Sustainable Lake Management Plan
Gilfillan Lake

Prepared by The
Vadnais Lake Area Water Management Organization
In Partnership with the Lake Gilfillan Watershed Association, Wenck Associates, Inc., and the Ramsey Conservation District
(2009 – 2010)

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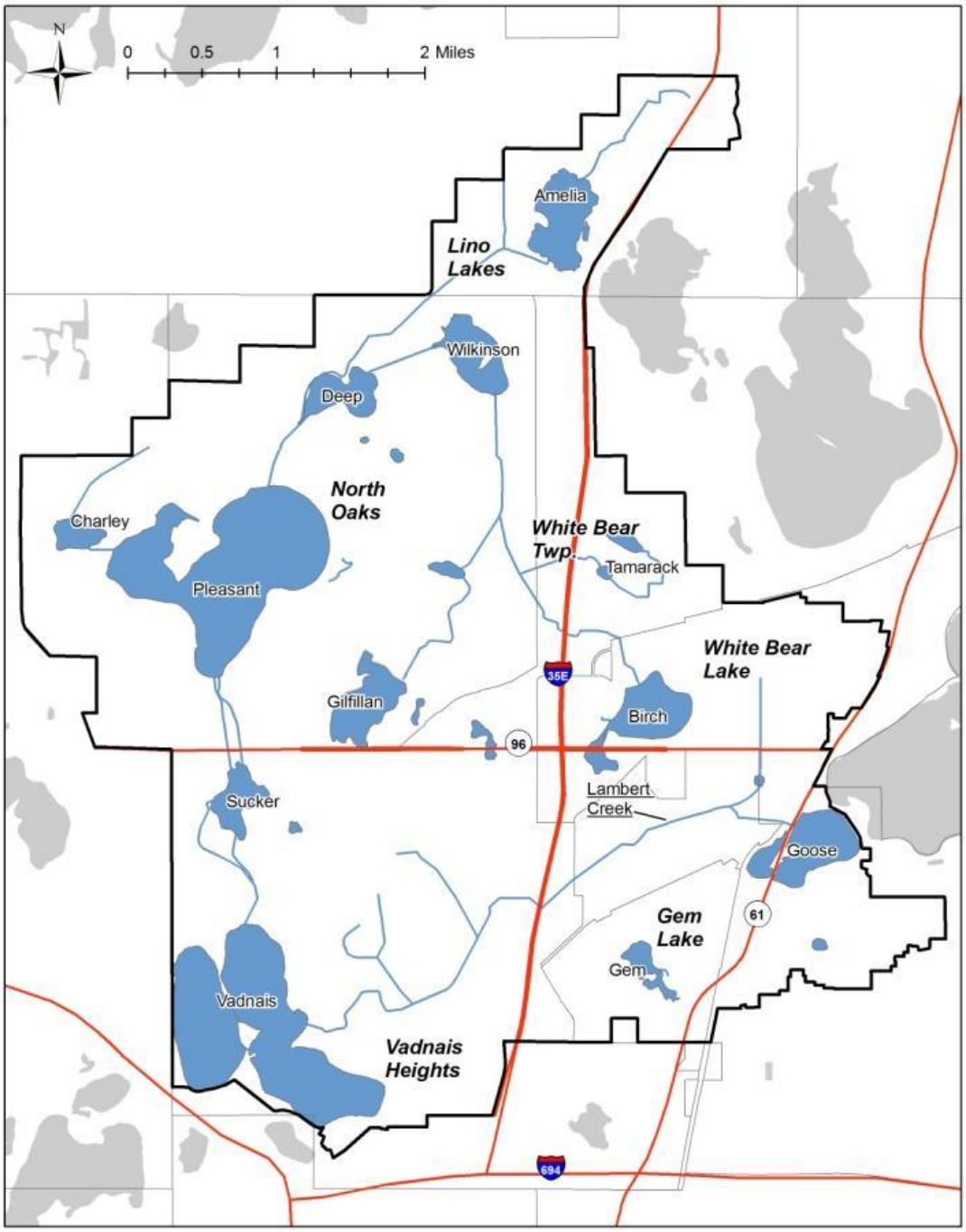
Introduction

Gilfillan Lake is located in the City of North Oaks and lies within the Vadnais Lake Area Water Management Organization (VLAWMO). In 2009 residents formed the Lake Gilfillan Watershed Association (LGWA). Gilfillan is a shallow lake with a maximum depth of about 6 feet. The 110 acre lake has murky water and abundant aquatic vegetation. Gilfillan Lake sits in a small 220 acre subwatershed and receives very little runoff from storm events and snow melt. In 1950 Gilfillan was dredged to make a lake and augmentation was necessary to keep a consistent water level. Augmentation was ceased in 1989 – 90 by the State.

Location Map



Gilfillan Lake is surrounded by private homes with one large open lot belonging to the North Oaks Home Owners Association. Bald Eagles, Trumpeter Swans, Muskrats/Otters, and Geese are just some of the observed fauna. The studies for this report were conducted by VLAWMO, Ramsey Conservation District, Conestoga-Rover & Associates and Wenck Associates, Inc. All figures and tables were created by Wenck or VLAWMO, unless otherwise noted. The studies and surveys are attached as Appendices. The Lake Gilfillan Watershed Association (LGWA) has assisted VLAWMO with monitoring activities and has been an active participant in the formulation of this SLMP. The LGWA, and it predecessor, the Lake Gilfillan Improvement Association, have been active stewards of the lake for many years. Partnership is the keystone of success for VLAWMO and this report is an excellent example of that cooperation.

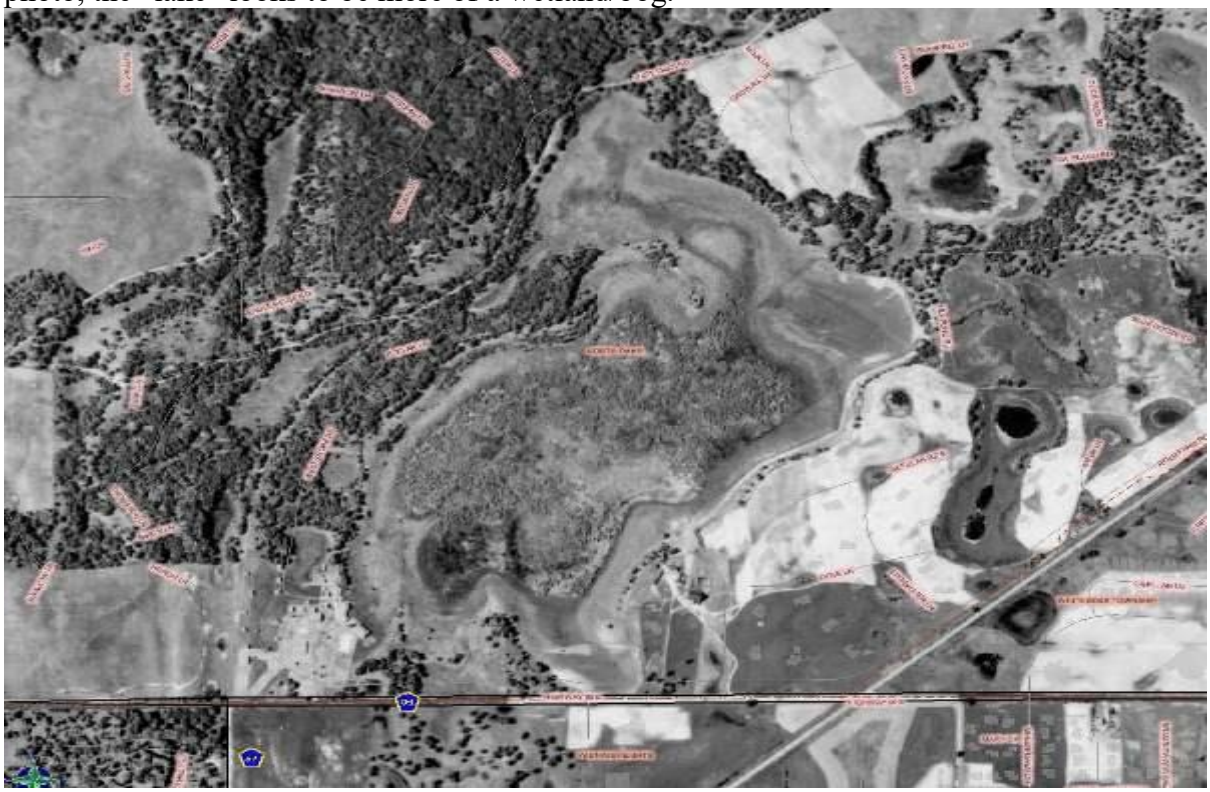
Bald Eagle snacking on a Koi in a tree near Gilfillan Lake

