Lake Vegetation Management Plan

☒ **Variance Requested by Cooperator**
☒ **Variance Approved (see Section VI)**

Section I: Lake Information

Name: MTKA Carson & St. Louis DOW Number: 27013327&28 County: Hennepin
Fisheries Area: West Metro Surface Acres: 195 Littoral Acres: 120
Classification: General Development

Cooperator(s): Carson and St. Louis Bay Associations; Minnehaha Creek Watershed District.

Section II: Water Quality and Plant Community

A. Water Quality

☒ Total Phosphorus:	23.9 ppb	Date: 2004-2011 June-Sept Summer Ave.
☒ Chlorophyll-a:	4.8 ppb	Date: 2004-2011 June-Sept Summer Ave.
☒ Secchi Disc:	2.9 meters	Date: 2004-2011 June-Sept Summer Ave.

Narrative (describe water quality concerns, quantify TSI, NOTE if impaired or if TMDL exists):
Minnetonka Basin Delineation including surface area and littoral areas are listed in Appendix 2. Water quality data were collected by the Minnehaha Creek Watershed District on Minnetonka, Carson Bay (see Appendix 3).

Carlson Trophic Status for Total Phosphorus: 50 (TSI(TP) = 14.42 ln(TP) +4.15
Carlson Trophic Status for Chlorophyll-a: 46 (TSI(CHL) = 9.81 ln(CHL) + 30.6
Carlson Trophic Status for Secchi Disk: 45 (TSI(SD) = 60-14.41 ln(SD))
Overall Trophic Status: Mesotrophic

Carson Bay is a mesotrophic bay located in Lake Minnetonka. The water quality currently exceeds state recreation goals for impairment based on TP, SD and CHL.

B. Plant Community:

Narrative (describe plant community, list plant surveys, include a table of percent frequency, and make sure to note rare species and species of concern):
The Minnesota Department of Natural Resources conducted 2 point-intercepts on July 9, 2010 and June 3, 2011 (Hummel et al. 2010). The dominant plant in Carson Bay during 2010 and 2011 was Eurasian Watermilfoil occuring at ~ 65% of the points sampled. Curlyleaf Pondweed was present at ~11% of the points sampled in June and was only 2% of the sites in the July survey. The most frequently observed native aquatic plants were Coontail, Chara, and Large leaf Pondweed in June 2011. Later in the season (July 2010), Coontail and Chara were still the most frequently observed native plants with the frequencies of Flatstem Pondweed, Water Celery, and white and yellow waterlilyincrasing. For more information see frequency table below. The entire survey report is available upon request.

Percent frequencies of occurrence of surveyed sites.

	03-Jun-2011 92 pts.	09-Jul-2010 92 pts.
Eurasian Watermilfoil	**65**	**66**
Coontail	33	59
Chara	15	34
Large leaf Pondweed	15	10
Curlyleaf Pondweed	**10**	**2**
Robbins Pondweed	9	3
White Waterlily	6	13
Water Stargrass	5	7
Bladderwort	5	10
Illinois Pondweed	4	3
Flatstem Pondweed	3	11
Whitestem Pondweed	3	7
Elodea	3	5
Narrowleaf Pondweed	2	2
Water Celery	2	11
Northern Watermilfoil	1	2
Water Marigold	1	2
Spatterdock	--	13
Claspingleaf Pondweed	--	4
Horned Pondweed	--	3
Sago Pondweed	--	2
Naiad	--	2
Star Duckweed	--	1
Watershield	--	1

Section III: Public Input Process (narrative):
Letters were sent to the Carson and St. Louis Bay Associations, Minnehaha Creek Watershed District, and Lake Minnetonka Conservation District. A meeting was held with the Bay Associations and the City of Deephaven on April 14, 2011 where we discussed the sunsetting of the the clause allowing Carson and St. Louis Bays to chemically treat a greater percentage of aquatic plants within the littoral area than the rest of the lakes in Minnesota is set to expire by April 15, 2014. Before this clause expires, Minnesota DNR is required to create a lake vegetation management plan (LVMP) to identify aquatic plant management issues on Carson and St. Louis Bays and develop a specified plan to address the issues, if needed. DNR is partnering with the lake association, watershed district, and local municipalities to create this LVMP for Carson and St. Louis Bays.

DNR representatives communicated with the Carson and St. Louis Bay Association, Minnehaha Creek Watershed District and the City of Deephaven via email and phone during the fall 2012 to develop the LVMP. The bay associations decied to use the St. Alban Bay LVMP as a model for this LVMP and adopt similar goals.

