

**2012 Lake Vegetation
Summary
Lake Sarah (Hennepin County)**

Introduction

Lake Sarah is a 561 acre lake located near the town of Rockford in Hennepin County. It has a littoral area of 373 acres, and is dominated by Curlyleaf Pondweed and Eurasian Watermilfoil, which are aquatic invasive plants, as well as Coontail, which is a native plant but can have nuisance characteristics.

Discussion of 2011 Aquatic Plant Survey

Three Rivers Park District performs two aquatic plant surveys on the lake annually, one in the spring and one in the fall. They typically divide the lake into the East Basin and West Basin, and this discussion will separate the two as well.

Spring survey: East Basin, June 9, 2011

Plant:	Curlyleaf Pondweed	Eurasian Watermilfoil	Coontail	White Water- Lily	Star Duckweed	Filamentous Algae
% Frequency	68.92	40.54	43.24	13.51	13.51	12.16

Plant:	Leafy Pondweed	Elodea	Yellow Water-Lily	Flat-Stem Pondweed	Chara	Sago Pondweed
% Frequency	8.11	6.76	2.7	2.7	2.7	1.35

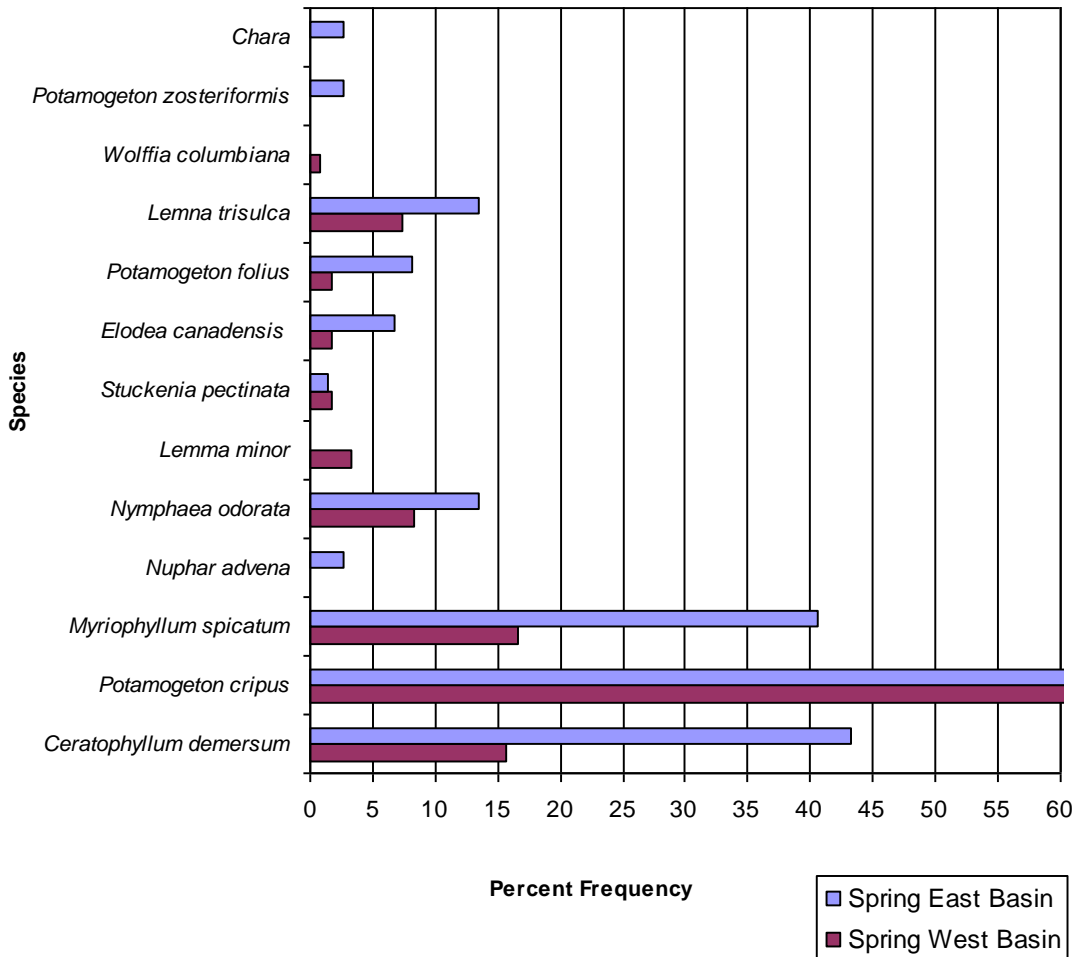
*% Frequency can be described as the number of sample points found with a given species, divided by the total number of sample points.