Exposed water level gauge and lake bottom, July 2009

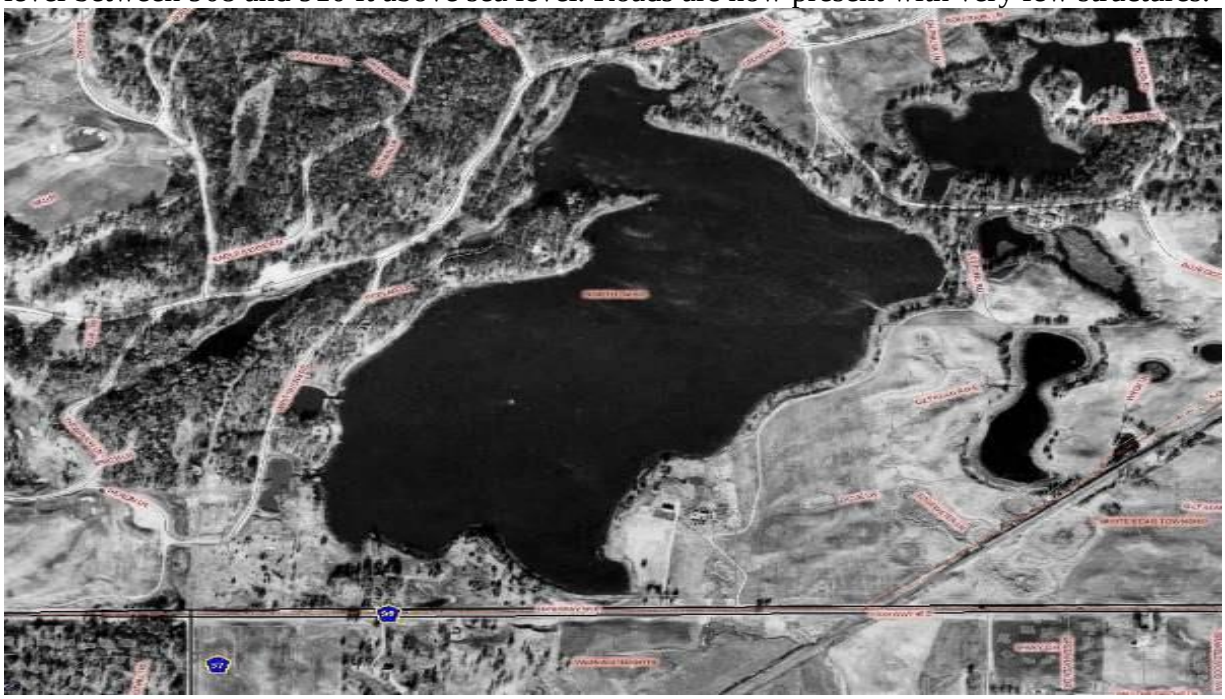
Watershed Features

History

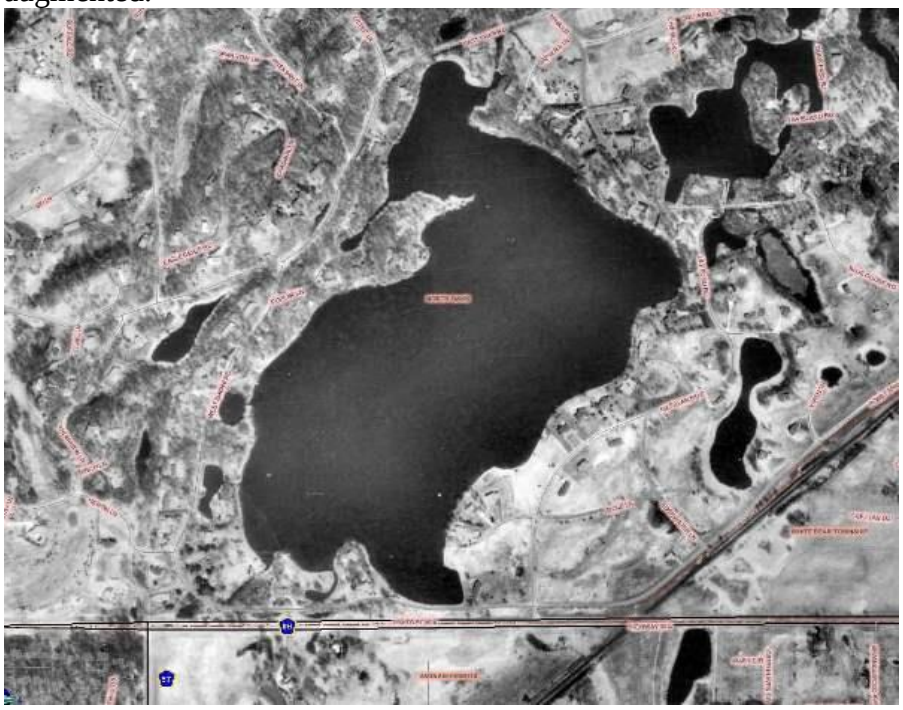
This is a **1945 aerial** photo of what is now Gilfillan Lake. There is very little standing water in the photo, the "lake" looks to be more of a wetland/bog.



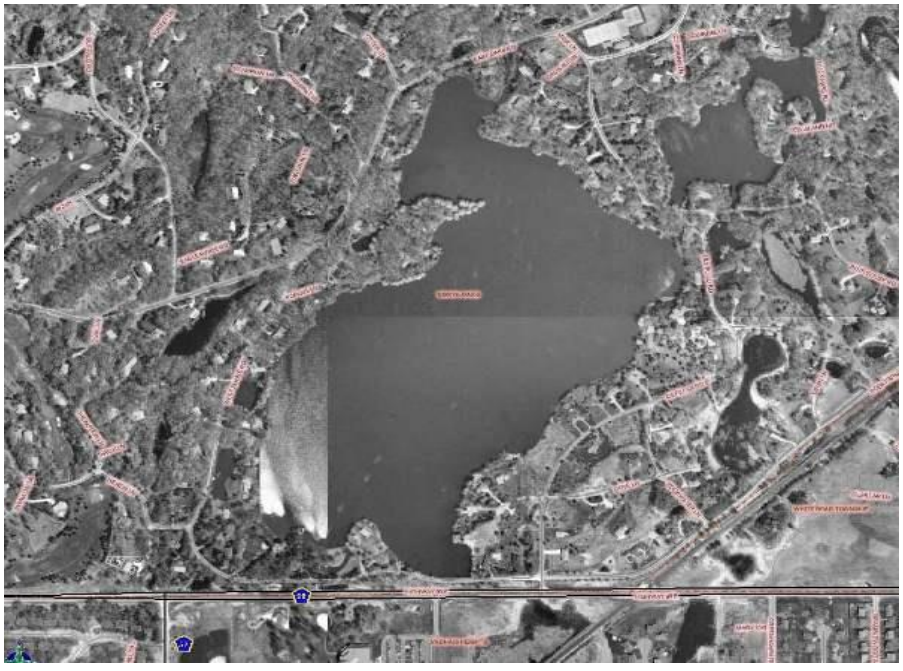
Here is the **1953 aerial** photo. Gilfillan was dredged in 1950 and augmented to sustain a constant water level between 908 and 910 ft above sea level. Roads are now present with very few structures.



This is the **1974 aerial**. More structures are appearing around Gilfillan and the lake is still being augmented.

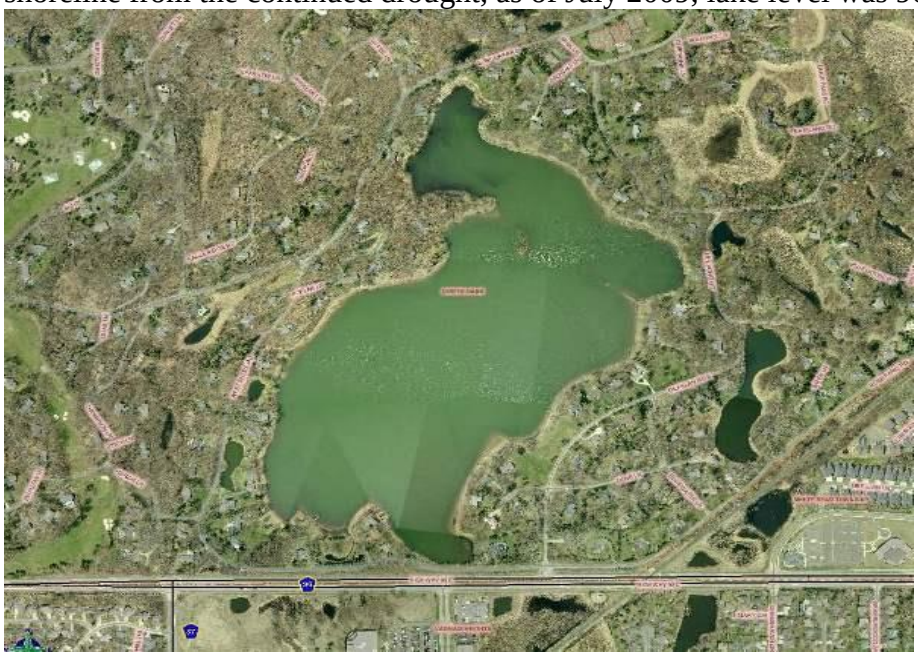


1985 aerial.



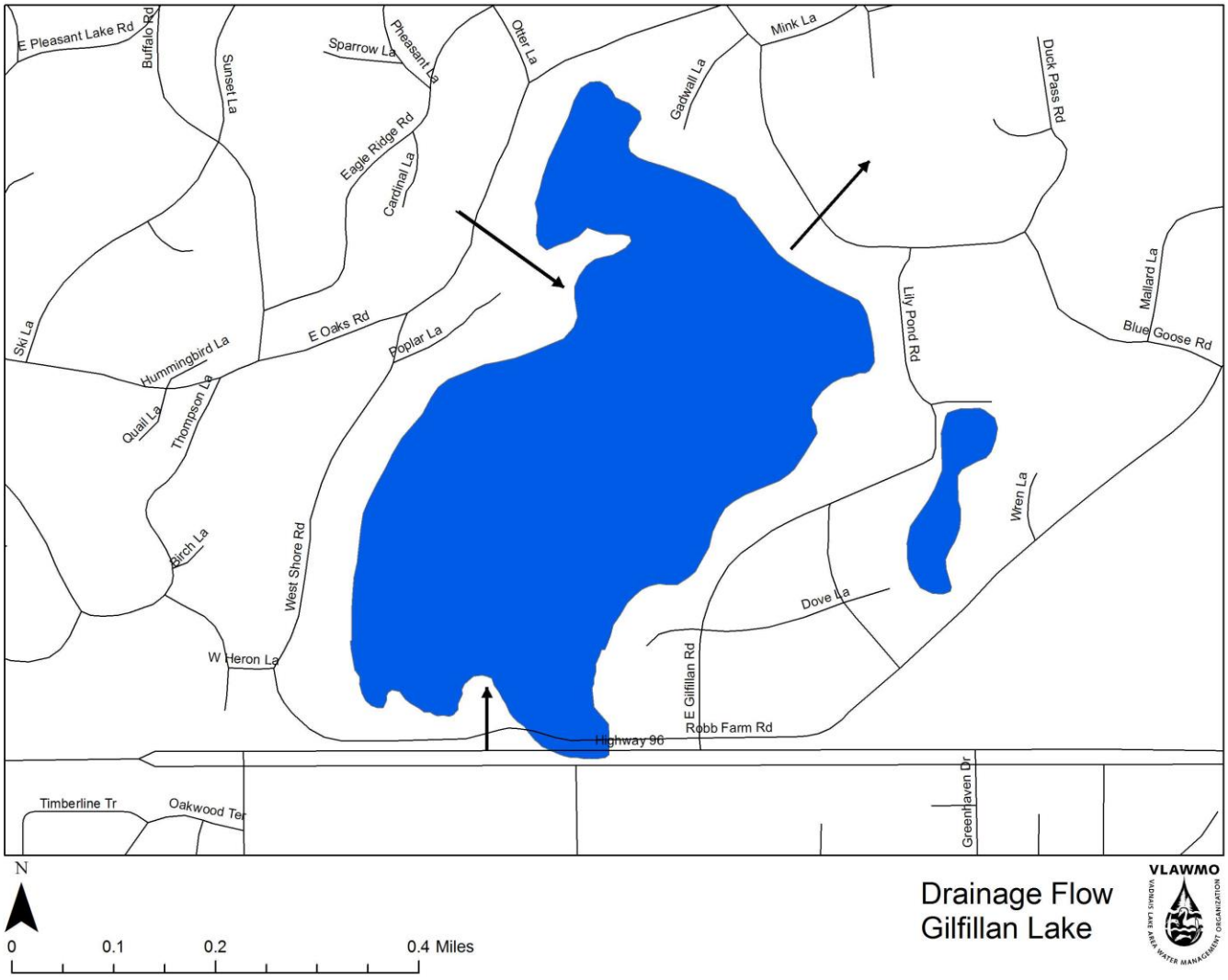
2006 aerial. Hwy 96 was widened and development around the lake has slowed. Legislation was passed by the State to stop lake augmentation in 1990. You can see the green color of the lake from the high chlorophyll levels.