<<<The remainder of this section will be filled in as we hold more meeting below is the public input from another "Grandfather" Lake>>>

The LVMP was posted to the DNR's website on January 17, 2012 and it was presented to the public on January 24, 2012 during a public meeting at Deephaven City Hall. A notice was put in a press release through the DNR on January 17, 2012 and a public notice was published in Sun Salior weekly newspaper on January 19, 2012. The plan was made available on the DNR website, and a 30-day comments period start January 24, 2012 and ended February 24, 2012. No written comments were received.

Section IV: Problems to be Addressed in this Plan (narrative):
The Minnesota Department of Natural Resources (DNR) revised the aquatic plant management (APM) rules on April 15, 2009 (MR 6280). The clause within the revised rule allowing Carson and St. Louis Bay to chemically treat a greater percentage of littoral area than the rest of the lakes in Minnesota is set to expire by April 15, 2014. The DNR is required to develop a lake vegetation management plan (LVMP) for Carson and St. Louis Bay before the clause expires. The lake vegetation management plan will serve as a guide for the management of aquatic plants. The lake vegetation management plan is a document the DNR develops in partnership with the public to address aquatic plant issues on a lake resulting in a targeted management plan to address those issues. The problems addressed in the lake vegetation management plan include:

Abundant Eurasian watermilfoil can interfere with recreational use of the lake, including fishing, boating, and swimming. Eurasian watermilfoil also can displace native aquatic plants.

Curly leaf pondweed has been a significant problem on Minnetonka in the past, but not in recent years. Should CLP interfere with recreational use or ecological function of the lake, this plan can be amended to allow larger CLP treatments. Currently, the few remaining areas of CLP can be treated early in the season.

Section V: Goals for Management of Aquatic Plants (narrative, include a description of efforts to protect rare features):
Goal A. Control Eurasian watermilfoil and other invasive plants, such as curlyleaf pondweed, to reduce the problems described above.

Goal B. Maintain or increase abundance and distribution of native submersed aquatic plants throughout the growing season. Native submersed plants should be protected, except as described in Goal C.

Objective B-1. The overall diversity of native submersed plants, as measured by the mean number of native species per point (littoral zone), will be maintained or allowed to increase in the years after a year of bay-wide treatment.

Goal C. Control of plants, including native submersed plants, in localized areas where they interfere with use or access by individual property owners when bay-wide selective control applications are performed.

Goal D: Maintain or improve water quality.

Lake Vegetation Management Plan

Section VI: Treatment Plan (map marked with areas where control of plants is anticipated):

A. Commons Area (>150' from shore)

☐ Mechanical Control: 60 acres to be treated, 50 % of littoral area

Narrative:
Mechanical control of aquatic plants is allowed up to 50% of the littoral area (M.R. 6280). The cumulative amount of mechanical and chemical aquatic plant control may not exceed 50% of the littoral area. Currently, mechanical treatment is not anticipated.

☒ Herbicide Control: In 2010, an estimated 79 acres to be treated, ~66 % of littoral area

☐ Other: #### acres to be treated, #### % of littoral area

Narrative:
NONE

B. Individual Permit Standards

Chemical Treatment of Submerged Plants: 50 feet or half of the frontage whichever is less feet along shore 50 feet lakeward.

Narrative:
Any permit applications received from riparian landowners for chemical treatment of native submersed plant on Carson and St. Louis Bay after the lake-wide treatment will be considered on an individual basis. Removal of native submersed vegetation will be limited to only that area necessary to allow reasonable use, with the maximum area being no more than 50 feet wide, or half of the owner's frontage whichever is less, by 50 feet lakeward plus a 15 foot wide channel to open water that may extend from the lakeward side of the 50 x 50 foot area. No removal of sparse native vegetation through the use of chemicals will be permitted.

Permit requests are subject to inspection and the aforementioned limits are maximums allowed for native species control. Selective control of invasive submerged aquatic plant species may be allowed to treat up to the entire frontage of the shoreline given that the stand of invasive species is nearly a monoculture, very dense and matted, and there are not many native species present that would be affected by the "selective treatment".

Treatment of Emergent Plants: #### feet along shore to open water

Narrative:
Individuals who would like to control emergent vegetation to access open water may apply for a permit. The neccessity of harvesting to create an access channel will be assessed by the DNR before a permit is issued.

Other Treatment - Click here to enter text.: ##### feet along shore ##### feet lakeward

Narrative:
Click here to enter text.

