Burt Lake Profile

2011 Report

What would Michigan be without water? One might as well ask what the Sahara would be without sand or the Himalayas without mountains. Michigan is defined by water and, in fact, the definition of Michigan in some Native American languages literally means water, “big lake” to be precise.

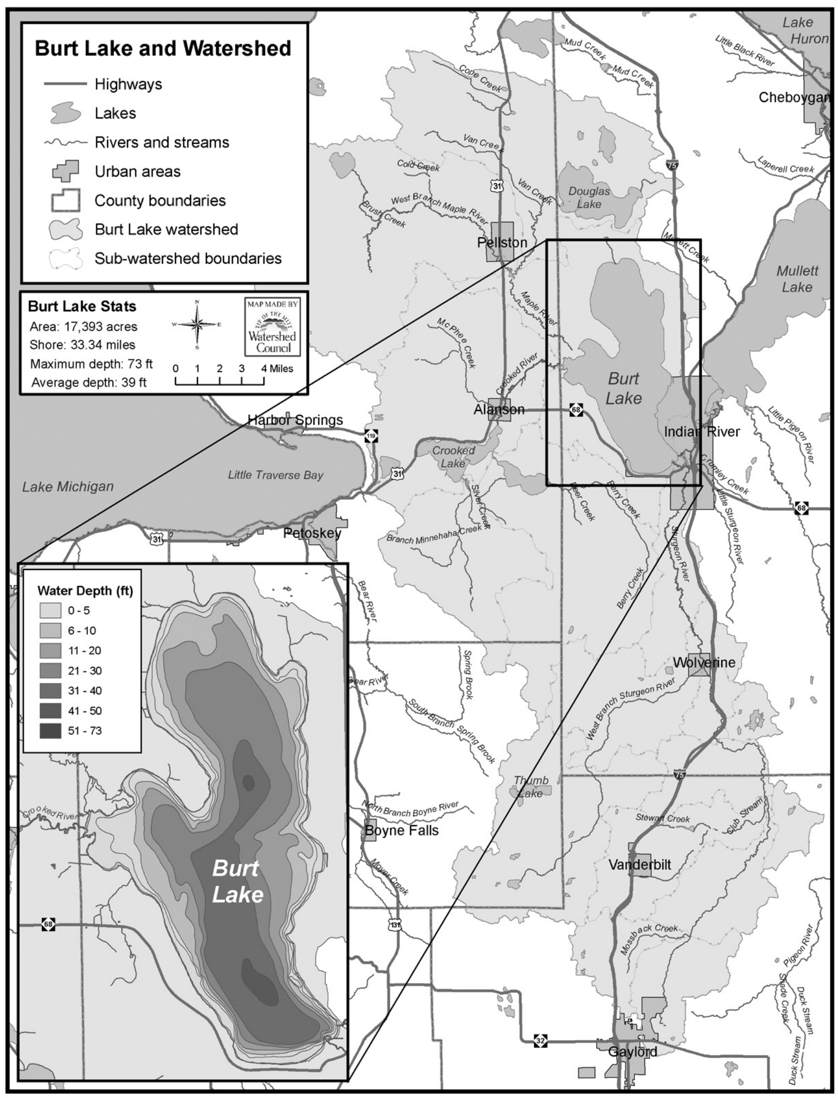
Water formed Michigan, frozen water that is, thousands of feet thick. A series of glaciers advanced and retreated across Michigan over the course of millions of years, creating the present-day landscape of rolling hills and broad plains; dotted with lakes, crisscrossed with rivers, and surrounded by freshwater seas. Glacial scouring and huge ice chunks that were left behind formed thousands of lakes across the landscape, lakes of all shapes and sizes, each unique: each beautiful and special in its own way.

Many people live in or travel through Northern Michigan because of these lakes and the character they lend to the region. Burt Lake is among the most picturesque and stunning lakes in the world, a true aquatic treasure that is experienced and enjoyed by thousands upon thousands of people annually; year after year and generation after generation. The Watershed Council has long recognized the value of Burt Lake and worked diligently for decades to protect its water quality and preserve its ecosystem integrity.