2008 aerial. Aerial color is brighter than the one above, but still shows the high chlorophyll level indicated by the green water color compared to that of the surrounding ponds. You can see the receding shoreline from the continued drought, as of July 2009, lake level was 906.72 ft above sea level.



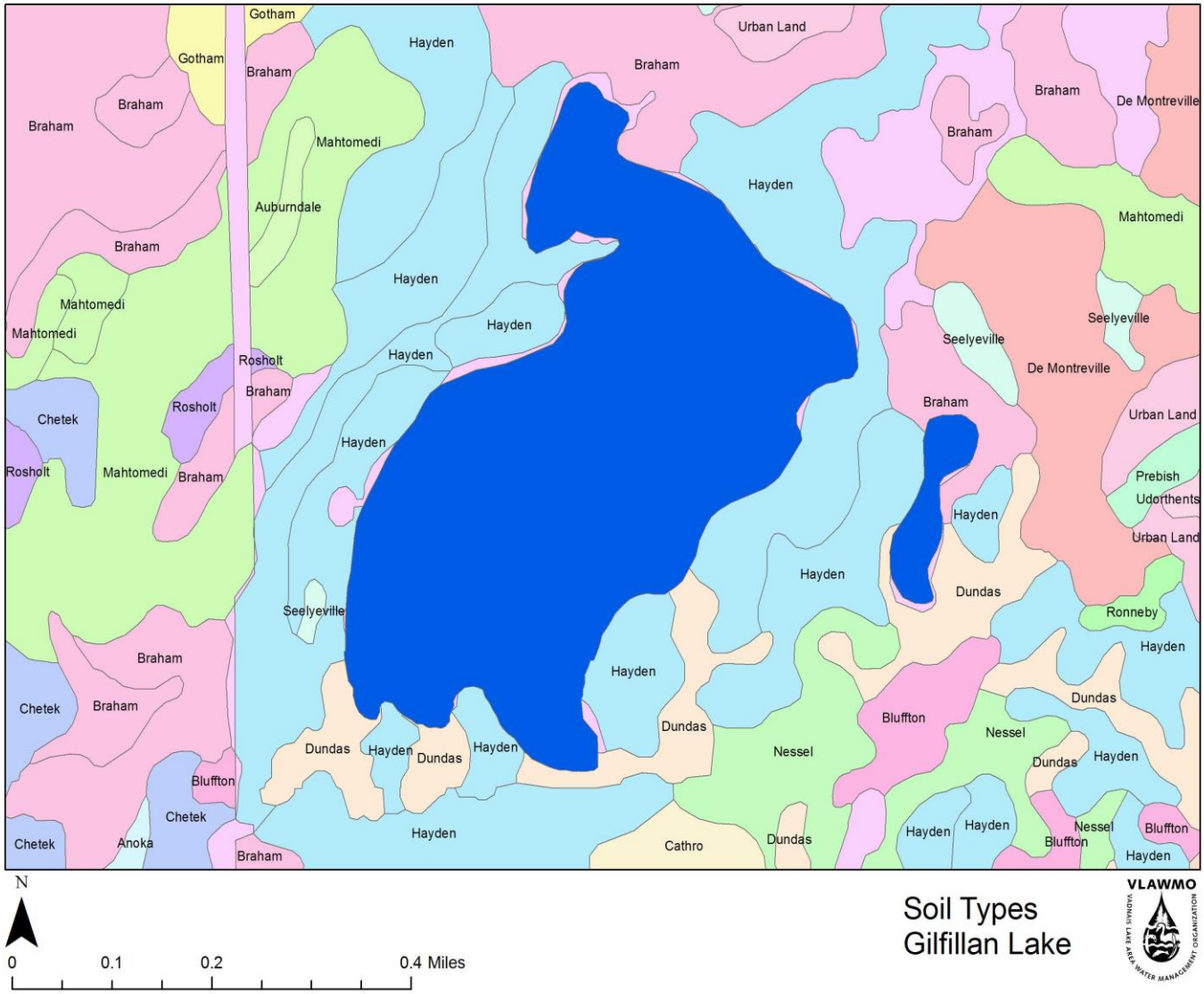
Drainage area

It is important to understand where water flows into and out of a waterbody in order to ascertain the potential inputs of pollutants. The drainage area into Gilfillan Lake is approximately 220 acres and is about 2 times larger than the surface area of Gilfillan Lake which is 110 acres. This is a very small drainage area to Gilfillan Lake which can be a positive aspect for the lake. Small drainage areas are less likely to wash pollutants into the lake and usually have better water quality. During normal to high rainfall years runoff from Hwy 96 can enter Gilfillan Lake through a series of ponds and culvers on the south side of the Hwy. The last few years have been very dry and runoff from Hwy 96 is no longer making it to the lake. Water enters the lake primarily through rain events and possibly ground water. The Wenck memo, Ramsey Conservation District Groundwater report, and the Conestoga-Rovers & Associates report August 1992 (appendix A, B & C) goes into more detail on this and the ground water effects on Gilfillan Lake. The augmentation well was constructed near Sora Pond. A system of culverts connecting the ponds provided flow from Sora Pond to Teal Pond and then to Gilfillan Lake and John Pond. North and South Mallard ponds are also connected to this system, however, flow from Teal Pond was controlled manually. There is a culvert under Duck Pass Road connecting Gilfillan with Teal Pond. The invert of this outlet culvert is 909.46 ft. The watershed map is shown on page 11.



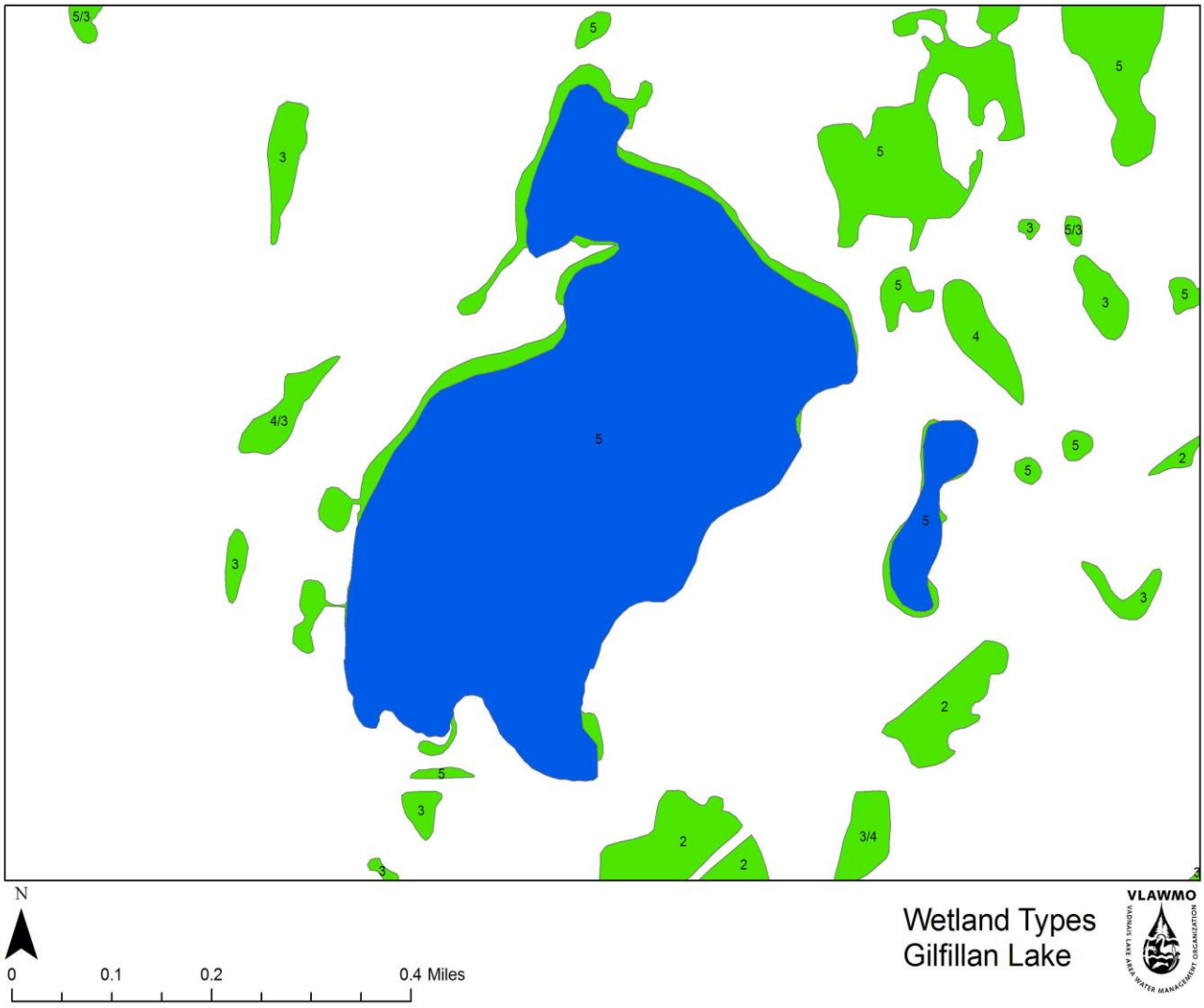
Soils

Soils within the Gilfillan Lake subwatershed is dominated by Hayden fine sandy loam. This soil tends to drain well, allowing water to filter into the ground. However, with urban development, much of the soil has been compacted, moved, and covered over, thus pushing rain water into storm sewer systems or away from the lake. Additionally, a survey was conducted to examine the sediment of the lake bottom and the detailed results are addressed in Appendix D. The sediments raise no major concerns but do suggest an internal loading possibility due to the above normal phosphorus levels in the sediment. The rough fish present in the lake can stir up this sediment, releasing the nutrients trapped in it causing the high nutrient levels we see in the lake today. A few locations also show high copper and potassium levels. This could be due to runoff from highway 96, chemicals used in the past to control weeds (copper sulfate for example), atmospheric deposits form rain or leaking septic tanks. The contaminated plume going under the lake has also be mentioned as a possible source of contaminates in the lake, there however is no evidence of this. Further investigation into this could be an option in the future.



