyleaf Pondweed	Brazilian Elodea	Lilies
2,4-D	Good	Good	Good to Excellent
Diquat (Contact only burns plants does not kill)	Moderate	Moderate	Poor
Endothall (Contact only burns plants does not kill)	Moderate	Moderate	Poor
Florpyrauzifen-benzyl (ProcellaCOR)	Excellent	Poor	Not targeted - potential
Fluridone	Excellent	Excellent	Fair
Glyphosate (no longer recommended)	Poor	Poor	Good
Imazamox	Good	n/a	Good
Imazapyr	Good	n/a	n/a
Penoxsulam	Good	Good	Good
Triclopyr	n/a	n/a	Good

Management Alternatives: Long Lake

- Discuss by plant species
- Management options dependent on level of control/management goal
- IAVMP will present all potential options to community but will include options or suite of options the committee has recommended that the community move forward with

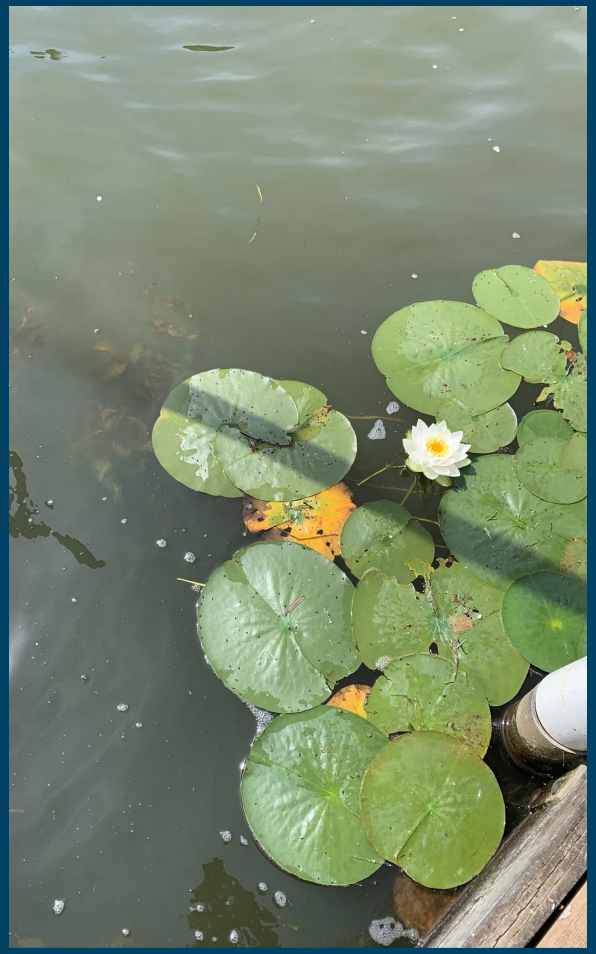

Photo: Dean Miller, CILL

Curlyleaf Pondweed

Management Goal	Management Option(s)	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Eradicate remaining small infestations within the lake	**Manual, includes annual surveying (diver hand-pulling)**	• **$12-20K for 3-5 days for entire lake survey and hand-pulling** • **Currently scattered throughout roughly 15 acres – majority within south end of lake and along eastern shoreline** • **Annual surveys should be conducted for at least 5 years post eradication**	**$60K - $80K**	**Recommended for further consideration**
	Chemical, Fluridone, 2, 4-D, or Florpyrauxifen-benzyl (some evidence of control but not currently labeled for use on CLP)	• $800 - $1,500 per acre, as needed; • Currently scattered throughout roughly 15 acres – majority within south end of lake and along eastern shoreline • Annual surveys should be conducted until eradications and at least 5 years post eradication	$12K - $22.5K (if needed)	Not recommended for further consideration for curlyleaf pondweed only - based on low density and random coverage; should be an option to pursue in future if coverage expands. Chemical treatment for other targeted plant species will have beneficial impacts in areas where curlyleaf pondweed is present
Status Quo	No Action	• $0 • Most likely will spread to cover a larger area and other parts of the lake	$0	Not recommended