Section VII: Variances and conditions of permits
The commissioner may issue APM permits with a variance from one or more of the provisions of parts 6280.0250, subpart 4, and 6280.0350, except that no variance may be issued for part 6280.0250, subpart 4, items B and C. Variances may be issued to control invasive aquatic plants, protect or improve aquatic resources, provide riparian access, or enhance recreational use on public waters (6280.1000, subpart 1). Variance(s) and Justification(s) [check all that apply]

☒ **Application of pesticides to control submerged vegetation in more than 15 percent of the littoral area (M.R. 6280.0350, Subp. 4, A). (list justification below)**

☐ **Application of pesticides to control aquatic macrophytes in natural environment lakes established pursuant to part 6120.3000 (M.R. 6280.0250, Subp. 4, E.). (list justification below)**

☐ **Mechanical control of aquatic macrophytes in more than 50 percent of the littoral area (M.R. 6280.0350, Subp. 3, B). (list justification below)**

☐ **Waiver of dated signature requirement for invasive aquatic plant management permits because collecting a signatures would create an undue burden (M.S. 103G.615, Subp. 3a(b)). (list justification below)**

☐ **Other (please explain)**

Click here to enter text.

Justifications (identify which variance and provide the rational for all items checked above):
Narrative:
A variance to the 15% limit is required to meet the goals LMVP mentioned above. Specifically the variance will allow bay-wide control of Eurasian watermilfoil and curlyleaf pondweed;

The 15% limit is a level of plant control the DNR has confidence in that will allow riparian owners access to the lake while maintaining the basic functions and benefits that aquatic plants provide. Most lakes never reach the 15% limit for chemical control of aquatic plants. A variance is required to remove more than 15% of the littoral area and monitoring of the plant community and the water quality is required to ensure that cumulative impacts of aquatic plant removal are not resulting in harm to the lake.

One of the situations the DNR considers issuing a variance to the 15% limit is for the selective control of invasive species to enhance ecological and recreational benefits. Currently, Eurasian watermilfoil makes up a significant proportion of the plant community and could be an ecological and recreational nuisance on Carson and St. Louis Bays.

If the mean number of native species per point decreases during a year of bay-wide treatment, the native species are expected to recover in subsequent years. If the mean number of native species per point decreases during a year of bay-wide treatment, it is expected that bay-wide treatments will not be done during at least the first year following a bay-wide treatment in order to meet Objective B1.

Monitoring data will be collected as described below.

☐ **Variance approved without condition(s)**

☒ **Variance approved with following conditions(s):**

☒ **Pre-treatment data collection**

Narrative:

Two pre-treatment point-intercept plant surveys were conducted by the DNR.
During each year of bay-wide treatment, the Carson and St. Louis Bay Associations or its agent will inspect the bay prior to treatment to delineate areas to be treated. If any deviations from the most recent inventories are observed during pre-treatment inspections, these results should be noted and the treatments adjusted accordingly, in a manner consistent with the APM permit issued by the MnDNR. Treatment areas should be delineated using GPS and Geographic Digital Data, including all necessary electronic files, will be submitted to the DNR to enable re-creation with GIS software of all polygons, waypoints, track logs, etc.

☒ **Post treatment data collection**

Narrative:

At least one point-intercept survey will occur annually during the peak growth of native vegetation (late June through August). Reliable water quality data must also be collected throughout the season. The survey reports and water quality data must be provided to the DNR, the lake association, and other interested parties by 31 December of each year. The Minnehaha Creek Watershed District has been collecting water quality data and have stated they are willing to continue to monitor the water quality.

☒ **Evaluation**

Narrative:

The DNR, in conjunction with other interested parties, will review the point-intercept survey(s) and water quality results annually. If the point-intercept surveys or water quality data reveal that the treatments appear to be producing results that do not meet the goals of this plan, then the approach to control may be revised at the discretion of the DNR. Examples of reasons to revise the approach may include, but are not limited to, notable decreases in water quality or obvious decreases in native vegetation. If treatments need to be modified, the DNR will work with the associations to develop an alternative management strategy.

☐ **Requirements for Signature Waiver:**

Narrative:

Currently a waiver for signature is not authorized.

If a waiver for the signature requirement is issued under MS 103G.615 Subp 3a(b) an alternative form of notification is required. The allowed alternate forms of notification are a news releases or public notices in a local newspaper, a public meeting, or a mailing to the most recent permanent address of affected landowners. The notification must be given annually and must include: the proposed date of treatment, the target species, the method of control or product being used, and instructions on how the landowner may request that control not occur adjacent to the landowner's property.