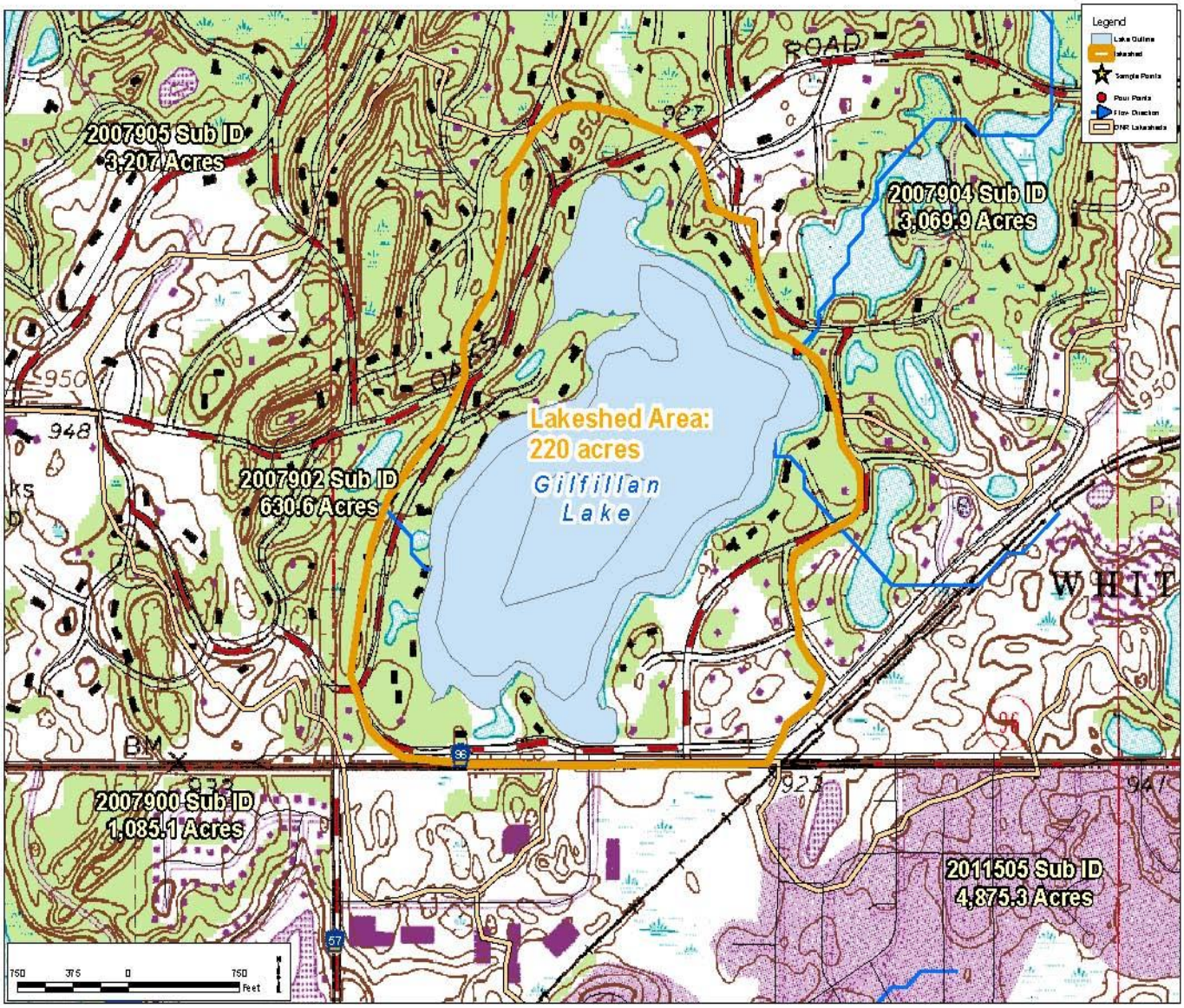
Wetlands / Watershed

There are about 25 delineated wetlands around Gilfillan Lake, only 5 within the small 220 acre sub watershed surrounding the lake. Very little area drains into Gilfillan and the lake level is highly dependant on what water falls onto the lake and the recharge of the perched aquifer the lake sits on. More information on this is discussed in the Wenck memo, Ramsey Conservation District Groundwater report and the Conestoga-Rovers & Associates report (august 1992) in appendix A, B & C. As discussed in the Ramsey Soil & Water Conservation District report (January 1993) in appendix E, Gilfillan Lake and the surrounding ponds were type III an IV wetlands before dredging and augmentation. Given time, it is likely the ponds will revert back to their natural wetland conditions. Wetlands are numbered on the map and the key is below.



Wetland Types

1 – Seasonally Flooded
2 – Wet Meadow
3 – Shallow Marsh
4 – Deep marsh
5 – Shallow Open Water


Legend
Lake Outline
Lakeshed
Sample Points
Pour Points
Flow Direction
DNR Lakesheds
2007905 Sub ID
3,207 Acres
2007904 Sub ID
3,069.9 Acres
Lakeshed Area:
220 acres
Gilfillan
Lake
2007902 Sub ID
630.6 Acres
2007900 Sub ID
1,085.1 Acres
2011505 Sub ID
4,875.3 Acres
ROAD
WHITE
BM
750
375
0
750
Feet

Homeowner Survey Summary

VLAWMO conducted a survey of homeowners on Gilfillan Lake in 2009. A little more than 75% of the residents responded which is a very high number of returns for a paper survey. A summary of the results are shown below. Water level was the major concern of many of the residents who responded along with the poor quality of the lake.

How important to you are the following concerns? (1 not important, 5 very important)

Lake Level	Healthy Fish Community	Waterfowl and Wildlife Presence	Boating Ability	Access to Lake	Aquatic Veg. Levels	Swimming	Lake Monitoring	Exotic Plant Control
5	4	4	3	3	4	3	4	4

What is your primary activity on the lake?

Viewing	Fishing	Boating	Swimming	Other
32	4	13	2	2

Over the last 5 years would you say the overall quality of Gilfillan was;

About the same	Getting better	Getting worse
2	2	29

How do you feel about the following aspects of your lake in its present state? (1 poor, 5 excellent)

Water Quality	Fishing	Boating	Swimming	Wildlife viewing	Other
2	2	2	1	4	n/a

Would you be interested in being part of a Gilfillan Lake Homeowners Association?

Yes	No	Maybe
19	3	2

Over the last five years how would you say the overall quality of Gilfillan was?

Water to low, drying up, too many weeds and rough fish (goldfish), liked DNR stocking program

What is your highest priority regarding the management of Gilfillan Lake?

Water level back to normal, clear water, good water quality, keep shore looking natural, not letting it turn into a swamp, find ways to get water

What does "good water quality" mean to you?

Safe, no toxins, high water and clean, no freeze outs, low vegetation, no smell, safe for swimming

What are your goals for Gilfillan Lake? What do you want your lake to look like in 20 years?

Full lake, abundant and diverse wildlife, 3 feet higher and ability to use for human enjoyment, keep lake clean and non-motorized like it was 20 years ago and clear

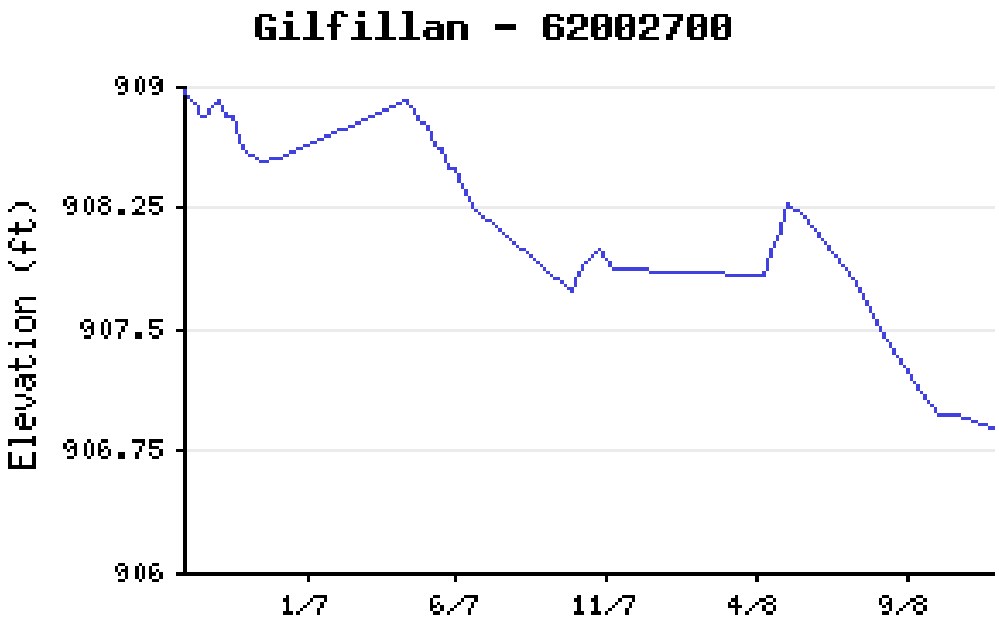
List any other questions or concerns:

If an increase in water level is not possible/sustainable, lets improve the lake view and attract wildlife. The lake is currently an eyesore, movement was ever present from big lake to small, not using the lake for watering and pond filling, thank you for your efforts, governments should stay out of the problem and stop making it worse.

A. Lake Levels/Appropriation Permits

Water levels have consistently dropped in Gilfillan Lake since a high of 910. 87ft in June of 1994. The lake low is the current reading of 906.72 as of July 2009. Recent water levels from 2007 through 2008 are shown below. Gilfillan Lake is approximately 3-4 feet below its historical augmented average of 908-910ft. There is no official ordinary high water level (OHW) set for Gilfillan by the DNR. The lake was drained and dredged in 1950 and augmentation also began in 1950. There has been little rain over the last few years and a majority of lakes in the area are reporting lower than normal water levels. Water level has been a great concern on Gilfillan Lake since augmentation stopped in 1990. It is unlikely the water level will drop much below its current level due to the perched aquifer Gilfillan Lake is on. Since the stop of augmentation Gilfillan Lake has gradually dropped to its current water level, the levels of the perched aquifers water table. It is suggested that Gilfillan will likely stay at this level and may bounce a little one direction or the other based on the aquifer recharge, but it is likely this is the "new" normal for the lake. The DNR would be able to provide more information on setting an OHW if it is in the interest of the homeowners. Reports by Wenck, Conestoga-Rovers & Associates report (august 1992), and Ramsey Conservation District go into great detail on the current water level, perched aquifers, and wells surrounding Gilfillan Lake. Appendix A, B, C..

Gilfillan is a meandered lake. The State has jurisdiction waterward from the ordinary high water level (OWH) The State would hold in trust the bed of the lake for riparian owners and the DNR has permitting authority.