Lakes throughout Northern Michigan, whether large or small, are monitored by staff and volunteers alike who gather valuable data to keep tabs on the health of our waters. Over 50 lakes and streams in the region are monitored in early spring by Watershed Council staff on an every three year rotation through our Comprehensive Water Quality Monitoring Program. Volunteers supplement the comprehensive program and fill in data gaps by collecting weekly water quality data throughout summer months as part of our Volunteer Lake Monitoring Program.

In addition to monitoring, the Watershed Council works with property owners, associations, local governments, and others on a variety of projects intended to protect lakes throughout Northern Michigan. Projects carried out on these lakes have ranged from lake-wide aquatic plant surveys to individual shoreline property restoration projects. Details about recent projects involving Burt Lake are included in this report.

We hope you find the information presented in this report both interesting and insightful. If you have any questions, comments, or concerns, please contact Kevin Cronk at Tip of the Mitt Watershed Council at (231) 347-1181 or visit our website at www.watershedcouncil.org/protect.



Comprehensive Water Quality Monitoring

Restoration Ecologist, Jennifer Gelb, uses Kemmerer bottle to collect water sample.

Water Quality Trends in Burt Lake

Tip of the Mitt Watershed Council has been consistently monitoring the water quality of Northern Michigan lakes for decades as part of the Comprehensive Water Quality Monitoring Program. When the program was launched in 1987, Watershed Council staff monitored a total of 10 lakes. Since then, the program has burgeoned and now, remarkably, includes more than 50 lakes and rivers throughout the tip of the mitt. Over the course of 20+ years of monitoring, we have managed to build an impressively large water quality dataset. This unique, historical dataset is, simply put: invaluable. Data from the program are regularly used by the Watershed Council, lake and stream associations, local governments, regulatory agencies, and others in efforts to protect and improve the water resources that are so important to the region.

Every three years, Watershed Council staff head into the field in early spring, as soon as ice is out, to monitor lakes and rivers spread across the tip of the mitt. All lakes over 1000 acres and the majority of lakes greater than 100 acres in size, as well as all major rivers, are included in the program. In each of these water bodies, the Watershed Council collects a variety of physical and chemical data, including parameters such as dissolved oxygen, pH, chloride, phosphorus and nitrogen.

Water quality data collected in the field are compiled and used by Watershed Council staff to characterize water bodies, identify specific problems and examine trends over time. One obvious trend found by analyzing data from this program is that chloride (a component of salt) levels have increased significantly in many water bodies during the last 23 years. Why? We need not look any farther than ourselves to find the answer as we use salt in everything from de-icing to cooking.

The following pages contain descriptions of the types of data collected in the program as well as select data from Burt Lake. We have also included charts to provide a graphic display of trends occurring in the lake. For additional information about the Comprehensive Water Quality Monitoring Program please visit our web site at www.watershedcouncil.org/protect.

Parameters and Results

pH

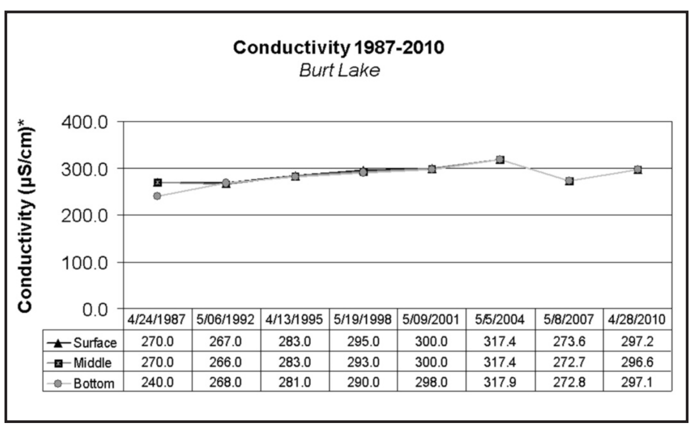
pH values provide a measurement of the acidity or alkalinity of water. Measurements above 7 are alkaline, 7 is considered neutral, and levels below 7 are acidic. When pH is outside the range of 5.5 to 8.5, most aquatic organisms become stressed and populations of some species can become depressed or disappear entirely. State law requires that pH be maintained within a range of 6.5 to 9.0 in all waters of the state. Data collected from Burt Lake show that pH levels consistently fall within this range, with a minimum of 7.52 (1992) and a maximum of 8.42 (2001).