☒ **Conditions of permits [limits on amounts of area to be treated, method and timing of control, etc]:**

Product(s): Herbicides to be used may include endothall (such as Aquathol K or Aquathol Super K) for curlyleaf pondweed (CLP) and Auxin mimic (such as 2,4 D and Triclopyr) for Eurasian Watermilfoil (EWM) or others. Protocols describing our current understanding of selective treatments including: target concentraion, timing of application and frequency of treatments are attached in Appendix 1.

☒ **Other:**

Narrative:

Additional information is contained in the following appendices:
Appendix 1: Background Information.
Appendix 2: Minnetonka basins and littoral area
Appendix 3. MTKA Carson Bay June-Sept summer average 2004-2011 collected by Minnehaha Creek watershed District
Appendix 4. Welling et al. 2011. Target concentrations of herbicides and timing of treatments of Eurasian watermilfoil in bays of Lake Minnetonka during 2011. Dated Feb. 9, 2011.
Appendix 5. Literature Cited.

Lake Vegetation Management Plan

<u>Section VIII</u>: Signatures

This Lake Vegetation Management Plan is in effect for five (5) years from date of Regional Ecological and Water Resources approval. If the plan is not renewed, then permits will be issued according to the standards listed in MR6280.

DNR Approval

Submitted By: _Chip Welling and Sean Sisler_____

Title: _____

Date: _____

_____	_____
Area Fisheries Supervisor	Date
_____	_____
Regional Fisheries Approval	Date
_____	_____
Regional Ecological and Water Resources Approval	Date

I affirm that I am an authorized representative of Carson Bay Association and St. Louis Bay Association and acknowledge participation in the development and implementation of this lake vegetation management plan.

_____	_____
Cooperator's Signature and Title	Date

Either party may terminate participation in this plan at any time, with or without cause, upon 30 days' written notice to the other party. If participation is terminated, permits will be issued according to standards listed MR6280.

Appendix 1: Background Information.

Rationale for Section II: Water quality and plant community
Values of Aquatic Plants in Lakes
Aquatic plants are valuable for a number of ecological and biological functions including utilizing nutrients that would otherwise be available to algae, stabilizing bottom sediments and shorelines, providing shelter for a variety of game and non-game fish and aquatic insects, and providing food for waterfowl and other wading birds. There is evidence that removal of submersed aquatic plant through the use of herbicide can harm lakes (such as reductions in populations of vegetation-dependent fish, removal of nursery habitat for fish, removal of habitat for invertebrates (food source for waterfowl and fish), and reductions in water quality). Cumulative loss of aquatic plants (especially when coupled with nutrient loading) can lead to drastic ecological changes in lakes causing the lake to have low water clarity, become algae dominated with little to no rooted aquatic plants, and shift to disturbance-tolerant fish species such as bullhead and carp (Engle 1990; Wilcox and Meeker 1992; Scheffer and Carpenter 2003; Egertson and Downing 2004).

Section VI: Treatment plan
Target Concentration: Current recommended rates for selective CLP treatment utilize Endothall applied at a rate to achieve a target concentration of 0.75-1.0 ppm up to 1.5 ppm for areas less than 1 acre. For 2011, the selective treatment of EWM uses Auxin Mimics applied at rates to achieve target concentrations of ~ 0.5 ppm bay wide. Selective control of invasive species is an evolving science and the treatment protocol may change as new information becomes available.

Timing of Application: Timing of bay wide application will be early spring when invasive plants are actively growing but before the majority of the native plants begin to germinate (typically before 60 degrees F) to reduce the damage to native plant and to prevent turion development.

Frequency of Treatments: If the mean number of native species per point decreases during the first year of bay-wide treatment, it is expected that bay-wide treatments will not be done during at least the first year after bay-wide treatment until native species per point reach pre treatment levels in order to meet Objective B1. Bay-wide treatments may be repeated at intervals of every other to every third year, depending on trends in the frequencies of the target invasive plants and also non-target native plants. If the mean number of native species per point does not decrease during the first year of bay-wide treatment, then bay-wide treatments may be considered during the following year.

Narrative:
The treatment protocols for Carson and St. Louis Bays are similar to those developed for St. Alban's and Gray's Bay were developed in consultation with the U.S. Army Engineer Research and Development Center, Lake Minnetonka Association, and the MN DNR for selective control of EWM (Appendix 4). Carson and St. Louis Bays are mostly enclosed and is expected to have similar extended herbicide exposures as was document in Grey's Bay 2009 (another enclosed bay). Applying herbicides in early spring can potentially increase their selectivity by targeting CLP and EWM at a time when these invasive species are actively growing and when many native species remain dormant (Netherland et al. 2000).