Spring survey: West Basin, June 9, 2011

Plant:	Curlyleaf Pondweed	Eurasian Watermilfoil	Coontail	White Water-Lily	Star Duckweed	Filamentous Algae
% Frequency	63.64	16.53	15.7	8.26	7.44	3.31

Plant:	Common Duckweed	Sago Pondweed	Leafy Pondweed	Cattails	Elodea	Watermeal
% Frequency	3.31	1.65	1.65	1.65	1.65	0.83

The most dominant plant in the spring is clearly Curlyleaf Pondweed, on both basins. On the East Basin; Eurasian Watermilfoil and Coontail are also very abundant, but they are slightly less abundant on the West Basin. There are several natives found throughout the lake, but at a lesser abundance.



Fall Survey: East Basin, August 11, 2011

Plant:	Coontail	Star Duckweed	Eurasian Watermilfoil	White Water-Lily	Filamentous Algae	Curlyleaf Pondweed	Elodea
% Frequency	50.67	22.67	17.33	12	9.33	6.67	4

Plant:	Greater Duckweed	Yellow Water-Lily	Wild Celery (Vallisneria)	Common Duckweed	Water-meal	Leafy Pndwd	Sago Pndwd
% Frequency	4	2.67	2.67	2.67	1.33	1.33	1.33

*% Frequency can be described as the number of sample points found with a given species, divided by the total number of sample points.

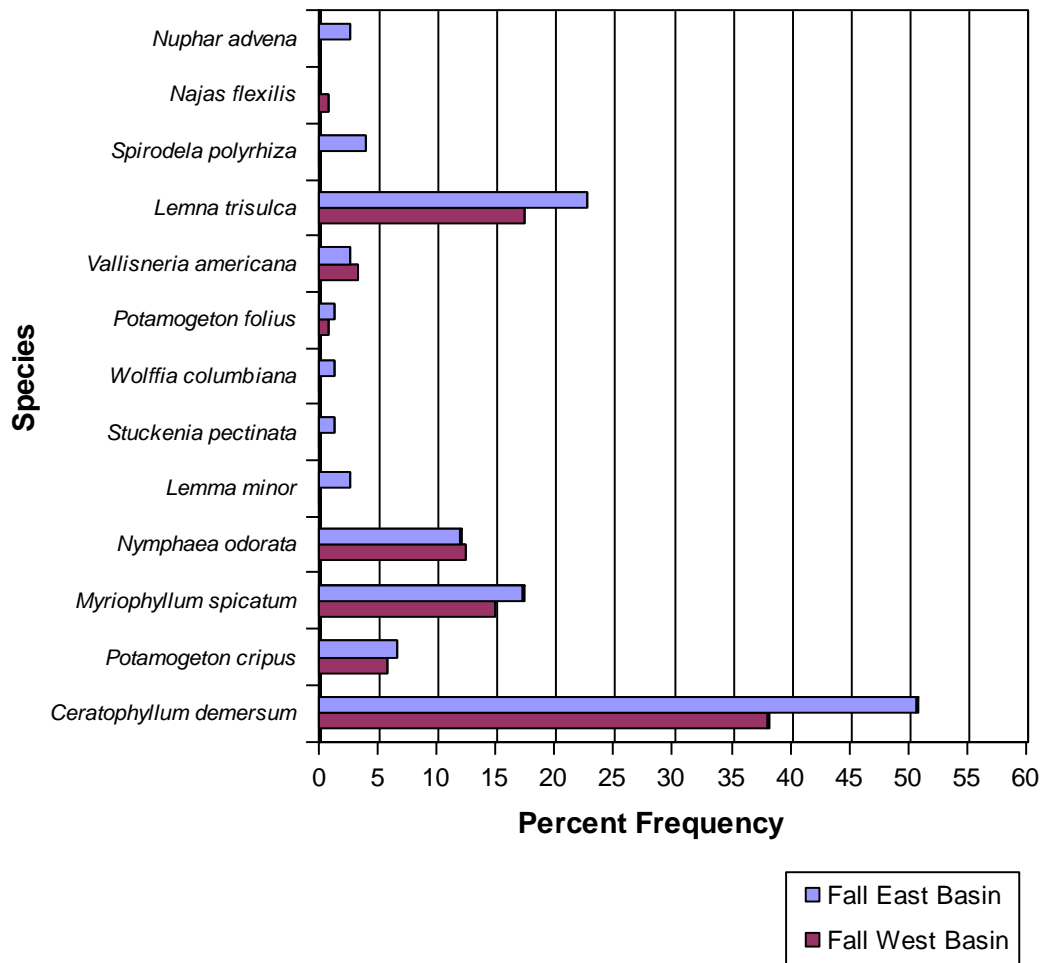
Fall Survey: West Basin, August 11, 2011