Dissolved Oxygen

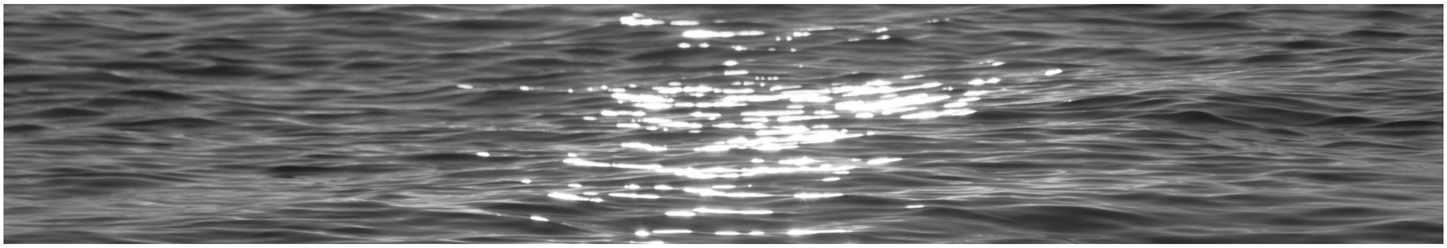
Oxygen is required by almost all organisms, including those that live in the water. Oxygen dissolves into the water from the atmosphere (especially when there is turbulence) and through photosynthesis of aquatic plants and algae. State law requires that a minimum of 5 to 7 parts per million (PPM) be maintained depending on the lake type. Dissolved oxygen levels recorded in Burt Lake, from lake surface to bottom, have consistently exceeded State of Michigan minimums, ranging from 8.2 PPM (1998) to 13.1 PPM (1995).

Conductivity

Conductivity is a measure of the ability of water to conduct an electric current, which is dependent upon the concentration of charged particles (ions) dissolved in the water. Research shows that conductivity is a good indicator of human impacts on aquatic ecosystems because levels usually increase as population and human activity in the watershed increase. Readings from lakes monitored by the Watershed Council have ranged from 175 to 656 microSiemens (µS), and in Burt Lake, ranged from a low of 240 µS (1987) to a high of 318 µS (2004). Data from Burt Lake show that conductivity levels have increased, though there was a substantial, and thus far inexplicable, drop in 2007.

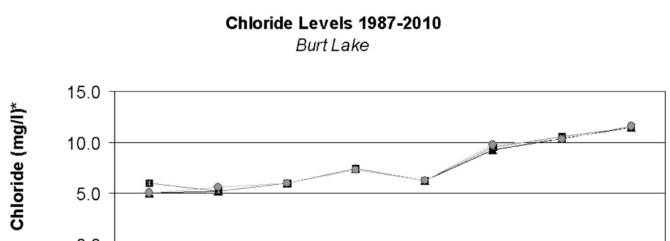


	4/24/1987	5/06/1992	4/13/1995	5/19/1998	5/09/2001	5/5/2004	5/8/2007	4/28/2010
Surface	270.0	267.0	283.0	295.0	300.0	317.4	273.6	297.2
Middle	270.0	266.0	283.0	293.0	300.0	317.4	272.7	296.6
Bottom	240.0	268.0	281.0	290.0	298.0	317.9	272.8	297.1



Chloride

Chloride, a component of salt, is present naturally at low levels in Northern Michigan surface waters due to the marine origin of the underlying bedrock (typically < 5 PPM). Chloride is a “mobile ion,” meaning it is not removed by chemical or biological processes in soil or water. Many products associated with human activities contain chloride (e.g., de-icing salts, water softener salts, fertilizers, and bleach). Although most aquatic organisms are not affected until chloride concentrations exceed 1,000 PPM, increases are indicative of other pollutants associated with human activity (such as automotive fluids from roads or nutrients/bacteria from septic systems) reaching our waterways. Chloride concentrations in Burt Lake have gradually increased from a low of 5.0 PPM in1987 to 11.6 PPM in 2010.