There are no treatment regimes that are 100% selective for only invasive species. However, there are some treatment regimes that are more selective using low dose, targeted herbicides, and timing of treatment to reduce the impacts to native plants. The above information on herbicides, timing, and target concentration are the current understanding of "selective control" for curlyleaf pondweed and Eurasian watermilfoil. Selective control of invasive species is an evolving science and the treatment protocol may change as new information becomes available. If the treatment protocol changes the new treatment protocol and why it was changed will be added to the LVMP in appendix 4 and those conditions will be incorporated into the APM pemrits.

Section VI: Treatment Plan, B. Individual Permit Standards

Permit standards for individual shorelines are in place to ensure each shoreline retains some aquatic habitat. Near-shore habitat, which are the most frequent targets for control efforts by shoreline property owners, are particularly important as habitat for young or small fish, and have the greatest diversity of non-game fish and amphibians (Poe et al. 1986; Bryan and Scarnecchia 1992; Weaver et al. 1997). Many species of mammals and waterfowl depend on these aquatic plants for food and nesting sites and are especially important for laying females whose reproductive success is closely tied to the availability of aquatic plants (Krull 1970; Bellrose 1976; Batt et al. 1992: 7-9). Development is increasing on lakes (particularly in the metro area) and entire reaches of near-shore habitat have been impacted through development. Having restrictions on the amount of shoreline individual properties can treat, allows each property owner to have access to the lake while retaining some of the near-shore habitat that is so critical for fish and wildlife. These restrictions also allow for an equitable distribution of aquatic plant management activities among all riparian property owners while mitigating the cumulative impacts on the lake as a whole.

Carson and St. Louis LVMP Appendix 2: Minnetonka Basins and Littoral

Lake: MINNETONKA

Bay/Basin: ENTIRE LAKE

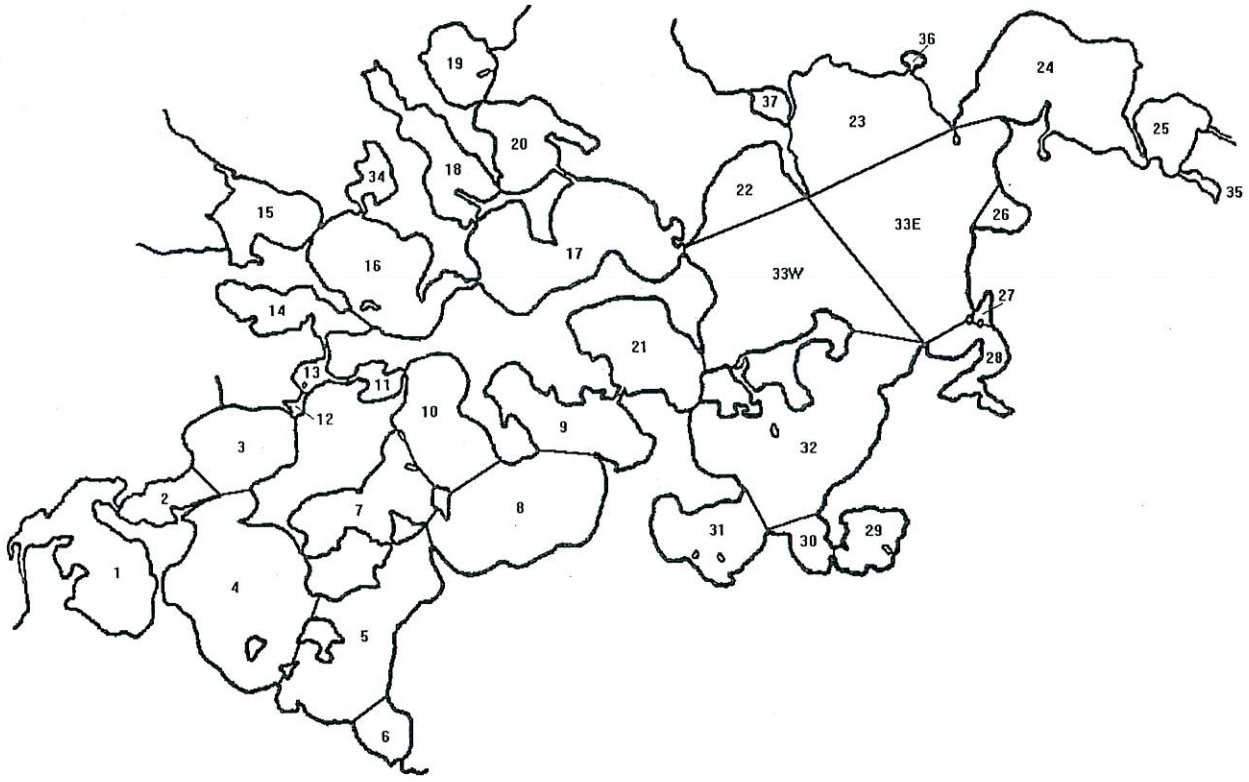


Figure 3: *Location and numbering of individual sampling bays on Lake Minnetonka.*