Plant:	Coontail	Star Duckweed	Eurasian Watermilfoil	White Water-Lily	Curlyleaf Pondweed	Cattails
% Frequency	38.02	17.36	14.88	12.4	5.79	5.79

Plant:	Filamentous Algae	Wild Celery (Vallisneria)	Leafy Pondweed	Bushy Pondweed
% Frequency	4.13	3.31	0.83	0.83

Given the unique life cycle of Curlyleaf Pondweed, the vast majority of it dies off sometime in July; it appears that there were still a few plants present during this survey, but in low numbers. Coontail appears to be the most dominant plant by August, with Eurasian Watermilfoil being the next most abundant. This data would suggest that Coontail actually outgrows EWM by late summer. There is a significant difference in the percent frequency of EWM on the East Basin from the spring survey to the fall survey. EWM had a percent frequency of 40.54% in the spring, but in the fall it was down to 17.33 %. Comparatively, Coontail went from 43.24% in the spring, to 50.67% in the fall. This could more than likely be explained by Coontail creating more biomass than EWM, thus creating more likelihood that Coontail is pulled up on the sample rake with less EWM be pulled in, even though it is still there. Several other natives were found during the fall survey, but in lower numbers once again.

**Lake Sarah
Aquatic Plant Survey
8-11-2011**



Aquatic Invasive Plants in Lake Sarah

Curlyleaf Pondweed:

The very unique life cycle of this plant gives it a competitive advantage over all other plants. It can start growing during late fall, and continue to grow at a slower rate underneath the ice. By ice off, with water temperatures increasing, the plant starts growing at a more rapid pace. It is the first plant up in the spring, often creating dense mats that can limit recreation and reduce native plant abundance. Curlyleaf dies off mid-summer, releasing excess Phosphorus into the water column often resulting in nuisance algae blooms. Before it dies off, the plant releases what is called a Turion, which has the ability to form new plant in the fall. These Turions will fall off the plant, float around with any current and wave action, and plant itself in the sediment all over the lake. Come fall, these Turions can start sprouting new plants. This is why Curlyleaf spreads so fast and takes over so quickly.

What is the plants impact in Lake Sarah?

Curlyleaf Pondweed is the most abundant plant in the spring, creating dense, un-useable areas. It also contributes to the poor water quality in Lake Sarah, when it dies off it often results in nuisance algae blooms. From the draft version of the Lake Sarah Vegetation Management Plan, *“The approved TMDL identifies decomposition of curly-leaf pondweed as contributing over 900 pounds of phosphorus load to the lake, about 17% of the overall phosphorus load entering the lake under existing conditions.”*

Management Goal:

Any long term goals for Curlyleaf Pondweed should be focused around depleting the Turion bank in the lake. Much research has been performed in this area, and it has been proven that lake-wide herbicide treatments for Curlyleaf Pondweed can reduce Turion numbers over the course of multiple years. Treating the Curlyleaf before it produces Turions leads to a decreased abundance of the plant lake wide, leading to smaller more manageable areas after several years of management. Decreasing the amount of Curlyleaf in the lake would not only lead to more open water for recreation, but it will have a direct, positive impact on water quality and reducing some amount of Phosphorus.