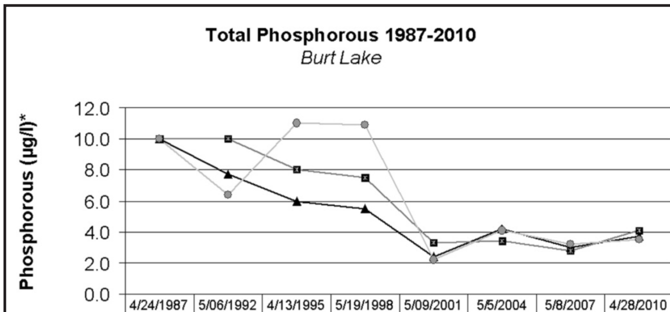
	4/24/1987	5/06/1992	4/13/1995	5/19/1998	5/09/2001	5/5/2004	5/8/2007	4/28/2010
Surface	5.0	5.2	6.0	7.4	6.2	9.3	10.4	11.5
Middle	6.0	5.2	6.0	7.4	6.2	9.5	10.5	11.5
Bottom	5.0	5.6	6.0	7.3	6.2	9.7	10.3	11.6

Nutrients

Nutrients are needed by organisms to live, grow, and reproduce; occurring naturally in soils, water, air, plants, and animals. Phosphorus and nitrogen are essential nutrients for plant growth and important for maintaining healthy, vibrant aquatic ecosystems. However, excess nutrients from sources such as fertilizers, faulty septic systems, and stormwater runoff lead to nutrient pollution, which can have negative impacts on our surface waters. In general, nutrient concentrations are highest in small, shallow lakes and lowest in large, deep lakes.

Total Phosphorus

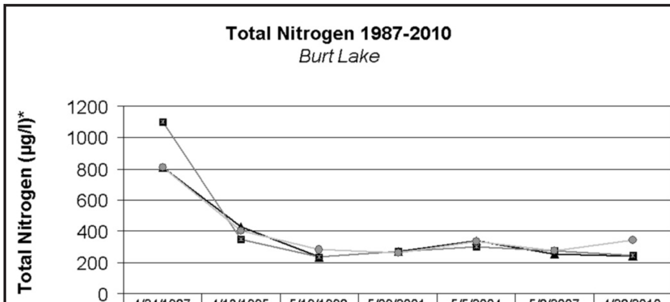
Phosphorus is the most important nutrient for plant productivity in our lakes because it is usually in shortest supply relative to nitrogen and carbon. A water body is considered phosphorus limited if the ratio of nitrogen to phosphorus is greater than 15:1. In fact, most lakes monitored by the Watershed Council are found to be phosphorus limited. Because of the negative impacts that phosphorus can have on surface waters, legislation has been passed in Michigan to ban phosphorus in soaps, detergents, and fertilizers. Water quality standards for nutrients in surface waters have not been established, but total phosphorus concentrations are usually less than 10 parts per billion (PPB) in the high quality lakes of Northern Michigan. Total phosphorus concentrations have decreased over time in Burt Lake, ranging from approximately 6 to 10 PPB in the 1990s to 3 to 4 PPB during recent years. The decrease in phosphorus levels is thought to be a result of the introduction of zebra mussels, which have filtered much of the algae out of the water column and disrupted the natural nutrient cycle in the lake.



	4/24/1987	5/06/1992	4/13/1995	5/19/1998	5/09/2001	5/5/2004	5/8/2007	4/28/2010
Surface	10.0	7.7	6.0	5.5	2.4	4.2	3.0	3.7
Middle	10.0	10.0	8.0	7.5	3.3	3.4	2.8	4.1
Bottom	10.0	6.4	11.0	10.9	2.2	4.1	3.2	3.5

Total Nitrogen

Nitrogen is a very abundant element throughout the earth’s surface and is a major component of all plant and animal matter. Nitrogen is also generally abundant in our lakes and streams and needed for plant and algae growth. Interestingly, algae have adapted to a wide variety of nitrogen situations in the aquatic environment, some fixating nitrogen directly from the atmosphere to compete in low-nitrogen environments (blue-green algae), while others tend to thrive in nitrogen-rich environments (diatoms). Total nitrogen levels in Burt Lake have ranged from 236 PPB (1998) to 1100 PPB (1987). There was an initial drop in nitrogen concentrations, but levels have gone up and down from 1998 to present with no clear trends in the data.