1. Costs are estimated for first five years of control. Continued control work will be necessary beyond five years.

Brazilian Elodea

Management Goal	Management Option(s)	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Control to reduce coverage and density to promote native plant growth	**Chemical, Fluridone with PAK 27**	• **$800 - $1,500 per acre** • **Treat 25 acres each year, equivalent to 55% of current coverage over 5 years** • **PAK 27 used to stress plants for more effective herbicide control and to control filamentous algae growth while reducing DO demand from organic decay** • **PAK 27 oxidizes sediment "goo"**	**$100K - $187.5K**	**Recommended for further consideration - current herbicide treatment has reduced density and coverage by 50% or more** **Will also have beneficial treatment for other target plant species (fragrant waterlily)**
	Manual (DASH)	• **$100 – 200K per year for 30 days of diving annually (unsure of progress achievable – need to be adaptative)** • **Highly selective – no off-target impacts allowing for reestablishment of native plants**	**$500K to $1M**	**Recommended for further consideration as non-chemical option**
	Manual – hand-pulling (divers in deep areas; landowners in shallow)	• Market labor costs for contractor (higher for divers); or volunteer/landowner in shallow areas • Must remove all plant parts and contain fragments	Unknown	Considered but not recommended due to size of current coverage and plant density
	Bottom Barriers (Individual Landowner)	• Dock and swimming areas per landowner discretion • Shoreline residences only (following WDFW Pamphlet) • Cost incurred by landowner	Unknown – costs incurred by landowner $1.00 - $3.00 ft^2 for materials	Not recommended for large scale control but could be used for control in front of individual shorelines

1. Costs are estimated for first five years of control. Continued control work will be necessary beyond five years.

Fragrant Waterlily: Aggressive Control

Management Goal	Management Option(s)	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Aggressive Control: Target 75% reduction of lilies and up to 3 ft of sediment removal. Focus on south end of lake, high-use recreational areas, and where lily has significantly explained in density and coverage.	Mechanical – Hydraulic Dredging for lily control and sediment removal	• $40M - $50M for 50 acres • One time event • Remove all plants in dredging areas • Permits are extensive and could be challenging to obtain • Dewatering and disposal costs are very high	$40M - $50M	Recommended for further discussion with steering committee; If aggressive control is management goal this suite of control strategies should be considered
	Manual (DASH)	• Post dredging cleanup of any surviving lilies and shoreline/channel maintenance • $45k - $88K/acre, as needed	$2M	
	Manual – hand-pulling or cutting (non-diver)	• Channel and shoreline maintenance • Hand cutting of flowers and seeds and removal from lake • Market labor cost for contractor; or volunteer/landowner	Unknown – costs incurred by landowner	
	Bottom Barriers (Individual Landowner)	• Dock and swimming area maintenance per landowner discretion • Shoreline residences only (following WDFW Pamphlet) • County could potentially supply materials - $10K per year • Installation cost incurred by landowner	$50K for materials	

1. Costs are estimated for first five years of control. Continued control work will be necessary beyond five years.

Fragrant Waterlily: Moderate Control

Management Goal	Management Option(s)	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Moderate Control: Target 40 to 50% reduction of lilies. Focus on south end of lake, high-use recreational areas, and where lily has significantly explained in density and coverage.	**Option 1 – Chemical, Imazamox**	• **40% reduction would include treatment to approximately 30 acres** • **15-acre treatment annually; whole area cannot be treated at once -likely be 2 times per year over 5 years** • **$25 - $40K per year, decreasing as infestation decreases**	**$125K - $200K**	**Recommended for further consideration**
	Option 2 – Mechanical, Harvester/Cutter	• $2K - $3K per day • Assume can harvest 2 acres per day and will operate 5 days - 4 times a year • Unable to operate in shallow areas or where logs are present • Not specific to invasive water lily; non-target plant impacts	$200K – $300K, for contractor Capital Cost - $150K - $200K plus O&M	Considered but not recommended based on historical harvesting results
	Option 3 - Manual (DASH)	• $1.6 - $2K per day for 800 square feet • May not be feasible given large infestation • Dependent on available contractor	$900K – $1.8M	Considered but not recommended
	Manual – hand-pulling or cutting (non-diver)	• **Channel and shoreline maintenance** • **Hand cutting of flowers and seeds and removal from lake** • **Market labor cost for contractor; or volunteer/landowner**	**Unknown – costs incurred by landowner**	**Recommended for further consideration – combined with Option 1**
	Bottom Barriers (Individual Landowner)	• **Dock and swimming area maintenance** • **Shoreline residences only** • **County potentially supply materials** • **Installation costs incurred by landowner**	**$50 K for materials**	**Recommended for further consideration – combined with Option 1**

