








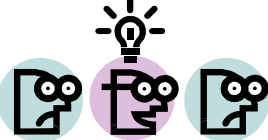












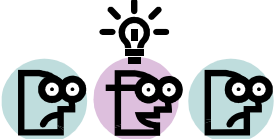










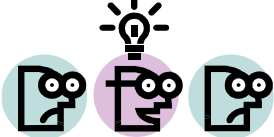








Hand Cutting Physical Control: Manual Method cutting only to depth below water, leaving roots.		PRO	CON
Efficacy		Immediate. Throw cutter from dock & harvest.	Fragmentation. Localized Treatment.
Longevity		***	Poor. Heavy regrowth. Multiple yearly treatments.
Capital Expense		Low: Scythes and rakes \$50 each --- Homeowner * 400 = \$20,000	***
Operating Costs		Zero labor if left to homeowners. Rake replacements on five year average.	400 docks * 3X/year * 1/2 day per dock per worker x 1 year/80 work days = 7.5 workers * \$60 wage/day * 80 days = \$36,000
Labor Requirements		Summer Employment: Unskilled labor force.	Intensive. 7.5 workers 80days during summer doing 2 docks a day each.
25 Year Cost		Zero labor if left to homeowners plus rake replacements at five year average.	Could be active management practice involving staff time. Cost of \$1,000,000
Species Selective		***	Generally indiscriminate unless targeted. Can be selective in a small scale.
Employee Risk		Low: If left to homeowner	Moderate: Done in house.
Effects on Wildlife		***	Shoreline disruption throughout the summer. Benthic organisms disturbed.
Effect on Sediment		Limited: Decaying plant matter. Turbidity returning to background in 24 hours.	***
Toxicity Concerns		None.	***
Public Acceptance		Low Impact Choice	Intensive lake operation during summer recreation months. Frustrated property owners with work transference.
Board Evaluation			







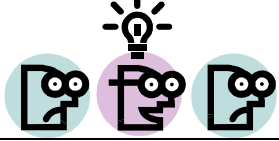






DIVER ASSISTED HAND PULLING Physical Control: Plants & roots dug up with a shovel.	PRO	CON
Efficacy		Immediate. Locally successful. Small scale treatment, not practical lake wide. Visibility hampers efficacy.
Longevity		*** Low: Multiple yearly treatments.
Capital Expense		Low: SCUBA Training, Plant ID Training & Gear ***
Operating Costs		Low if in house: Oxygen Tanks, PPE, Boat fuel & plant disposal or composting. Contracted costs \$300 per day
Labor Requirements		Summer Employment High: Must be repeated throughout the summer.
25 Year Cost		*** 400 Docks * 3X Year * 300 Day * 25 Yr = \$9,000,000
Species Selective		YES ***
Employee Risk		*** Moderate.
Effects on Wildlife		Only localized, but summer long operation. Benthic organisms disrupted.
Effect on Sediment		Limited, Short-term turbidity. ***
Toxicity Concerns		Few: Boat & Fuels ***
Public Acceptance		High, although skepticism expected on large scale application. ***
Board Evaluation		

Bottom Barrier Physical Control: Synthetic or natural fiber covering laid on bottom to block growth.	PRO	CON	
Efficacy		Immediate control possible. Does not contribute to fragmentation. Best around docks, swimming holes.	Very localized. Not lake wide.
Longevity		Limited to strength of material. Burlap 2-3 years, synthetics vary.	Must maintain anchoring system. SCUBA.
Capital Expense		Low: \$2/sq ft = \$2,000 per 100 x 100 foot areas	400 Docks = \$800,000
Operating Costs		Low: Surveying sites, replacing & repairing expired barriers.	***
Labor Requirements		***	Moderate: Periodic maintenance, gas accumulation beneath barriers, SCUBA to replace.
25 Year Cost		Negligible if left to homeowners	2.5 year replacement = \$8,000,000
Species Selective		***	No. Indiscriminate.
Employee Risk		***	Moderate.
Effects on Wildlife		***	Benthic populations known to decrease. Could cause anoxic sediment changing benthic organism distribution.
Effect on Sediment		***	May not be retrievable.
Toxicity Concerns		***	Anoxic sediments lead to formation of toxic and explosive gases, H ₂ S and CH ₄ , but not likely dangerous.
Public Acceptance		High: Simple, cost effective in small use.	***
Board Evaluation			