	4/24/1987	4/13/1995	5/19/1998	5/09/2001	5/5/2004	5/8/2007	4/28/2010
Surface	810	430	236	270	339	254	240
Middle	1100	350	236	270	301	276	246
Bottom	810	400	281	260	335	276	343

*Unit descriptions: mg/l = parts per million, µg/l = parts per billion, µS = microSiemens per centimeter

Comprehensive Water Quality Monitoring Program
How Does Burt Lake Compare?

Water quality data from the surface of all water bodies monitored in 2010

Water Body	Date	Dissolved Oxygen (mg/l) *	Specific Conductivity (µS)*	pH (units) *	Nitrate-Nitrogen (µg/l) *	Total Nitrogen (µg/l)*	Total Phosphorus (µg/l)*	Chloride (mg/l)*
Bass Lake	4/14/10	11.21	335.3	8.53	11	584	8.8	42.9
Bear River	3/24/10	13.05	283.1	8.30	192	433	16.2	14.3
Bellaire Lake	4/23/10	11.19	315.9	8.29	347	452	3.7	10.7
Ben-way Lake	4/6/10	11.06	358.0	11.32	406	567	6.4	10.8
Birch Lake	4/14/10	11.36	271.6	8.43	3	273	5.7	20.5
Black Lake	4/28/10	10.87	289.3	8.34	27	265	6.8	6.0
Black River	4/15/10	10.54	254.1	8.16	20	308	4.0	4.3
Boyne River	3/26/10	12.71	359.0	8.45	390	626	7.0	11.4
Burt Lake	**4/28/10**	**10.68**	**297.2**	**8.32**	**94**	**240**	**1.4**	**11.1**
Charlevoix, Main Basin	4/19/10	12.52	272.7	8.38	343	474	1.4	11.1
Charlevoix, South Arm	4/19/10	11.80	280.8	8.34	427	547	1.3	9.9
Cheboygan River	4/15/10	9.41	285.0	8.35	34	269	2.9	8.5
Clam Lake	4/23/10	10.76	317.6	8.25	322	423	2.7	10.0
Crooked Lake	3/24/10	11.72	252.8	8.51	269	443	8.7	8.7
Crooked River	4/21/10	10.76	293.9	8.50	137	296	4.5	9.4
Deer Lake	3/26/10	11.63	265.4	8.45	53	411	4.6	15.2
Douglas Lake	3/30/10	11.27	214.8	8.25	55	544	7.8	7.3
Elk Lake	4/19/10	12.80	246.7	8.35	193	411	9.6	9.8
Elk River	4/14/10	12.49	261.3	8.51	205	313	2.0	10.0
Ellsworth Lake	3/29/10	10.39	374.8	8.09	404	696	7.0	11.6
Hanley Lake	4/5/10	10.53	367.3	8.27	451	725	3.0	10.9
Huffman Lake	3/26/10	10.66	287.2	8.36	84	248	2.3	4.5
Huron, Duncan Bay	4/22/10	10.85	278.6	8.36	77	322	3.6	9.7
Indian River	4/21/10	11.32	301.4	8.48	75	226	1.6	12.4
Intermediate Lake	4/23/10	10.63	344.8	8.25	363	458	3.2	11.8
Jordan River	3/29/10	10.22	340.5	8.22	1122	1567	8.3	7.1
Lancaster Lake	4/1/10	8.49	276.0	7.72	75	596	6.9	9.1
Larks Lake	3/30/10	11.62	213.0	8.51	76	706	4.8	4.3
Little Sturgeon River	4/21/10	11.36	320.1	8.35	54	228	2.9	14.5
Long Lake	4/15/10	11.17	206.2	8.19	57	355	6.3	9.0
Maple River	4/22/10	10.30	275.9	8.16	308	544	4.5	6.4
Marion Lake	5/10/10	no data	no data	no data	<1	482	9.0	22.2
Michigan, Bay Harbor	5/3/10	11.31	277.0	8.16	284	493	2.2	14.8
Michigan, Grand Traverse Bay	4/28/10	12.40	241.1	8.26	251	360	1.4	11.8