Aquatic Invasive Plants in Lake Sarah

Eurasian Watermilfoil:

This plant grows quickly in the spring, leading to dense mats on the surface by the summer months. Milfoil can create dense monocultures, crowding out native plants which are vital to the overall health of the lake and reducing plant diversity. Milfoil is a nuisance to homeowners and boaters by creating dense mats that reduce recreation and navigational space on the lake and can affect fish populations by creating habitat that is typically occupied by small sunfish. EWM spreads most rapidly by fragmentation, so it is best to avoid driving through large beds of EWM to avoid creating fragments.

What is the plants impact in Lake Sarah?

EWM typically grows in shallower depths on Lake Sarah, often creating issues for homeowners trying to get out to open water. It can also affect recreation on the lake in select areas.

Management Goals:

The main management goal for controlling EWM in Lake Sarah is to reduce the surface matting of the milfoil, which often creates issues for homeowners trying to get out to open water and limits recreation. After Curlyleaf dies off from initial treatments, it could be very likely that EWM would take its place. Controlling EWM does not always lead to increased natives due to poor water clarity, however, if natives were to increase because of EWM treatments that would be looked at as a main management goal in the future and an added bonus.

2012 Herbicide Treatments

There is currently a draft version of a Lake Vegetation Management Plan for Lake Sarah that will hopefully be approved by the MN DNR sometime in 2012. Part of this management plan will enable the LSIA to treat Curlyleaf Pondweed on a lake-wide basis over multiple years, to reduce the plant population to smaller, more manageable areas and reduce the internal phosphorus load coming from massive amounts of Curlyleaf dying off in the hot, mid-summer months. The initial goals of the 2012 treatments were to prove the effectiveness and establish methods for the LSIA to treat their own aquatic invasive weeds on a volunteer basis. This experience would help dictate a comfort level on the part of the LSIA to increase to a whole-lake treatment in 2013 for Curlyleaf Pondweed.

Through several meetings with the LSIA board and homeowners of Lake Sarah, treatment locations were determined along with the willingness from homeowners to treat for Eurasian Watermilfoil in select areas as well. The DNR ultimately approved 50 acres for the treatment of Curlyleaf Pondweed and 50 acres for the treatment of Eurasian Watermilfoil. Due to a very early spring, aquatic plants were at least a month ahead of where they typically were. This created a heavy workload for the DNR in issuing permits, and thus the LSIA was forced to wait for their permit to be approved a little later than desired. Water temps increased into the 50's quickly, but luckily ended up holding steady long enough to make the appropriate treatments for Curlyleaf Pondweed. By the time treatments were made for Curlyleaf, a vast majority of the plant was topped out and matting. Mature plants can take longer to die, however the heavy density of Curlyleaf created good conditions to get the desired contact time needed for the herbicide to be most effective.

The LSIA was also able to obtain a grant from the MN DNR to help pay for the treatment costs.

Treatment timeline

Pre-Treatment Survey – March 30, 2012

A pre-treatment inspection was performed to delineate the initial proposal of 70 acres of Curlyleaf Pondweed. During the inspection, the area was further delineated to approximately 63 acres that actually had Curlyleaf. Curlyleaf was noted to be abundant in nearly every treatment site on the lake, with some sites close to being topped out. Sparse Eurasian Watermilfoil was found during this time, leading to the conclusion that the LSIA should wait to treat the EWM.