Water level drawdown Physical Control: Water level artificially lowered exposing plants to frost or desiccation.	PRO	CON	
Efficacy		Can be useful to facilitate repairs of bottom barriers, to conduct dredging, and repair dams.	Depth limited by proximity to sea level.
Longevity		Repeatable once the provisions are made.	Plant regrowth likely.
Capital Expense		***	High: Excavation & Dam required. Permits from USACE & DSL ??? \$1,000,000 - \$10,000,000???
Operating Costs		***	Maintenance required. Susceptible to sea surge damage
Labor Requirements		***	Moderate
25 Year Cost			???
Species Selective		***	No: Beneficial plant loss likely
Employee Risk		Low	***
Effects on Wildlife			Wetlands can suffer impact limiting their use. Loss of fish habitat.
Effect on Sediment		Can cement exposed mucky substrate, increasing the potential use.	
Toxicity Concerns		None.	
Public Acceptance			Docks left high & dry. Potential odor problems. Loss of Recreation & Tourism. Not practical.
Board Evaluation			







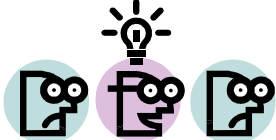






<h2 style="text-align: center;">Nutrient Control</h2> <p style="font-size: small;">Watershed Control: Best Management Practices (BMPs) & Education for homeowner, developers, agriculture, forestry, road maintenances, and other land uses and users.</p>	PRO	CON	
Efficacy		Long-term solution to reducing nutrients feeding the growth of aquatic plants.	Slow to reduce plant growth. On the scale of decades. Dependent on wide scale property owner participation.
Longevity		With continual upkeep of BMPs nutrient abatement should be long lived reducing the growth of aquatic weeds.	Property changes hands and the legal enforcement of BMPs may not be in place.
Capital Expense		Minimal: Research of BMPs and publication of information. www.DLWID.org	Passed on to property owners.
Operating Costs		Good BMPs tend to be long term solutions.	Ongoing continuing education is time consuming and will be required. \$2,500-\$5,000
Labor Requirements		Moderate: Outreach programs, Smart Development is time & money saved long-term.	***
25 Year Cost		\$60,000 - \$125,000	***
Species Selective		Some evidence shown that nuisance species are reduced when a surplus of nutrients are not available.	***
Employee Risk		Low	***
Effects on Wildlife		Positive effects anticipated as responsible land use is promoted. Native plants require less fertilizer and promote good wildlife habitat.	***
Effect on Sediment		Positive, a reduction of Phosphorus entering the system reduces the sediment source of this nutrient.	***
Toxicity Concerns		None: In fact abating the use of many toxic chemicals from non-point sources such as lawns.	***
Public Acceptance		Good, on the surface, but participation is key.	May have to move to mandatory practices if reductions are not seen.
Board Evaluation			

<h1>Mechanical Harvesting</h1> <p>Floating harvester cutting & often collecting plant fragments.</p>	<h2>PRO</h2>	<h2>CON</h2>	
Efficacy		Immediate. Current machines cut 6.5 to 12.1 ft deep in 5 to 8.2 foot swaths. Removal of biomass. Reality of about 1/3 acre per hour.	Fragmentation. Has not been shown to provide long-term growth reduction milfoil. Can lead to opportunistic plant invasions. Must have disposal means.
Longevity		***	Short-term. 30-60 days.
Capital Expense		***	High: \$50,000 - \$140,000 times 4 machines. With 20 year life expectancy
Operating Costs		10,000 year est. plus 5 fulltime summer staff. \$14,400	Contract at \$200-\$700 / acre * 680 acres = \$136,000 to \$476,000
Labor Requirements		Intensive. Summer Employment Fulltime Summer Crew of 5 @ \$10 per hour. = \$32,000	Contract.
25 Year Cost		\$1,520,000 without Disposal 3 large machines 1 small 25 year operation	\$3,400,000 - \$35,700,000
Species Selective		***	No. Indiscriminate, but can be targeted if monocultures exist.
Employee Risk		***	Moderate: Summer long activity
Effects on Wildlife		***	Noise, floating plant material, fish & invertebrates can be affected.
Effect on Sediment		Limited sediment disruption.	Decaying plant material.
Toxicity Concerns		None.	***
Public Acceptance		Mostly favorable responses anticipated.	Heavy summertime use may have public use and access impact.
Board Evaluation			