Nuisance Native Plant Control (Pondweeds)

- As non-native species are reduced, native plant species will increase
  - Occurred historically
  - Managed/Controlled to mitigate density and coverage
  - Help enhance water quality, promote aquatic habitat, and help prevent toxic algae blooms
- In most target areas where herbicide (Fluridone) is proposed – will impact native plants and help to control density
- Must be committed to monitoring in order to be adaptative regarding approach, timing and intensity of management

Tetra Tech Conclusions/Recommendations

- Curlyleaf Pondweed
  - Pursue eradication through combination of diver hand-pulling and non-targeted herbicide
- Brazilian Elodea
  - Pursue goal to control to reduce coverage and density through herbicide and PAK 27 application
- Fragrant Waterlily
  - Purse moderate control management goal and target 40% reduction through combination of herbicide application and aggressive manual cutting of flowers and seeds as well as installation of bottom barriers by landowners

Education Plan – Prevention (all plants)

Management Goal	Control Strategy	Description	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Prevent spread of invasive species to and from Long Lake	Boat Washing Station	Boat washing station set up at public boat launch	• Initial purchase $14K to $37K • Requires potential infrastructure upgrade • Maintenance and potentially staffing • Need adequate space for washing that does not disrupt boat traffic	$50K - $1.2M	Not recommended for further consideration
	Boat Launch Education through Use of Volunteers	**Community members visit the boat launch on heavy use days and provide education about cleaning, draining and drying boat**	• **Outreach materials** • **Time for volunteer training - assumes volunteer labor** • **Printing of education materials $1.5K**	**$1.5K - $3K**	**Recommended for further consideration**
	Outreach campaign to lake residents	**Develop and implement outreach campaign for landowners to prevent introduction form their boats**	• **Multi-year outreach campaign** • **$5K - $10K**	**$5K - $10K**	**Recommended for further consideration**
	Boat Launch Signage	**Additional signage at boat launch and park – all public access points**	• **Additional sign for Clean/Drain/Dry** • **Sign costs plus installation** • **Assume $2K**	**$2K**	**Recommended for further consideration**

Education Plan – Control/Management (all plants)

Management Goal	Control Strategy	Description	Preliminary Costs and Assumptions	Estimated 5-Year Cost [1]	Further Consideration/ Recommendation
Landowner/Resident Invasive Plant Control	Landowner Workshops	Host workshops with expert presenting control methods that individual landowners can use on property	• $5K per workshop • Assume 1 workshop annually	$25K	Recommended for further consideration
	Outreach campaign to lake residents	Develop and implement outreach campaign for residents to identify invasive species and control methods they can use on their property	• In conjunction with outreach campaign for prevention • County staff time or volunteer time	Unknown, would be in addition to prevention outreach campaign	Recommended for further consideration

Estimated 5 – Year Cost Scenario

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
CLP Diver Hand-Pulling	$20K	$20K	$12K	$6K	$6K	$72,000
Brazilian Elodea Herbicide & PAK 27	$37.5K	$37.5K	$37.5K	$37.5K	$37.5K	$187,500
Lily Herbicide Treatment	$40K	$40K	$40K	$40K	$40K	$200,000
Bottom Barrier Materials	$10K	$10K	$10K	$10K	$10K	$50,000
Outreach & Education	$10K	$10K	$8K	$6K	$6K	$40,000
Project Management & Permitting	$10K	$10K	$7K	$7K	$6K	$40,000
TOTAL	**$127,500**	**$127,500**	**$114,500**	**$106,500**	**$105,500**	**$589,500**

Costs are estimated for first five years of control. Continued control work is necessary beyond five years.

Funding Opportunities & Grants

- Department of Ecology – Aquatic Invasive Plants Management Grants Program
  - Implementation Grants ($100,000 max – 75% grant; 25% match)
  - Can re-apply after initial 2 years but less competitive
- Lake Management District or Lake Association Fees (private entity)
- County Wide Lake Management

Next Steps

- Steering Committee email County/Tetra Tech with any additional questions
- Steering Committee votes/provide input on selection of management options via email or survey
- Finish Draft IAVMP
  - Review by Steering Committee – late July/early August
- Send Draft IAVMP to Community – August
- Public Meeting to review Draft IAVMP – August/early September
- Draft IAVMP to Ecology – end September