Received permit from the DNR on April 18, 2012

The permit allowed for 50 acres of Curlyleaf Pondweed and Eurasian Watermilfoil control. The permit was restricted to offshore areas only (150 ft. from shore and out)

Pre-Treatment Survey – April 22, 2012

Given the wait time to receive the permit from the DNR, another survey was needed to assess the current state of Curlyleaf Pondweed and Eurasian Watermilfoil. Curlyleaf was abundant everywhere and topped out in several areas. Eurasian Watermilfoil was starting to become a problem, but through discussion it was decided the LSIA should wait to treat the EWM at a later time when more EWM was actively growing, and just to focus on the Curlyleaf Treatment at this time.

Curlyleaf Pondweed Treatment – April 29, 2012 (50 acres)

This first treatment was for 50 acres of Curlyleaf Pondweed. Aquathol K (Endothal) was the herbicide used at a rate of 1 ppm. The wind speeds were about 5 – 10 mph out of the Southeast, making ideal conditions for the treatment. The treatment took less than one day with a lot of help from Lake Sarah volunteers under the guidance of Craig Mueller from Aquatic Solutions, who is a licensed applicator with many years of experience.

Permit was amended – May 8, 2012

The permit was amended to include onshore areas (within 150 ft. of shore) and also gave us a wider range of rate for 2,4-D, which was needed for the EWM treatment.

Post Treatment Survey – May 16, 2012 (This is the report from the survey)

North Shore Drive: CLP treatment looks good, still some spotty CLP in areas, but it is starting to die and decompose so I expect it to be gone within the week. Everywhere else is CLP free, except for the channel area going out towards the main lake. The area that seemed to get some control was narrower than the actual channel treatment area; some of the CLP in this area is still green and healthy, while some is dying. I expect it to thin out some within the week. Lots of CLP outside the treatment area showing some injury, with probably 500 feet west of the treatment site getting complete control out probably 200 feet or so. Still lots of algae, lots of EWM, Coontail and some Elodea.

South Lake Sarah Drive: This area seems to have gotten better in the last day or two according to Scott. There are still scattered spots of CLP, but a lot of it is starting to die and decompose. There are a few areas that are still a little green. Within the week it should look even better. The areas that still have some green CLP are right onshore, which we were not allowed to treat during the 2012 CLP treatment, so that would explain why some is still healthy. There are also a few areas in deeper water that still have some green CLP. Overall, I think more CLP is dying in this area. They also have plenty of milfoil.

Lake Sarah Heights Drive West Basin: This area looks great overall, with only a few scattered spots of CLP remaining, which is in the process of dying. There is a lot of injury to CLP outside this treatment area as well, complete control north of the treatment site quite a ways. Also, lots of EWM here.

Lake Sarah Heights Drive East Basin: Overall, great success here with once again a few scattered patches of CLP still in the process of dying. On the far eastern edge of the treatment site where it gets narrow and goes around the corner (by Roger's house) there are still some patches of CLP that are green and some that are dying. I expect it to thin out some within the week, but some may remain. This area has a sharp drop off making control difficult due to contact time. EWM throughout this area as well, with lots of Coontail.

Fern Drive: CLP is pretty much gone on the north end, but as you head south in this area there still seems to be plenty of CLP below the surface, it seems to be fairly healthy with some dying. I think this area had more injury to the plants, but not enough to knock them out. I expect it to thin out some within the week, but some will still remain. Lots of Coontail on the north end, with a few scattered plants of EWM. Not much EWM in any other part of the site, I would honestly not recommend treating this site for EWM, there is not enough there.

Overall, I recommend treating the entire North Shore Drive area for EWM, along with the entire Lake Sarah Heights Drive East Basin for EWM. Fern Drive does not have enough EWM to warrant a treatment. CLP is mostly gone, with some still dying. Few scattered patches of green CLP, especially in Fern Drive, but overall I call it very successful for a pilot program, especially since we treated when the plants were nearly topped out and more mature. Also, lots of control outside the treatment areas, meaning there was probably more drift than expected.

Permit was amended – May 18, 2012

The permit was amended to allow for up to 5 acres to re-treat Curlyleaf Pondweed. This permit ended up not being needed, as almost all the Curlyleaf ended up dying off.