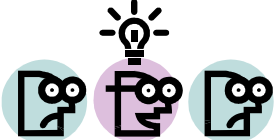






<h2 style="text-align: center;">Aeration</h2> <p style="font-size: small;">Physical Control: Air or oxygen injection into water.</p>	PRO	CON	
Efficacy			
Longevity		Long-term solution to promoting lake ecology.	
Capital Expense		***	High: Large infrastructural requirements. Blowers, Lines, Blower Houses, electric grid.
Operating Costs		***	High Electrical Demand. \$50,000 year.
Labor Requirements		***	Ongoing maintenance of blower units.
25 Year Cost			
Species Selective		Anticipate oxygenated substrate leading to reduction in available nutrients which favor invasive species.	
Employee Risk		Moderate.	
Effects on Wildlife		Low to Beneficial: Increased oxygen feeds microbial breakdown of organic material over long run. Increased trophic levels.	
Effect on Sediment		Beneficial: Oxidation of organic sediment, reduction in bioavailability of nutrients.	
Toxicity Concerns		None.	
Public Acceptance		Positive response anticipated from lake users over Solar Bees	High Operating Cost.
Board Evaluation			






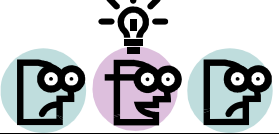




Diver Operated Suction Operation from a barge, SCUBA Divers dislodge plants and suction materials up through hose for filtration and disposal.	PRO	CON	
Efficacy		Can be highly effective: 85% - 97% milfoil reduction. Can be used in tight spaces.	Dependent on density of plants, substrate and visibility. Localized Treatment regime. Permits: DSL & USACE
Longevity		2-3 years, but localized treatments only.	***
Capital Expense		Moderate: Barge, pumps, SCUBA certification and equipment. \$20,000 est.	***
Operating Costs		Trained Staff time, Oxygen & Boating requirements. \$100 day	Contracted \$300-\$2,400 per Day without disposal.
Labor Requirements		3 Fulltime trained summer staff = \$10 hr = \$19,200	Intensive.
25 Year Cost		\$700,000	\$600,000 - \$4,800,000
Species Selective		Very much. Specific plants targeted.	***
Employee Risk		***	High
Effects on Wildlife		Low impact on fish & wildlife.	Disrupts & potentially kills benthic organism
Effect on Sediment		Returned to Background within 24 hours generally.	Disruptive, sediment slurry discharged overboard.
Toxicity Concerns		Few: Fuel & Oil	***
Public Acceptance		High acceptance anticipated for localized work.	Not large scale.
Board Evaluation			







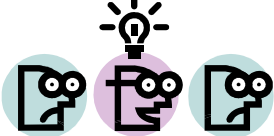






<h2 style="text-align: center;">Weed Rollers</h2> <p>Physical treatment. Lake sediment & weeds compacted by weight of roller machine. 270 degree Arc</p>	PRO	CON	
Efficacy		Plant growth in small areas can be readily subdued.	Plant fragmentation. Storage concerns, roller left in the water.
Longevity		***	Weekly treatments.
Capital Expense		Low: \$2,000 5 year life expectancy	400 Docks * \$2,000 = \$800,000 Power Required near water.
Operating Costs		Minimal runs on electricity.	***
Labor Requirements		Operated by homeowner	Weekly.
25 Year Cost		\$10,000 per unit	\$4,000,000 Lake wide
Species Selective		***	No. Indiscriminate
Employee Risk		***	Low
Effects on Wildlife		***	Benthic organisms impacted by compaction.
Effect on Sediment		Can solidify the sediment.	***
Toxicity Concerns		Few: Lubrication.	***
Public Acceptance		***	Time consuming & reactive method of treating aquatic plants.
Board Evaluation			