KEY TO NUMBERED BAYS OF LAKE MINNETONKA (27-0133)

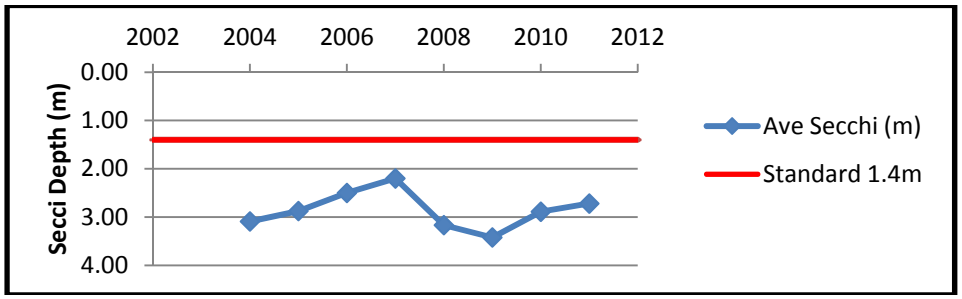
1	Halsteds Bay
2	Priests Bay
3	Cooks Bay
4	West Upper Lake
5	South Upper Lake
6	Smithtown Bay
7	Phelps Bay
8	East Upper Lake
9	Carmans/Old Channel Bay
10	Spring Park Bay
11	Black Lake
12	Emerald Lake
13	Seton Lake
14	Harrisons Bay
15	Jennings Bay
16	West Arm Bay
17	Crystal Bay
18	North Arm Bay
19	Stubbs Bay
20	Maxwell Bay
21	Lafayette Bay
22	Smith Bay
23	Browns Bay
24	Wayzata Bay
25	Grays Bay
26	Robinsons Bay
27	St. Louis Bay
28	Carsons Bay
29	St. Albans Bay
30	Excelsior Bay
31	Gideons Bay
32	South Lower Lake & Echo Bay
33W	North Lower Lake (West half)
33E	North Lower Lake (East half)
34	Forest Lake (27-0139)
35	Libbs Lake (27-0085)
36	Peavy Lake (27-0138)
37	Tanager Lake (27-0141)

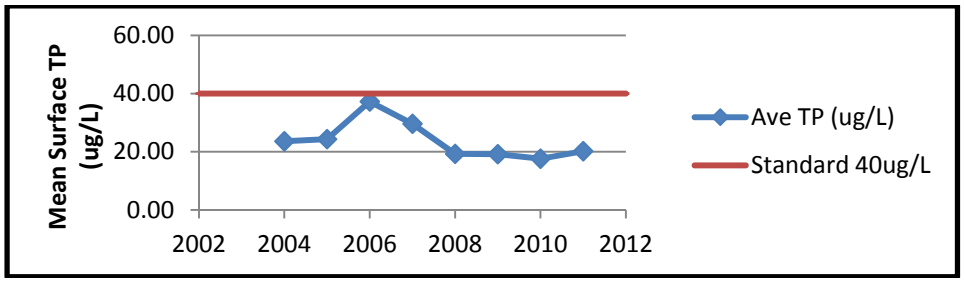
Lake: Minnetonka
Bay/Basin: Entire Lake

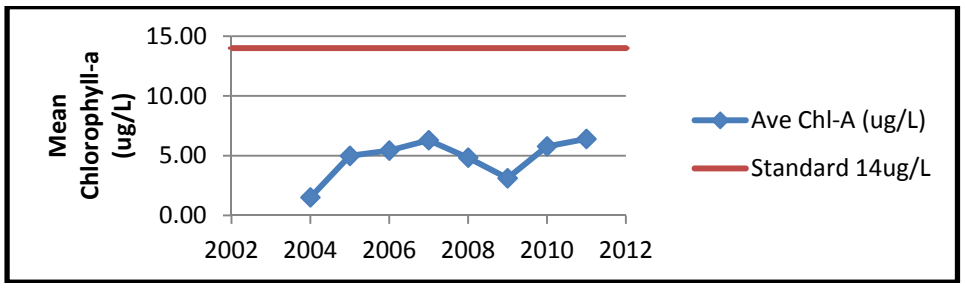
Physical Parameters and Sampling Effort, by Basin