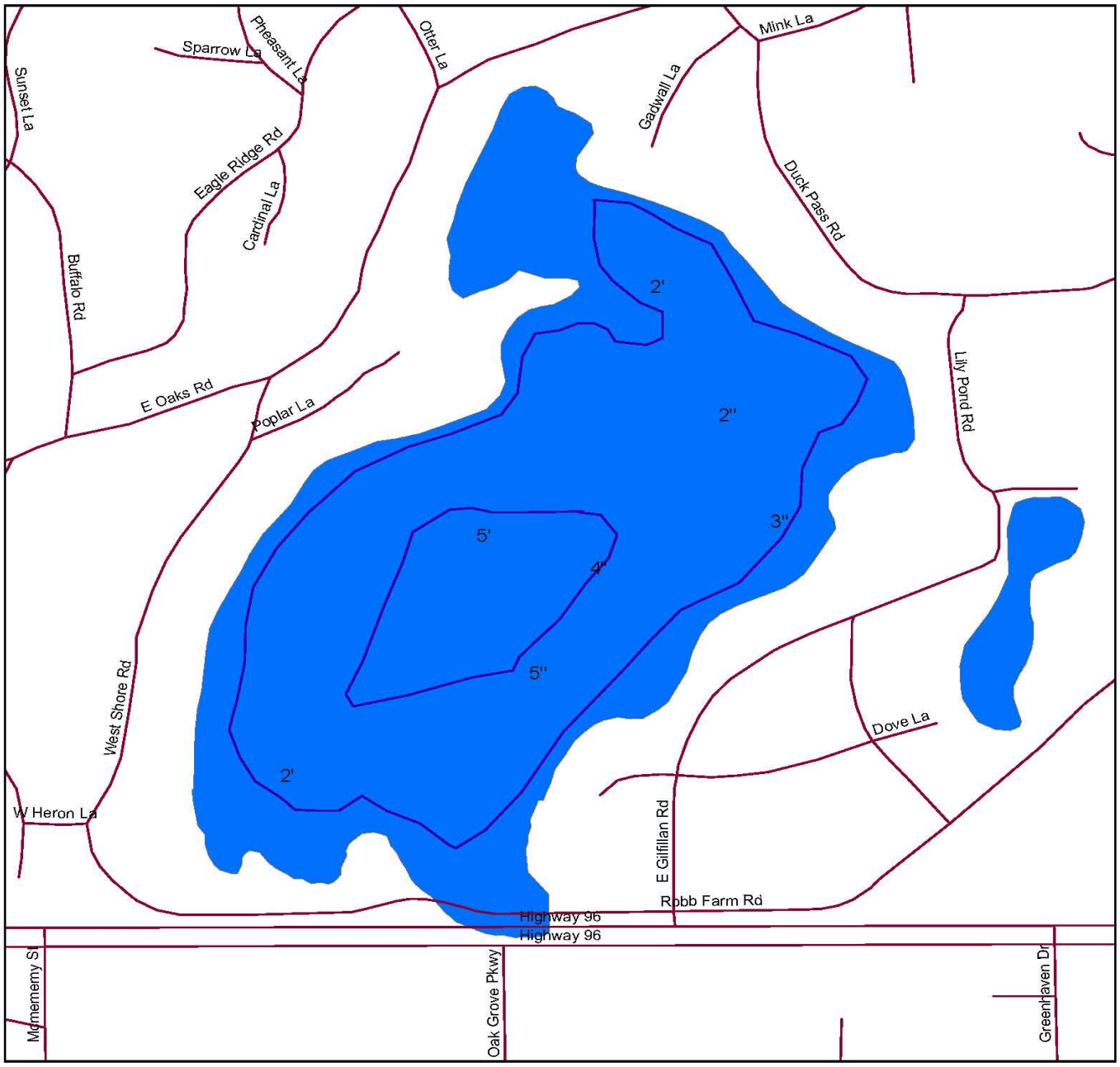


Appropriation Permits

The Vadnais Lake Area Water Management Organization (VLAWMO) has granted a General Permit to the City of North Oaks allowing the use of small or under 10,000 gallons per day amounts of surface water for non essential uses. Homeowners must register with the City to be eligible for this permit authorization. Non-registered use of surface water is considered illegal under Minnesota Statute Chapter 103B.211, Subdivision 4. Non essential uses include, but are not limited, to lawn watering, ornamental pond filling, and car washing. Please contact the City of North Oaks for registration information.

The General Permit may be found on the VLAWMO website www.vlawmo.org as Appendix E of the VLAMWO Water Management Plan. Highlights of permit are located in appendix F of this report.

Gilfillan Lake Depth Map



Legend

- Gilfillan_depth_line
- ramsey_roads
- VLAWMO_Lakes

N W E S

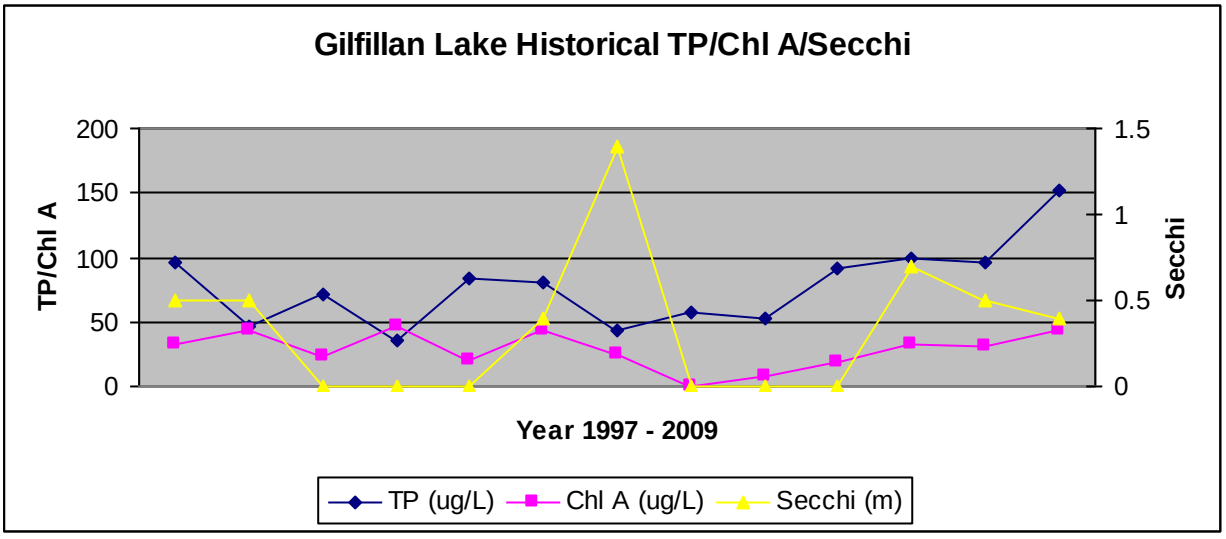
This map was generated by VLAWMO and is not yet intended for official use.

B. Lake Water Quality Summary

Gilfillan Lake is very eutrophic as indicated by table on page 16. It is impaired for nutrients and will be part of a TMDL study starting the spring of 2010. Gilfillan is above state standards in both phosphorus (TP) and chlorophyll (ChlA). Water quality data has been collected since 1997 and is shown below. Also included are the water quality results for samples taken every 2 weeks during the 2009 sampling season. Overall, phosphorus and chlorophyll levels are very high for a shallow lake in this ecoregion. Water transparency is very poor. The high nutrients in the lake are a bit of a mystery considering the lake receives very little runoff from the watershed and most of the properties have very good buffers between the lake and the turf. This would suggest the high nutrients are due to internal loading.

Gilfillan Lake Historical Avg TP/Chl A/SDT			
Year	TP (ug/L)	Chl A (ug/L)	Secchi (m)
1997	96	32	0.5
1998	47	44	0.5
1999	72	23	0
2000	35	47	0
2001	84	20	0
2002	81	43	0.4
2003	44	25	1.4
2004	58	0	0
2005	52	8	0
2006	91	19	0
2007	100	33	0.7
2008	96	31	0.5
2009	152	44	0.4

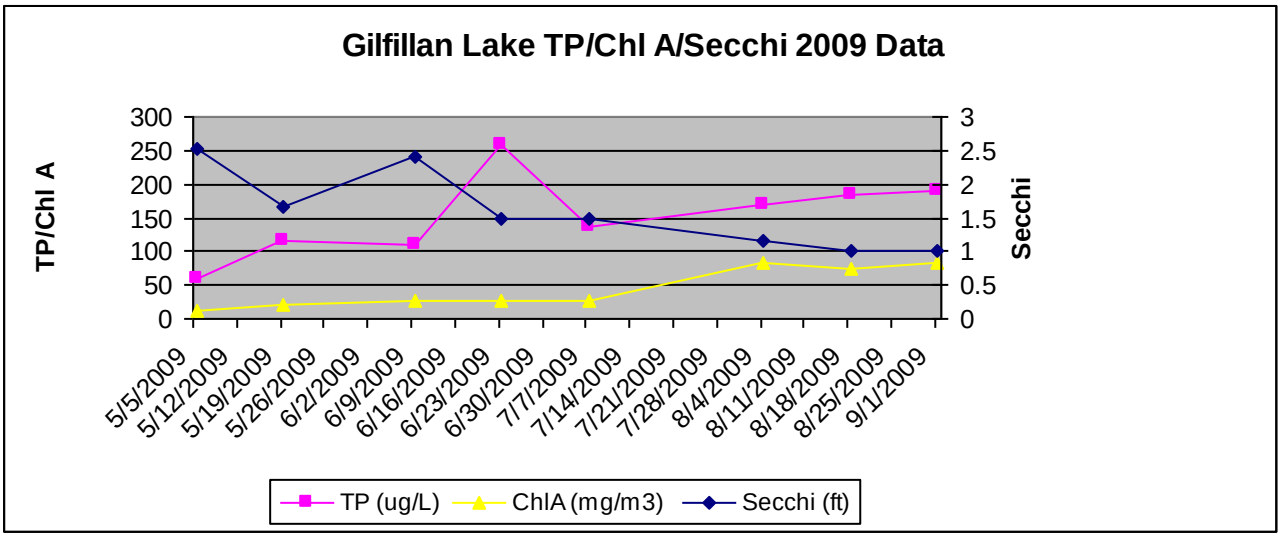
Numbers in red indicate above PCA Standard.
Standards Below
-Total Phosphorus (TP) < 60 ug/l
-Chlorophyll a (ChlA) < 20 ug/l
-Secchi Disk < 1.0 m



Phosphorus (TP) is the primary cause of excessive plant and algae growth in lake systems. Phosphorus originates from a variety of sources, many of which are human related. Major sources include human and animal wastes, soil erosion, detergents, septic systems, and runoff from yards and streets. The standard level set by the Minnesota Pollution Control Agency (MPCA) is less than 60 ug/L. **Gilfillan Lake currently exceeds the MPCA standards.**

Chlorophyll A (ChlA) is a green pigment in algae. Measuring Chlorophyll A concentration gives an indication of how abundant algae are in a waterbody. The MPCA standard for Chlorophyll A is less than 20 ug/L. **Lake Gilfillan is well above the limits set by the MPCA.**