<h2 style="text-align: center;">Solar Bee</h2> <p>Physical Control: Lake wide circulation.</p>	<h2 style="text-align: center;">PRO</h2>	<h2 style="text-align: center;">CON</h2>	
Efficacy		Very effective at displacing cyanobacteria. Some evidence of controlling the spread of invasive macrophytes. Moves nutrients up the food chain, potentially lowering trophic state from Eutrophic to mesotrophic over many years.	Short historical record, but supported in literature using similar devices aimed at lake movement.
Longevity		Cyanobacteria & Macrophyte control for potentially the life of the product. 25 years.	***
Capital Expense		***	High: 45,000 * 17 = \$765,000
Operating Costs		Low: Free Power, limited maintenance.	***
Labor Requirements		Minimal operational checks.	***
25 Year Cost		\$800,000	***
Species Selective		Reduces cyanobacteria blooms. Retards Invasive Macrophytes.	***
Employee Risk		Low:	***
Effects on Wildlife		Low to Beneficial: Increased diatom production leads to increase predation by zooplankton, feeding the fish, which are food for higher organisms.	***
Effect on Sediment		Positive: Oxidation of sediment provides for greater microbial metabolism, which reduces the organic matter at the lake bottom.	***
Toxicity Concerns		None.	***
Public Acceptance		Unique physical control may prompt support.	Boating community and landowners may object.
Board Evaluation			









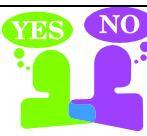

Rotovation & Cultivation Barge mounted unit for bottom tilling, uprooting vegetation.		PRO	CON
Efficacy		Highly effective at uprooting plants. Done in winter months.	Not recommended in newly infested milfoil waters. Logs or other sunken debris impairs machine's function. Utilities in Lake are obstacles. Requires USACE & DSL Permit.
Longevity		2-3 years. Can Contract for Service.	
Capital Expense		Moderate \$50,000 - \$80,000 est.	
Operating Costs		\$5,000 year	Contracted at \$1000-\$1700 per acre = \$680,000 - \$1,156,000
Labor Requirements		1 Staff member fulltime ¼ year \$10 hour. = \$15,600 each season required. Efforts reduced each year	Intensive
25 Year Cost		\$436,250 - \$466,250	\$8,500,000 - \$1,445,000
Species Selective			No. Can be targeted though if monocultures exist.
Employee Risk			High, unless contracted.
Effects on Wildlife		Does not effect fish like harvesters. Shown to promote plant diversity.	May have timing considerations around juvenile fish.
Effect on Sediment		***	Disruptive, but turbidity resolved in 24 hours generally. Plant materials left. Nutrients returned to sediment.
Toxicity Concerns		***	Moderate: Fuel & Hydraulics
Public Acceptance		Good. Does not impact recreation as done off season.	***
Board Evaluation			

<h1 style="text-align: center;">Dredging</h1> <p style="text-align: center;">Physical Control: Increasing depth and removing nutrients.</p>	PRO	CON	
Efficacy		Excellent: Attacks root of vegetation management problem which is nutrients.	Must be permitted DSL, USACE & ODFW
Longevity		Good: long-term reduction of internal recycling of nutrients from the sediment.	Must be coupled with BMP for nutrient control and reduction in the watershed.
Capital Expense		***	Extremely High:
Operating Costs		***	Must maintain active control of nutrients though BMPs,
Labor Requirements		Staff time.	***
25 Year Cost		***	
Species Selective		Sediment removal would take dominate plants and seeds with it. Potential to replant low growing natives.	No. .
Employee Risk		Low.	***
Effects on Wildlife		***	Highly disruptive, full lake ecology change expected.
Effect on Sediment		***	Extreme: High turbidity through project.
Toxicity Concerns		Low: Operations related Fuel & Hydraulics	***
Public Acceptance		Some possible preference to other short-term fixes.	High Cost.
Board Evaluation			

Grass Carp	PRO	CON
<p>Biological Control: Sterile, triploids</p> <p>Efficacy</p>		<p>Slow turnaround, but can be highly effective when used in large numbers if total macrophyte eradication is acceptable.</p>
<p>Longevity</p>		<p>10-25 years</p>
<p>Capital Expense</p>		<p>***</p>
<p>Operating Costs</p>		<p>None. Very favorable.</p>
<p>Labor Requirements</p>		<p>None.</p>
<p>25 Year Cost</p>		<p>\$204,000 – \$1,020,000</p>
<p>Species Selective</p>		<p>***</p>
<p>Employee Risk</p>		<p>None.</p>
<p>Effects on Wildlife</p>		<p>Has promoted native Coho fishery in Devils Lake system. Balanced with put & take fishery as well.</p>
<p>Effect on Sediment</p>		<p>Carp generally will not forage for roots, but will do if hungry enough.</p>
<p>Toxicity Concerns</p>		<p>None.</p>
<p>Public Acceptance</p>		<p>High among landowners.</p>
<p>Board Evaluation</p>		<p>Scientific Community generally pushing against.</p>