Eurasian Watermilfoil Treatment - May 20, 2012 (16.2 acres)

During this treatment, it was noted that almost all of the Curlyleaf Pondweed in the lake was gone, even areas outside the treatment areas. Three sites were originally proposed for EWM treatment: North Shore Drive, Lake Sarah Heights Drive East Basin and Fern Drive. However, due to a lack of EWM in Fern Drive, treatment only occurred in North Shore Drive and Lake Sarah Heights Drive East Basin. 16.2 acres were treated during this time. The winds were calm, around 5 mph, and were coming out of the Northwest. The EWM was treated with DMA-4 (liquid 2,4-D) at a rate of 2 ppm.

Permit was amended – June 5, 2012

The permit was amended to allow EWM treatment for two additional sites, South Lake Sarah Drive and Lake Sarah Heights Drive West Basin. There is a total of 10 acres between these two additional sites.

Eurasian Watermilfoil Treatment – June 6, 2012 (10 acres)

The two additional sites, South Lake Sarah Drive and Lake Sarah Heights Drive West Basin, were both treated on this day for a total of 10 acres. The wind was from the Southeast at 5 – 10 mph.

EWM Post Treatment Inspection – June 29, 2012

The EWM treatments worked great in the four treatment sites, with very little EWM remaining. The EWM that is still remaining is dying and decomposing. There are a couple spots with flowering milfoil, but they are mixed in with very thick stands of Coontail and covered with filamentous algae. Coontail is definitely the most abundant plant right now in the lake, covering many areas of the shoreline creating thick mats on the surface. Filamentous algae is also a problem right now, covering almost all the aquatic plants in the lake. Several natives were also noted, including Elodea, Wild Celery, Sago Pondweed and Coontail. The following are pictures taken from this survey.



(Coontail matted on the surface covered in Filamentous Algae)



(Native plant Elodea is fairly abundant in near shore areas)



(Native plant Coontail is the most abundant plant in the lake by mid-summer)



(Native plant Wild Celery is more abundant on Lake Sarah than in past years, it typically appeared in the lake covered in algae)



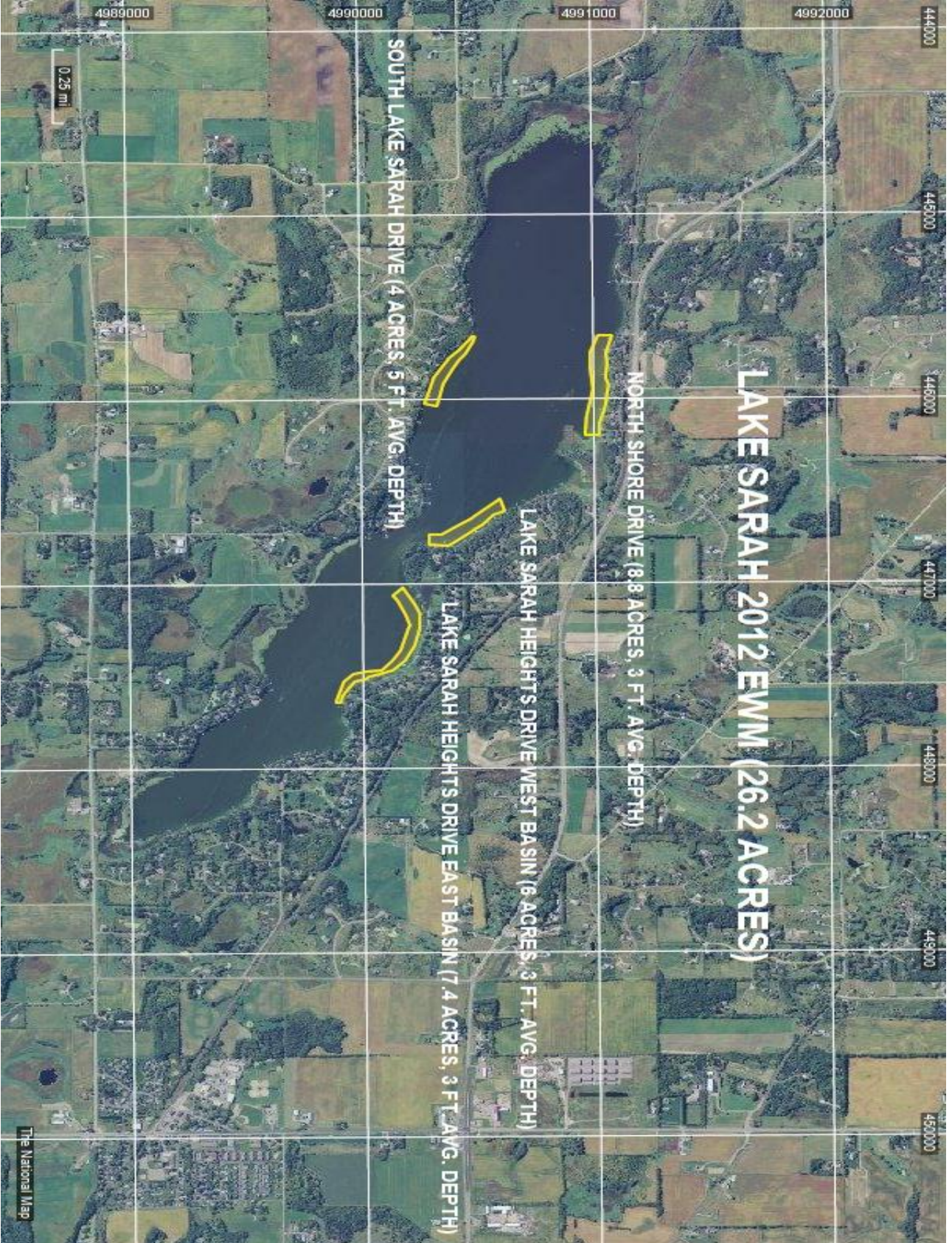
(Healthy EWM on the left, dying EWM on the right. Notice how the Healthy EWM is green, and the dying EWM is turning black and losing leaves from the stem)