Bay/Basin	Lake Section	Surface Area	Littoral Acres	Percent Littoral	Maximum Depth	Miles of Shoreline	Lake Class	2001 Effort (Number of Lifts)		
								Gill Nets	Trap Nets	Seine Hauls
Halsted	1	545	322	59	36	5.36	24	0	0	0
Priest	2	138	76	55	34	1.75	24	0	0	0
Cook	3	362	131	36	43	2.29	24	0	0	0
West Upper	4	379	193	51	84	5.62	27	2	0	0
South Upper	5	710	320	45	67	4.95	27	2	0	0
Smithtown	6	114	33	29	88	1.22	24	0	0	0
Phelps	7	379	272	72	36	3.81	24	0	0	0
East Upper	8	783	261	33	52	3.33	27	4	0	0
Carman	9	403	187	46	56	3.14	24	0	0	0
Spring Park	10	402	141	35	36	2.67	24	0	0	0
Upper Lake Total		**4215**	**1936**	**46**	**84**	**34.14**	**22**	**8**	**0**	**0**
Black Lake	11	80	64	80	24	1.81	38	0	0	0
Emerald Lake	12	15	14	93	16	1.02	40	0	0	0
Seton Lake	13	44	41	93	24	1.24	38	0	0	0
Harrisons	14	211	183	87	46	3.61	38	2	0	0
Jennings	15	285	174	61	23	3.05	24	0	0	0
West Arm	16	577	383	66	44	4.60	24	2	0	0
Crystal	17	800	285	36	113	6.10	27	2	0	0
North Arm	18	307	186	61	64	4.57	24	0	0	0
Stubbs	19	195	104	53	37	2.25	24	0	0	0
Maxwell	20	300	175	58	44	3.43	24	0	0	0
Forest Lake	34	84	49	58	42	1.72	30	0	0	0
NW Bays Total		**2898**	**1658**	**57**	**113**	**33.40**	**22**	**6**	**0**	**0**
Lafayette	21	460	195	42	62	3.47	24	0	0	0
Smith	22	262	244	93	20	1.71	38	0	0	0
Brown	23	648	209	32	88	3.05	27	2	0	0
Wayzata	24	751	198	26	63	3.33	27	2	0	0
Grey	25	175	127	73	28	2.19	30	0	0	0
Robinson	26	90	27	30	70	0.86	24	0	0	0
St. Louis	27	22	12	55	42	0.48	30	0	0	0
Carson	28	173	108	62	64	2.74	24	0	0	0
St. Albans	29	164	102	62	44	2.19	24	0	0	0
Excelsior	30	123	79	64	34	1.14	30	0	0	0
Giddeon	31	350	150	43	56	3.14	24	0	0	0
South Lower	32	1069	310	29	77	7.53	27	2	0	0
Northeast Lower	33E	1010	190	19	96	1.62	27	2	0	0
Northwest Lower	33W	1008	240	24	73	2.38	27	2	0	0
Libbs Lake	35	23	23	100	8	1.11	40	0	0	0
Heavy Lake	36	9	3	33	63	0.57	30	0	0	0
Tanager Lake	37	54	38	70	23	1.07	30	0	0	0
Lower Lake Total		**6391**	**2255**	**35**	**96**	**38.58**	**22**	**10**	**0**	**0**

Carson and St. Louis LVMP Appendix 3: Carson Bay June-Sept summer average 2004-2011 collected by Minnehaha Creek Watershed District







Carsons (June-Sept)	Ave Secchi (m)	Ave TP (ug/L)	Ave Chl-A (ug/L)	# of Obs - Secchi	# of Obs - TP	# of Obs - Chl-A
2011	2.72	20.20	6.40	10	10	10
2010	2.89	17.61	5.78	11	11	11
2009	3.42	19.17	3.11	10	10	10
2008	3.17	19.28	4.83	10	10	10
2007	2.20	29.63	6.29	8	8	8
2006	2.50	37.29	5.43	7	7	7
2005	2.88	24.33	4.98	4	3	3
2004	3.09	23.60	1.51	5	5	5
Ave.	**2.86**	**23.89**	**4.79**			

Carson and St. Louis LVMP Appendix 4:

Target concentrations of herbicide and timing of treatments of Eurasian watermilfoil in bays of Lake Minnetonka during 2011

DRAFT

Developed by Chip Welling and Sean Sisler, MnDNR; John Skogerboe and Mike Netherland, U.S. Army Engineer Research and Development Center; and Dick Osgood, Lake Minnetonka Association.