<h2 style="text-align: center;">Milfoil Weevils</h2> <p>Biological Control: Native NE United States weevil foraging on invasive plant.</p>	PRO	CON	
Efficacy		NE lakes have seen some control.	No solid evidence of milfoil control in Washington. Not found in Oregon. Still experimental.
Longevity		Potentially long term biological control, reproducing in concert with milfoil production.	6 months often, hard to over winter and establish population.
Capital Expense			\$1 each: Requires a suitability study.
Operating Costs		Require a monitoring program. \$20,000 a year. Could be tied to other monitoring already done.	***
Labor Requirements		Moderate. Committed Scientific studies must be ongoing.	***
25 Year Cost			
Species Selective		Yes. Eurasian watermilfoil	Limited invasive controls.
Employee Risk		***	Low. Sampling.
Effects on Wildlife		Milfoil Weevils are native to North America, but will select the invasive Eurasian Milfoil as a food choice.	***
Effect on Sediment		None anticipated.	***
Toxicity Concerns		None	***
Public Acceptance		Positive if it works!	Negative if other plants become dominant.
Board Evaluation			

<p style="text-align: center;">Fluridone</p> <p>Chemical Control: Slow acting Systemic Herbicide SONAR by SePro.</p>	<p style="text-align: center;">PRO</p>	<p style="text-align: center;">CON</p>	
Efficacy		Lake scale treatments. Particularly effective at treating Eurasian watermilfoil.	Slow acting 7-10 days showing signs, 60-90 days to become evident. Not suitable for flowing waters.
Longevity		Kills roots & shoots.	***
Capital Expense		***	High: \$900-\$1400/acre* 680 acres = \$612,000 - \$952,000
Operating Costs		***	Reapplication 1-2 years, Water Quality monitoring required separate from existing program.
Labor Requirements		Low: Monitoring Time	***
25 Year Cost		***	\$7,650,000 - \$2,380,000
Species Selective		***	Somewhat effective on Eurasian watermilfoil, but broad spectrum herbicide.
Employee Risk		***	High.
Effects on Wildlife		Low order of toxicity to fish, zooplankton, benthic invertebrates & wildlife.	***
Effect on Sediment		***	Reduced dissolved oxygen concerns due to decaying plants.
Toxicity Concerns		***	Yes, but said to be safe when used as directed.
Public Acceptance		***	Not widely accepted.
Board Evaluation			

2,4-D Chemical Control: 2,4-dichlorophenoxy acetic acid, Systemic Herbicide		PRO	CON
Efficacy		Can be used in slow flowing turbid waters. 50-70% reduction in Eurasian watermilfoil seen.	***
Longevity		Kills roots & shoots.	Regrowth in 4 to 5 weeks if roots not killed.
Capital Expense		***	High: \$700-\$1,000/acre * 680 acres = \$476,000 – \$680,000
Operating Costs		***	3 X treatments/yr \$1,428,000 - \$2,040,000
Labor Requirements		Low	***
25 Year Cost		***	Prohibitive: \$35,700,000 - \$51,000,000
Species Selective			No, Broad spectrum, fails to control Brazilian Elodea and/or Hydrilla.
Employee Risk			Yes. Danger on Label, Possible Carcinogen, Endocrine Disrupter.
Effects on Wildlife		Low toxicity to fish.	Toxic to benthic organism, slightly toxic to birds.
Effect on Sediment		***	Decaying plant material.
Toxicity Concerns			Yes. Higher toxicity at pH 6.5 and lower which is what Devils Lake is.
Public Acceptance			Not generally acceptable.
Board Evaluation			