(A few flowering EWM plants sticking up in a thick mat of Coontail with some Filamentous algae. This only occurred in a couple areas on Lake Sarah Heights Drive East Basin)

Final Breakdown of Treatment Sites and Acreage Treated





Curlyleaf Pondweed sites: 50 acres treated

North Shore Drive: 12 acres

South Lake Sarah Drive: 6 acres

Lake Sarah Heights Drive West Basin: 9 acres

Lake Sarah Heights Drive East Basin: 16.4 acres

Fern Drive: 6.6 acres

Eurasian Watermilfoil sites: 26.2 acres treated

North Shore Drive: 8.8 acres

South Lake Sarah Drive: 4 acres

Lake Sarah Heights Drive West Basin: 6 acres

Lake Sarah Heights Drive East Basin: 7.4 acres

Discussion of 2012 Aquatic Plant Survey

Three Rivers Park District performed their spring survey on June 8, 2012. This survey will be analyzed once Three Rivers compiles the data. A survey will also be performed this fall by Three Rivers.

Recommendations for 2013

After a successful pilot program in 2012, it is recommended that the LSIA move up to a whole-lake treatment for Curlyleaf Pondweed in 2013. Assuming the DNR approves the proposed Lake Vegetation Management Plan, there should be no issues with permitting. Signatures will be needed from all homeowners where the treatment sites come within 150 ft. of their shoreline. From Three Rivers Park District's spring 2011 survey, which is pre-treatment, there are approximately 234 acres of Curlyleaf Pondweed in Lake Sarah. That is about 62% of the whole littoral area on Lake Sarah. Not all 234 acres will need to be treated to control all the Curlyleaf in the lake, future discussions will be made with the LSIA on how many acres should be treated in 2013. The chemical used will be Aquathol K (Endothall) at a rate of 0.5 ppm to 0.75 ppm.

The 2012 Eurasian Watermilfoil treatment was successful, it is recommended to be continued in 2013 in similar areas or possibly more areas if homeowner interest is high.

Three Rivers Park District will continue to perform two aquatic plant surveys on Lake Sarah annually, this data will be looked upon to monitor the plants year to year, assess the status of native plants and invasive plants. This data will also give the LSIA an idea of how the treatments are reducing Curlyleaf Pondweed year to year.