Michigan, Little Traverse Bay	5/10/10	12.03	244.5	8.29	268	373	2.2	12.8
Mullett Lake	4/22/10	11.63	298.0	8.37	56	287	2.7	11.7
Munro Lake	4/1/10	11.55	215.4	8.41	36	1022	13.3	4.9
Nowland Lake	4/14/10	11.09	190.1	8.47	7	583	5.4	6.2
Paradise Lake	4/22/10	10.52	207.2	8.30	8	325	5.0	11.2
Pickerel Lake	3/24/10	11.26	261.6	8.26	183	453	3.1	7.3
Pigeon River	4/21/10	10.09	341.5	8.37	35	233	3.8	6.5
Pine River, Charlevoix	4/14/10	12.42	268.2	8.36	273	349	0.5	11.2
Round Lake (Emmet Cty)	3/30/10	11.95	306.3	8.52	49	739	2.9	25.9
Silver Lake (Wolverine)	4/20/10	10.65	194.4	8.35	26	247	3.3	4.9
Six-mile Lake	3/29/10	10.52	333.5	8.14	279	541	4.4	7.2
Skegemog Lake	4/19/10	10.87	255.8	8.45	186	292	1.4	9.6
Spring Lake	3/24/10	12.46	529.9	8.21	1397	1457	5.3	90.0
St. Clair Lake	3/29/10	10.49	351.0	8.14	260	560	5.4	8.8
Sturgeon River	4/22/10	11.03	374.0	8.33	194	273	1.0	13.9
Susan Lake	3/26/10	12.04	282.7	8.36	111	685	8.0	10.5
Thumb Lake	4/1/10	10.99	200.7	8.22	38	301	10.0	5.1
Torch Lake	4/23/10	12.39	260.3	8.31	270	371	0.7	8.0
Twin Lakes	4/23/10	11.49	259.6	8.32	27	393	9.7	2.2
Walloon, Foot	4/28/10	10.31	265.5	8.29	75	316	3.2	12.8
Walloon, Mud Basin	4/28/10	9.14	296.8	8.30	25	371	9.3	16.4
Walloon, North Arm	4/28/10	9.53	298.0	8.32	194	539	5.3	14.5
Walloon, West Arm	4/28/10	10.66	259.8	8.29	134	377	3.0	11.1
Walloon, Wildwood Basin	4/28/10	10.29	260.6	8.32	68	274	3.4	12.3
Wildwood Lake	4/20/10	10.35	295.0	8.38	<1	332	11.9	16.0
Wilson Lake	4/7/10	10.50	358.7	8.28	433	800	5.3	10.7

*Unit descriptions: mg/l = milligrams/liter (parts per million), µg/l = micrograms/liter (parts per billion), µS = microSiemens per centimeter

Lake Association and Watershed Council Continue Efforts to Protect Burt Lake.

With nearly identical missions, it is no wonder that the Burt Lake Preservation Association (BLPA) and Tip of the Mitt Watershed Council have worked together for decades to protect Burt Lake and its watershed. The two organizations have teamed up on a variety of projects, including the development of a watershed management plan, invasive species control, and water quality monitoring. Most recently, BLPA sponsored a survey that was performed by the Watershed Council to document and address any problems on the Burt Lake shoreline that could affect water quality. In the next few years, BLPA has wisely decided to look beyond the shoreline, deeper into the watershed, to determine if there are any problems in rivers and streams flowing into Burt Lake that require attention.