<p align="center">Glyphosate</p> <p><small>Chemical Control: Systemic Herbicide. n-(phosphonomethyl) glycine. RODEO or Pondmaster</small></p>	<p align="center">PRO</p>	<p align="center">CON</p>	
Efficacy		No swimming, fishing or irrigation label restrictions.	Only useful for emergent plants. Chemical must reach leaf, binds up to soils rendering it ineffective.
Longevity		Kills Roots & Shoots	Short term effect seen, Emergent Species only
Capital Expense		***	\$250/acre * 680 acres =\$170,000
Operating Costs		***	2-3 X per year. \$340,000 - \$510,000
Labor Requirements		Low	***
25 Year Cost		***	\$8,500,000 - \$12,750,000
Species Selective		Emergent Species Only.	No. Broad spectrum. Used for water lilies or other emergent species. Can have negative effect on non target species.
Employee Risk		***	High: Skin & Eye Irritant.
Effects on Wildlife		Low toxicity to benthic invertebrates, fish birds, and mammals.	***
Effect on Sediment		***	Decaying Plant Material.
Toxicity Concerns		No label restrictions for swimming or fishing.	Yes
Public Acceptance			Not likely.
Board Evaluation			

Endothall <small>Chemical Control: Contact Herbicide</small>	PRO	CON
Efficacy		Short contact time required.
Longevity		***
Capital Expense		
Operating Costs		
Labor Requirements		Low
25 Year Cost		
Species Selective		
Employee Risk		
Effects on Wildlife		Low Toxicity to Fish in Aquathol® formula
Effect on Sediment		***
Toxicity Concerns		***
Public Acceptance		***
Board Evaluation		

<p style="text-align: center;">Triclopyr</p> <p><small>Chemical Control: Systemic Herbicide</small></p>	<p style="text-align: center;">PRO</p>	<p style="text-align: center;">CON</p>	
<p>Efficacy</p>			
<p>Longevity</p>		<p>Kills roots and shoots.</p>	
<p>Capital Expense</p>			
<p>Operating Costs</p>			
<p>Labor Requirements</p>			
<p>25 Year Cost</p>			
<p>Species Selective</p>		<p>Selective for broadleaf plants.</p>	<p>Not, effective for curly pondweed.</p>
<p>Employee Risk</p>			
<p>Effects on Wildlife</p>			
<p>Effect on Sediment</p>			
<p>Toxicity Concerns</p>		<p>No label restrictions for swimming or fishing.</p>	<p>Yes.</p>
<p>Public Acceptance</p>		<p style="text-align: center;">***</p>	<p>Not likely.</p>
<p>Board Evaluation</p>			

Diquat <small>Chemical Control: Contact Herbicide</small>	PRO	CON
Efficacy		Short contact time.
Longevity		Short-term, does not impact root mass.
Capital Expense		
Operating Costs		
Labor Requirements		Low:
25 Year Cost		
Species Selective		
Employee Risk		***
Effects on Wildlife		***
Effect on Sediment		***
Toxicity Concerns		***
Public Acceptance		***
Board Evaluation		

Copper Treatments	PRO	CON
Chemical Control: Efficacy		Short contact time
Longevity		Repeated Treatments
Capital Expense		Low Cost
Operating Costs		Less than other herbicides
Labor Requirements		Low
25 Year Cost		***
Species Selective		No.
Employee Risk		Moderate
Effects on Wildlife		Toxic to mollusk and fish
Effect on Sediment		Accumulates in Sediment.
Toxicity Concerns		High
Public Acceptance		No.
Board Evaluation		

Water Column Dyes Watershed Control: Chemical treatment to shade out aquatic plant growth.		PRO	CON
Efficacy		Useful in shallow water bodies.	Generally not available for lakes with outfalls. Cannot be used in flowing waters.
Longevity		***	Repeated yearly treatments. Maintain 1ppm concentration.
Capital Expense		\$50/gallon treats 1 acre 4 feet deep. \$50* 680 acre * 12 ft/4 ft = \$102,000	***
Operating Costs		***	Repeated Treatments & Applications
Labor Requirements		Minimal.	***
25 Year Cost		***	\$2,550,000
Species Selective		***	No.
Employee Risk		Low.	***
Effects on Wildlife		Reported to be non toxic to humans, livestock & aquatic organisms.	No long term data.
Effect on Sediment		Reportedly none.	No long term data.
Toxicity Concerns		***	Likely.
Public Acceptance		***	Highly unlikely.
Board Evaluation			