DATE	Secchi (ft)	TP (ug/L)	ChlA (mg/m3)	Pheo	CORR Chla(mg/L)	TKN (mg/L)	NO3 (mg/L)	NH3 mg/L
5/5/2009	2.52	58	11	0.7	10.6	2.242	0.058	0.298
5/19/2009	1.67	117	21.7	5.9	18.3	4.95	0.02	0.055
6/9/2009	2.42	109	27	5.9	23.9	2.883	0.011	0.185
6/23/2009	1.5	258	25.3	5.9	21.7	5.44	0.01	0.05
7/7/2009	1.5	138	27.7	-2.5	27.9	2.562	0.011	0.05
8/4/2009	1.17	169	82.3	5.0	76.3	4.702	0.02	0.05
8/18/2009	1	185	74.0	5.3	68.0	3.025	0.01	0.05
9/1/2009	1	189	83.9	92.8	9.2	3.624	0.016	0.05
average	**1.60**	**152.88**	**44.11**	**14.88**	**31.97**	**3.68**	**0.02**	**0.10**



2009 TSI Calculations (Carlson Trophic State Index)												
	amelia	birch	black	charlie	deep	gem	**gilfillan**	goose east	goose west	tamarack	west vadnais	wilkinson
TSIS	44	40	35	46	43	38	**53**	60	53	67	60	43
TSIP	62	57	53	60	72	69	**76**	84	74	77	79	74
TSIC	61	49	46	58	60	63	**67**	77	66	80	76	57
avg.	**56**	**49**	**45**	**55**	**58**	**57**	**65**	**74**	**64**	**75**	**72**	**58**

TSI < 40 Oligotrophic: relatively nutrient-poor, deep, clear lake with bottom waters high in dissolved oxygen, but some shallower lakes will become anoxic in the hypolimnion during the summer

TSI 40 - 50 Mesotrophic: moderately clear lake, but with an increasing probability of anoxia in hypolimnion during summer

TSI 50 - 70 Eutrophic: nutrient-rich, usually shallow, "green" lake with limited oxygen in the bottom water layer

TSI > 80 Hypereutrophic: very nutrient-rich lake characterized by frequent and severe nuisance algal blooms and low transparency

C. Lake Sediments

A study of Gilfillan Lake sediment was conducted on February 3, 2009 by Brian Corcoran and Kristine Lampert, VLAWMO. Results were analyzed by the University of Minnesota. Gilfillan Lake sediments have a high organic matter which is consistent with the soft mucky bottom that exists. There was one site with a high sand content in the soil. Lake sediment phosphorus concentrations are relatively high. Below is a summary of the results and a map showing the sites the samples were taken from. Detailed results of each site are in appendix D.

Gilfillan Soil Sample Results

location	soil texture	Organic Matter %	soluable salts mmhos/cm	pH	Nitrate ppm	Phosphorus ppm P	Potassium ppm K	Sulfur ppm	Zinc ppm
G10	coarse	4.4	0.5	6.5	1.1	14	81	28	1.2
G11	muck	28.8	1.4	6.4	1	25	150	40+	7.3
G12	muck	34	1.7	6.4	1.6	8	220	40+	8.8
G13	muck	32.6	1.7	6.3	1.2	13	161	40+	6.5
G14	muck	32.7	3.3	6.3	3	12	250	40+	12.8
G15	muck	37.7	2.1	6.5	1.7	8	204	40+	8.6
G16	muck	46.3	1	6.4	2.1	14	86	40+	2.5
G17	muck	34.4	1.6	6.2	1.4	8	172	40+	9.2
G18	muck	26.1	1.9	6.5	1.6	7	214	40+	9.9
G19	muck	28.5	1.6	6.5	1.4	7	206	40+	10.9
G20	muck	27.3	3.1	6.3	1.8	9	220	40+	9.7
G21	muck	27.8	1.2	6.4	1.1	9	139	40+	4.1
G22	muck	27.5	1.3	6.4	1.3	9	177	40+	8.2
G23	muck	26	2.7	6.4	2.1	7	216	40+	14.9

location	soil texture	Iron ppm	Manganese ppm	Copper ppm	Boron ppm	Calcium ppm	Magnesium ppm
G10	coarse	99.9+	11.9	2.8	0.6	1211	220
G11	muck	99.9+	24.8	27	1.4	2829	596
G12	muck	99.9+	34.8	36.3	2.6	3965	799
G13	muck	99.9+	39.7	25	2.6	3362	658
G14	muck	99.9+	40.2	43.5	3.9	3708	829
G15	muck	99.9+	45.8	36.7	2.7	4088	830
G16	muck	99.9+	19.6	4.9	1.3	2237	396
G17	muck	99.9+	39	26	1.9	3853	768
G18	muck	99.9+	49.7	48.3	1.9	3592	788
G19	muck	99.9+	44.8	45.9	1.9	3683	799
G20	muck	99.9+	28.3	41.2	2.9	3597	801
G21	muck	99.9+	18.3	11.4	1.9	3077	640
G22	muck	99.9+	41.6	37.5	1.6	3347	704
G23	muck	99.9+	44.8	69	2.1	3735	831

interpretation of results

Phosphorus <----------> 5 10 15 20 25

low **medium** **high** **very high**

Potassium <----------> 25 75 125 175 225

low **medium** **high** **very high**

pH <---------->

		3	5	6	7	9
		Acid		**optimum**		**Alkaline**
	soluble salts	<----------				---------->
		0	2	5	8	10
		satisfactory		**possible problem**		**excessive salts**

Summary

Magnesium

Zinc

Metro lake are between 100ppm – 1000ppm
Adequate range 1ppm – 15ppm

pH soil pH was at optimum levels for all samples (6.0-7.0)

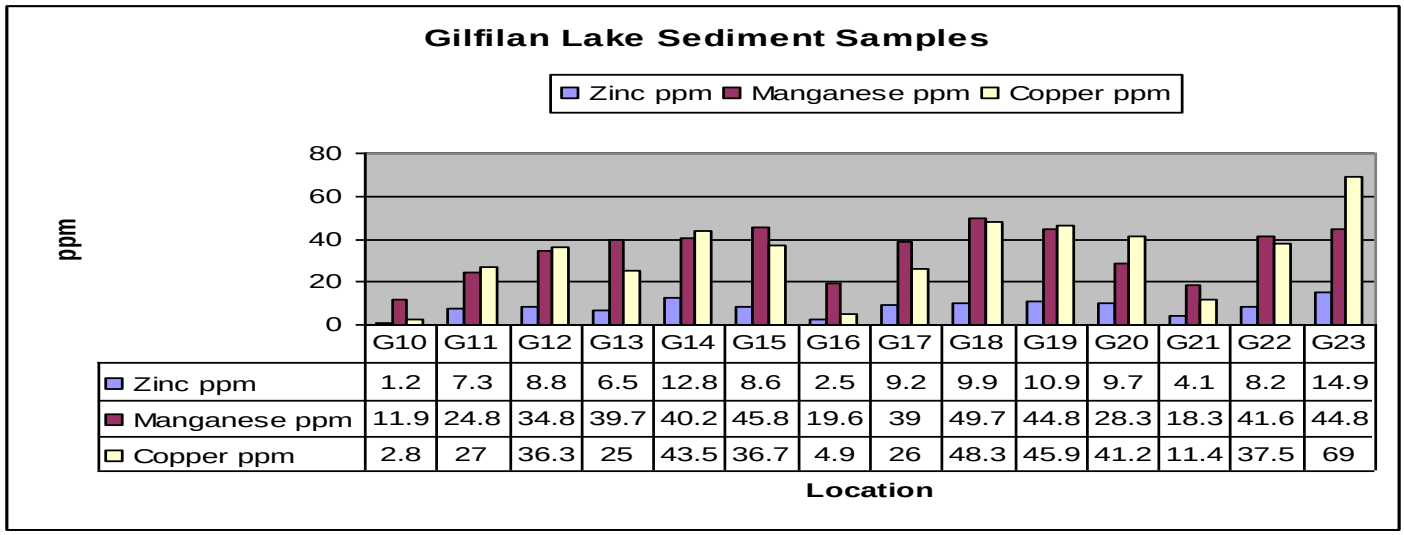
Soluble salts for most of the samples soluble salts were at satisfactory levels (1.0-2.0)
a few samples were approaching the possible problem level suggesting contamination
possibly coming from salted streets and sidewalks

nitrate this is an essential plant nutrient, most northern lakes have concentrations of less than 4ppm,
excessive concentration could contribute to high weed growth, Gilfillan (1-3ppm)

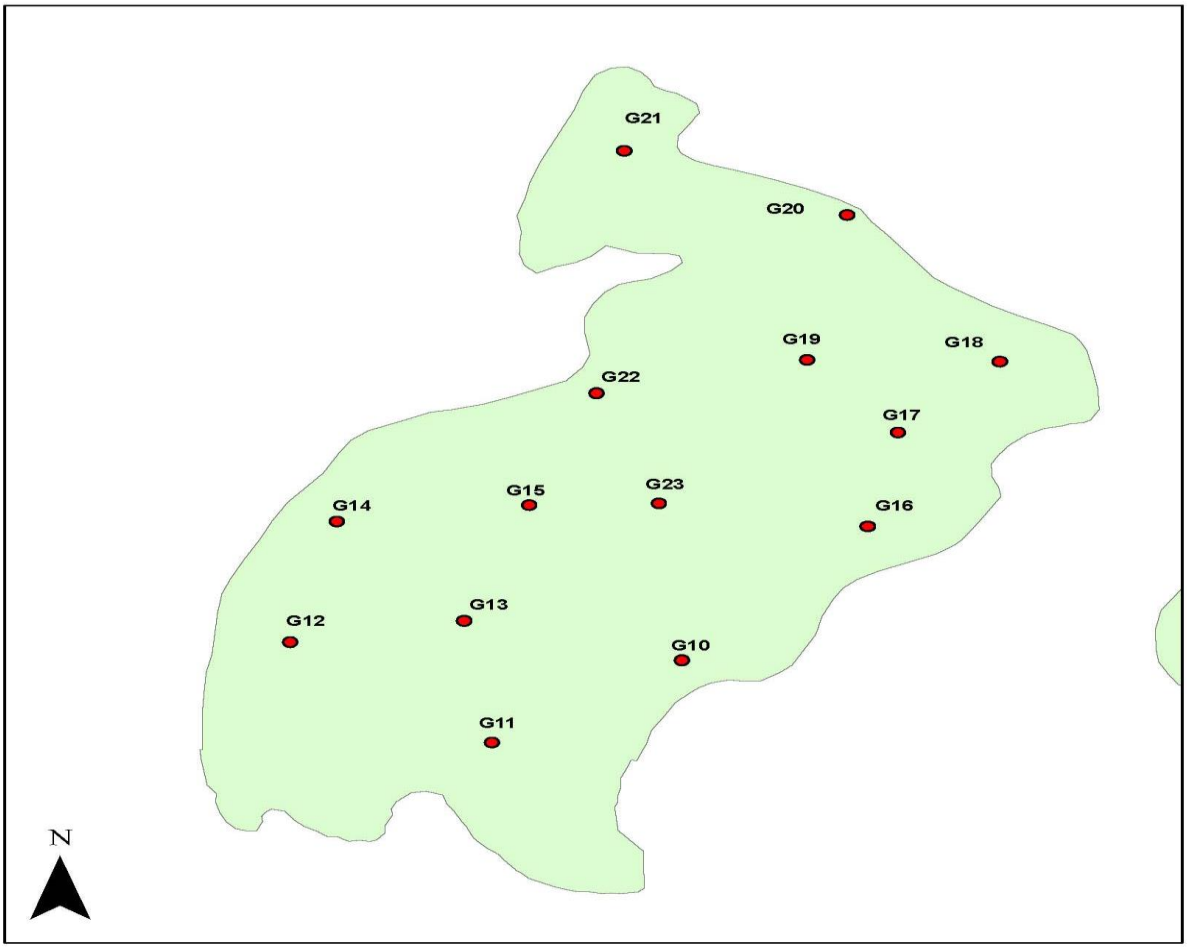
Potassium Since natural levels of sodium and potassium ions in soil and water are very low,
their presence may indicate lake pollution caused by human activities. Sodium
is often associated with chloride. It finds its way into lakes from road salt, fertilizers,
and human and animal waste. Potassium is the key component of commonly-used potash fertilizer, and is abundant in animal waste.
Soils retain sodium and potassium to a greater degree than chloride or nitrate; therefore,
sodium and potassium are not as useful as pollution indicators. Increasing sodium and potassium values
over time can mean there are long-term effects caused by pollution. Although not normally toxic themselves,
these compounds strongly indicate possible contamination from more damaging compounds.
Gilfillan ranges from 80-250ppm, medium to very high levels of potassium.