2011 February 9

It is important to remember that we lack the knowledge to provide recommendations for treatments that could be guaranteed to provide the desired level of control of Eurasian watermilfoil, while having little or no effect on non-target, native plants. Consequently, significant uncertainty remains regarding the effects of the proposed treatments. For this reason, monitoring is planned.

Closed Bays (Grays and St. Albans)

1. Timing, early is probably OK. In this case, early means pre-May and water temps. less than 60 degrees.

2. For enclosed bays, choose rates of application of herbicide based on calculation of the bay-wide concentration that would result from the application, however it is done.

3. Timing of treatments with an auxin-mimic in relation to temperatures of 50 to 60 F makes sense when there is extended contact time (enclosed bays), in these cases shoot for a whole bay concentration of 0.5 ppm.

4. Target concentration - aim for the actual bay-wide concentration found in Grays Bay in 2009. For Gray's Bay in 2009, "the mean initial concentration for all treated areas estimated by a linear regression was 490 ug/L ae" (Skogerboe and Netherland 2010:3).

5. To get this, we should look carefully at the amount of product applied and whether any thermocline existed and adjust accordingly.

Open Bays (Carmans and Gideon)

1. Timing - 'late' is preferred, it should be keyed to EWM growth, ie. larger plants.

2. Target concentrations - OK as you proposed. [see Table 1]

3. Little data exists on short term exposures during this temperature window. Work in progress suggests that low dose and short exposure time during early-season treatments may produce less control than later treatments. Consider treating at higher concentrations during the 50-60 degree window in situation where there is retention time is reduced (open bays like Carmen). If treating later you can reduce the rates to improve selectivity.

4. Treatments of off-shore areas in open bays may include more than one application of herbicide, i.e., a split treatment.

5. Consider possible application of herbicide when Eurasian watermilfoil is approximately two to four feet in height, i.e., actively growing. It is estimated that this height may be reached during late-May to early-June.

Phelps Bay

1. We should clarify what is the closed vs. open aspects of Phelps. Presumably, this will have to

Delineated.

Information needed in 2011

1. Concentrations of herbicide in water following applicatio0n of herbicide to bays.

2. Biomass or biovolume data for both target and non-target plants.

[3. Targeted sampling of floating-leaved plants, i.e., water-lilies?]

Lake Vegetation Management Plan

Revisions to be considered include:

> Objective B-1. The overall diversity of native submersed plants, as measured by the mean number of native species per point (littoral zone), will be maintained or allowed to increase in the first year after bay-wide treatment, though it may decrease in the year of treatment. Biomass samples will be collected in 2011 to provide additional insight into the effects of treatments.

Report cited

Skogerboe, John G. and Mike D. Netherland. 2010. Revised Draft Report: Evaluation of the June 2009 aquatic herbicide treatments on Gray's Bay and Phelps Bay, Lake Minnetonka, Minnesota. Unpublished report by the US Army Engineer Research and Development Center, W. 500 Eau Galle Dam Rd., Spring Valley, WI 54767 and Center for Aquatic and Invasive Plants, 7922 NW 71st Street, Gainesville, FL 32653. [received on 10 February 2010]

Table 1. Proposed target concentrations of triclopyr herbicide for control of Eurasian watermilfoil in bays and parts of bays on Lake Minnetonka for treatments planned for 2011.

	Enclosed			Open					
	Grays	St Alban's	Phelps, West	Carmans	Carmans	Gideons	Gideons	Phelps, East	Phelps, East
				Nr-Shr < 6 foot depth	Off-Shr > 6 foot depth	Nr-Shr < 6 foot depth	Off-Shr > 6 foot depth	Nr-Shr < 6 foot depth	Off-Shr > 6 foot depth
Early	$\leq$ 0.5 ppm	$\leq$ 0.5 ppm	$\leq$ 0.5 ppm						
Late – milfoil plants are larger				$\leq$ 750 ppb	1,000 ppb < Rate$\leq$ 2,000 ppb	$\leq$ 750 ppb	1,000 ppb < Rate$\leq$ 2,000 ppb	$\leq$ 750 ppb	1,000 ppb < Rate$\leq$ 2,000 ppb

Carson and St. Louis LVMP Appendix 5: Literature Cited

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