Phosphorus phosphorus is the key nutrient effecting algae and weed growth. Phosphorus originates from a variety of sources.
Major sources include human and animal wastes, soil erosion, detergents, internal loading,
septic systems and runoff from farmland or lawns. Gilfillan ranges between 7-25ppm, medium to very high

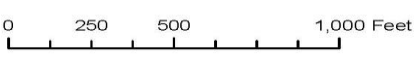
copper copper is a relatively common metal in the environment. Average copper concentrations in lakes is 15-30ppm.
copper is applied on many lakes to control algae and weeds and over time can accumulate in lake sediment to
levels that can become toxic to fish and other organisms. Gilfillan ranges from 3-69ppm.



	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21	G22	G23
Zinc ppm	1.2	7.3	8.8	6.5	12.8	8.6	2.5	9.2	9.9	10.9	9.7	4.1	8.2	14.9
Manganese ppm	11.9	24.8	34.8	39.7	40.2	45.8	19.6	39	49.7	44.8	28.3	18.3	41.6	44.8
Copper ppm	2.8	27	36.3	25	43.5	36.7	4.9	26	48.3	45.9	41.2	11.4	37.5	69

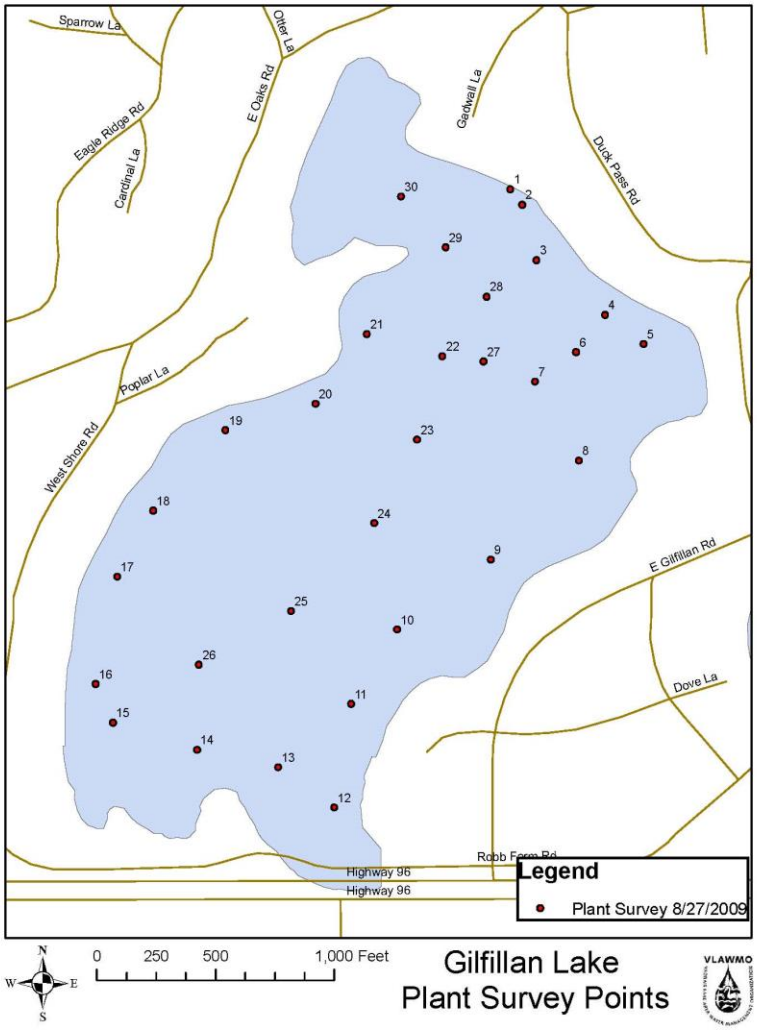


Gilfillan Lake Sediment Survey



D. Aquatic Plant Status

A late summer (August) survey tracked the amount and location of aquatic plants in Gilfillan Lake. The most abundant plant in Gilfillan Lake was bushy pondweeds (najas), a native plant, and it was found at nearly every site that was surveyed. There were no invasive aquatic plants found during this survey, and only three different types of plants were observed. Also, many crayfish were observed while taking weed samples. The harvesting option suggested by some residents to manage the heavy growth of lily pads in certain areas of the lake is a possibility. Birch Lake in White Bear Lake has a harvesting program and would be a great source of information. Herbicide controls could increase phosphorus levels even more and promote larger algae blooms. Spot treatment would be acceptable. Consulting Steve McComas of Blue Water Science could give more detail on possible techniques to help control algae/weeds. Barley straw and iron filings are a few options that Steve has worked with in the pass with success to help with algae and aquatic plant control.



Lake Gilfillan Aquatic Plant Survey 8/27/2009			
	Prevalence on a Scale of (1-5)		
GPS Point	Bushy Pondweeds and Naiads (Najas spp.)	Elodea	Water Lily (Nymphaea odorata)
1	3	3	1
2	3	3	1
3	1	3	1
4	1	3	1
5	1	0	5
6	3	1	0
7	2	2	0
8	3	1	0
9	1	2	1
10	3	1	0
11	4	1	1
12	1	2	1
13	0	4	0
14	2	1	1
15	1	3	0
16	1	1	0
17	1	1	0
18	2	1	0
19	1	0	0
20	1	0	0
21	1	1	0
22	2	2	0
23	4	0	0
24	0	0	1
25	0	0	0
26	1	1	0
27	4	0	0
28	4	1	0
29	2	0	0
30	0	0	5

E. Fishery Status

The only fish survey on record is from 1961. Recent qualitative data from residents indicate there is a mix of walleye and goldfish/koi in Gilfillan Lake. According to the 1961 survey, there were also crappie, sunfish and bullhead, but as of 2002, those fish are probably gone due to a fish kill the DNR conducted to clear the lake of predators for their walleye stocking program.

The water is very murky and could be due to the addition of rough fish, which stir up bottom sediment while foraging for food releasing phosphorus and other nutrients stored in the sediment causing high algae growth. The recent "dirty" appearance of Gilfillan in the last few years could be due to the addition of the goldfish/koi, they are part of the carp family, combined with the drop in water levels. A new survey could be conducted by the MN Department of Natural Resources or through a company such as Blue Water Science to assess the fish within Gilfillan Lake. Gilfillan was also used as a walleye nursery by the DNR in 2002, and was a very productive nursery. There is little documented on why they stopped the program, but the otters chewing up their nets have been mentioned as one reason. Contacting the DNR could be an option to see if there is any interest in resuming the program in the future.

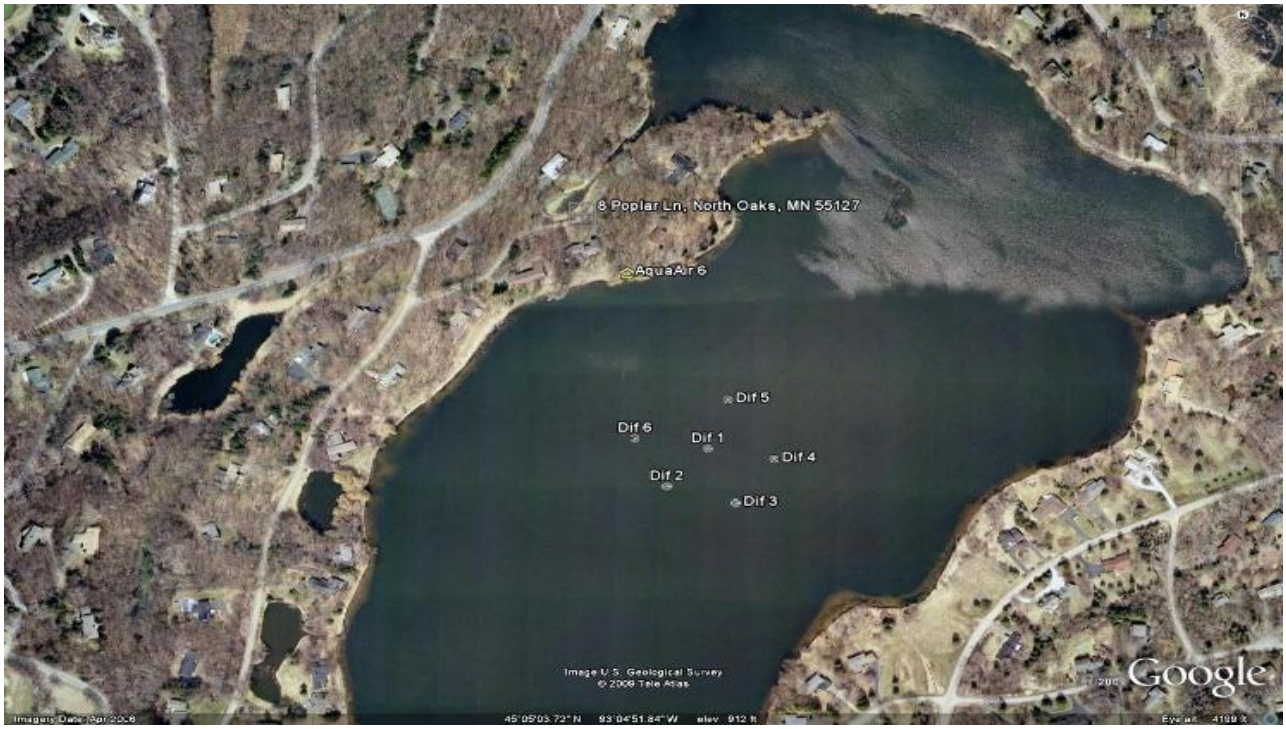
Fish Sampled for the 1961 Survey Year (DNR)

Species	Gear Used	Number of fish per net		Average Fish Weight (lbs)	Normal Range (lbs)
		Caught	Normal Range		
Pumpkinseed Sunfish	Trap net	21.2	0.8 - 9.3	0.10	0.1 - 0.2
Hybrid Sunfish	Trap net	0.1	N/A - N/A	0.10	N/A - N/A
Bluegill	Trap net	80.4	2.8 - 43.3	0.10	0.1 - 0.3
Black Crappie	Trap net	97.4	1.3 - 27.7	0.13	0.1 - 0.4
Black Bullhead	Trap net	69.4	2.5 - 70.2	0.12	0.1 - 0.5

F. Aeration

In the fall of 2009, the Lake Gilfillan Watershed Association raised private funds to install an aeration system on the lake. The hope is that the aeration will keep the shallow lake well enough oxygenated and partially open through the winter to help limit the severity of potential fish kills. Also, the aeration will help with the mixing of the water table and may eventually help reduce the high chlorophyll levels in the lake by limiting the amount of time the chlorophyll is exposed to the sunlight. Below is a map showing the location of the unit.

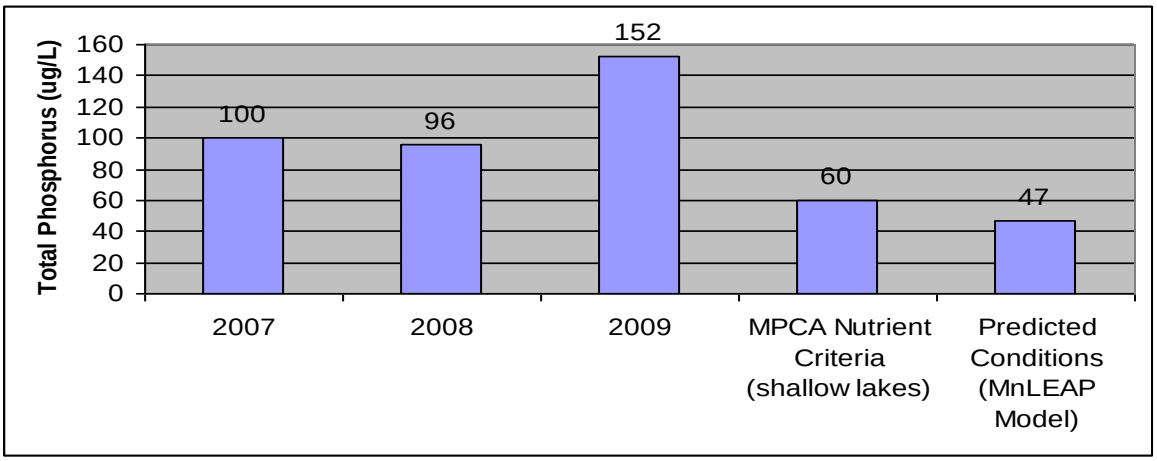
Aerator Location

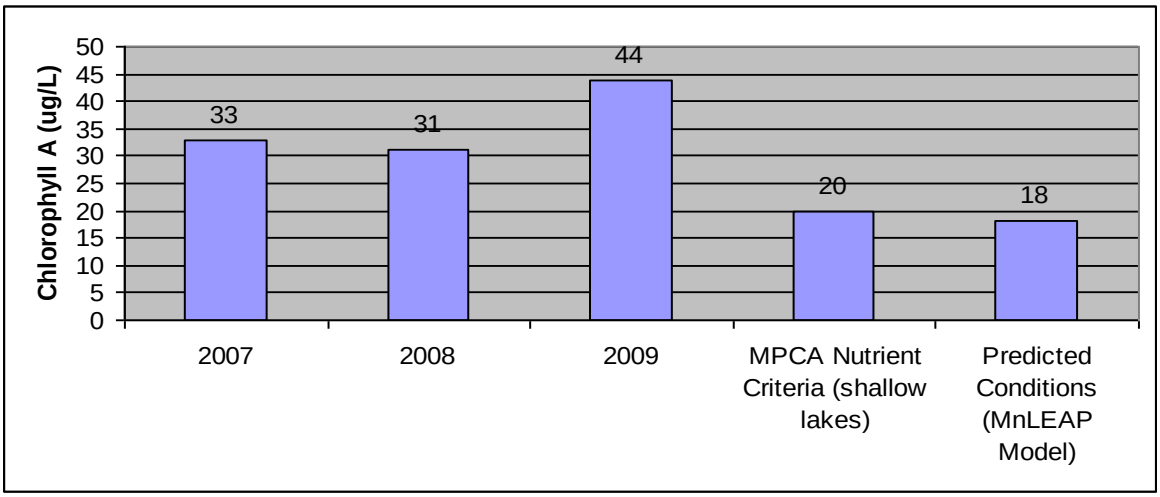


4. Setting Water Quality Goals for Lake Gilfillan

Gilfillan Lake is very high in nutrient levels. The water quality is far higher than the MPCA nutrient criteria for shallow lakes and higher than predicted by the MN Leap modeling program for lakes within this ecoregion. MN Leap (which can be found on MNPCA website) takes into account lake surface area, mean depth, watershed area and ecoregion in which the lake is located.

	Total Phosphorus (ug/L)	Chlorophyll A (ug/L)	Sechi disc (m)
Existing Conditions			
2007	100	33	0.7
2008	96	31	0.5
2009	152	44	0.4
MPCA Nutrient Criteria (shallow lakes)	60	20	1.1
Predicted Conditions (MnLEAP Model)	47	18	1.4





5. Lake Management Plan for Protecting the Lake Environment

As stated previously in this report, Gilfillan Lake's water quality is very high in nutrients and above MPCA standards. This means that actions should be taken that could help reduce the poor water quality issues. Additionally, the homeowner's survey indicates a strong concern regarding the poor lake conditions, lack of recreation and abundance of aquatic vegetation.

The table below lists various action items that will expand on the current knowledge of the lake and watershed and help to enhance the lake's water quality. The table also lists who the lead for each item could be as well as a cost range for each item. One action item will not "fix" Gilfillan Lake, but a combination of them can certainly help improve the lake conditions from the present state.

The Lake Gilfillan Watershed Association (LGWA) also put together a mission statement and priority list for their vision of a future Lake Gilfillan. The watershed along with the LGWA and other stakeholders will incorporate these items into the future management of the lake to enhance the aesthetics and water quality for generations to come.

LGWA Sustainable Lake Management Plan
Mission Statement

It is the mission of the Lake Gilfillan Watershed Association to maintain and care for Lake Gilfillan to the enjoyment and betterment of all lakeshore property owners as well as the property owners in the surrounding watershed areas. Priority is placed upon the quantity and quality of water in Lake Gilfillan and the effluent that is discharged into the surrounding small ponds such as Teal, Mallard and John's.

First and foremost, it is our goal to maintain Lake Gilfillan as lake, not allowing it to slip into the category of wetland as has happened to the surrounding small ponds. To do this we will make every effort to increase the current (estimated at 905') water level in the lake to a level between 908' and 910' allowing for the levels of all ponds in the watershed to be raised via the discharge through the existing tile system that was originally built to share water in the watershed.

Second, we will use the Sustainable Lake Management Plan developed by the Vadnais Lake Area Water Management Organization (VLAWMO) as a guide for maintaining the quality of water in our lake. This will entail educating all lakeshore property owners as to the best methods of lakeshore maintenance methods.

Third, we will determine what can and cannot be done legally regarding the current shoreline. To do this we will engage the Minnesota Department of Natural Resources (DNR) to determine the particulars of the current shoreline control and responsibilities. With that, we will educate our shoreline property owners as to what can and cannot be done on the shore lands as well as what may be most helpful in the desire to maintain property values through appropriate land management of the lakeshore. This will include information on weeds and invasive plant species control and elimination and possible lakeshore restoration where needed.

Priority List

1) Continue to address the need for additional water in the lake
2) Continued sampling of water to monitor effects of aeration
3) Specific assistance with understanding individual lot needs, not a blanket "lakeshore restoration planning guide"
4) Assistance with DNR interface for possible assistance
5) Education on controlling the current invasive species issues such as cattails.

Mission Statement

Lake Gilfillan is an important resource for the neighboring community and within the watershed. Gilfillan is valued for its aesthetic, recreation, aquatic life, fish and wildlife habitat assets. These qualities and functions should be protected and preserved for present and future generations.

Weighted Priority 0 – 5 *	**Action Item (Highest priority to lowest)**	**Description**	**Leader**	**Cost Estimate** **$ = <$1,000** **$$ = $1,000-$2,500** **$$$ = $2,500-$5,000** **$$$$ = $5,000-$25,000** **$$$$$ = $25,000-$100,000** **$$$$$$ = >$100,000**
*****	Continued Lake Monitoring	Continue monitoring program of twice monthly lake sampling to measure nutrient levels, dissolved oxygen and temperature levels	VLAWMO	$
*****	Enhanced Monitoring	Check dissolved oxygen in Gilfillan every two weeks in January, February, and March depending on winter conditions.	VLAWMO	$
*****	Lake Augmentation from Surface Sources	Investigate options for augmenting lake levels by diverting other sources of surface water	LGWA	$$$$$$
***	Fish Survey	Document the type and amount of fish in Gilfillan.	VLAWMO	$$
***	Reduce Phosphorus (P) Levels	Work with LGWA to determine how to reduce P levels and implementation of those mechanisms: aerobic testing, consultant.	VLAWMO	$$$ - $$$$
***	Education Efforts – newsletter	Include information for LGWA about shallow lake ecology as well as specifics for Gilfillan Lake. Use DVD. Shoreline restoration workshop for interested residents	LGWA	$
***	Aeration	Help to enhance wildlife and water quality, * one system already installed (fall 2009)	LGWA	$$$$
**	Lake Augmentation from Rooftops	Residents divert rooftop rainwater to the lake through rain gardens	LGWA	$
**	Fish Augmentation	Work with DNR Fisheries to enhance the quantity and quality of fish in the lake	LGWA	$
**	Weed/Algae Control	DNR, Blue Water Science or Wenck to help with control and harvesting options.	LGWA	$$ - $$$$
**	Invasive species control.(Purple Loosestrife, Cattails, etc.)	Collect information about past methods, evaluate current levels, and determine if changes need to be made.	VLAWMO	$
**	Shoreline Restoration Projects	Partner with VLAWMO and City of North Oaks to enhance homeowner shorelines around lake.	LGWA	$$$$
*	Ground water dynamics	Update and educate LGWA on water budget and water flow. Hire consultant to dig deeper into issues	LGWA	$$$$