In 2009, Watershed Council staff and interns paddled at least 100 miles of Burt Lake shoreline to comprehensively survey conditions that affect water quality. You may already know that, in spite of being one of the largest inland lakes in Michigan with over 17,000 acres of surface area, Burt Lake does not have 100 miles of shoreline. However, performing a survey of this intensity requires multiple passes to fully and accurately survey the lake's 35-mile shoreline. Throughout the course of two weeks in early summer, with an additional week in the fall, nutrient pollution, erosion, greenbelts and other items were assessed on every property on Burt Lake.

Since the last survey in 2001, there were dramatic improvements in certain shoreline conditions, while indications of degradation in others. In 2001, greenbelts (i.e., vegetated areas directly along the shoreline) were found to be in poor condition on 56% of properties, but then there was quite a turn-around following the hard work of BLPA and the Watershed Council in a multiple year "Restore the Shore" campaign. A great many lakeshore residents took it upon themselves to do what's best for the lake, establishing or improving shoreline vegetation, which resulted in a spectacular increase in the percentage of healthy greenbelts (23%) and a considerable decrease in the number of poor greenbelts in the 2009 survey (20%). Conversely, indications of nutrient pollution, from sources such as malfunctioning septic systems, fertilizers, or stormwater, were found to be much higher in 2009 (>20% increase). Considering their success with greenbelt improvement, there is no doubt that BLPA will take the bull by the horns and work diligently to address nutrient pollution problems around the lake.

This year, BLPA has contracted with the Watershed Council to begin a comprehensive evaluation of all major tributaries flowing into Burt Lake, a project that could potentially span several years. The water quality of the Burt Lake tributaries will be monitored in the spring and fall of 2011 to assess relative contributions of pollutants, such as nutrients and sediments, of each river and stream. If it is found that some tributaries are contributing an excessive amount of nutrients or sediments relative to the volume of water they deliver to the lake, then BLPA and the Watershed Council will take a closer look to identify and control pollution sources higher up in the watershed. Continuing such collaborative efforts will ensure that Burt Lake remains the treasured resource that it is for generations to come.

Maple Bay

Volunteer Lake Monitoring

Local Volunteers Monitor & Protect Our Lakes

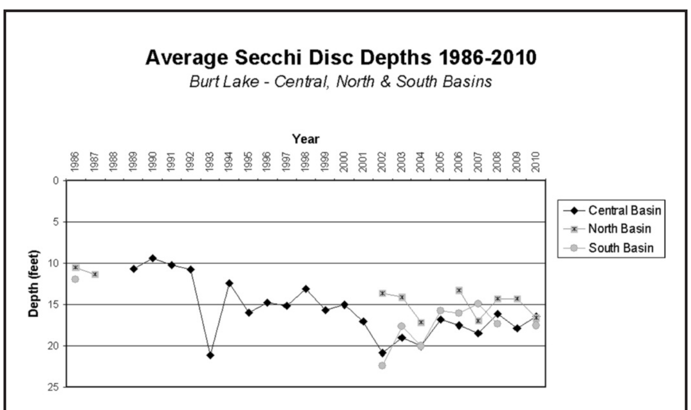
Since 1984, Tip of the Mitt Watershed Council has coordinated the Volunteer Lake Monitoring program (VLM), relying upon hundreds of volunteers to monitor the water quality of dozens of lakes in the northern Lower Peninsula of Michigan. During the most recent summer for which data are available (2010), 51 volunteers monitored water quality at 32 stations on 25 lakes.

A remarkable amount of data has been generated by the VLM program and is available to the public via our web site (www.watershedcouncil.org/protect). This data is essential for discerning short-term changes and long-term trends in the lakes of Northern Michigan. Ultimately, the dedicated effort of volunteers and staff will help improve lake management and protect and enhance the quality of Northern Michigan's waters.

Volunteers measure water clarity on a weekly basis using a Secchi disc. Every other week volunteers collect water samples to be analyzed for chlorophyll-a. Staff at the Watershed Council process the data and determine Trophic Status Index (TSI) scores to classify the lakes and make comparisons. Volunteers have monitored water quality in Burt Lake over the past few decades. The following section summarizes the parameters monitored and results.

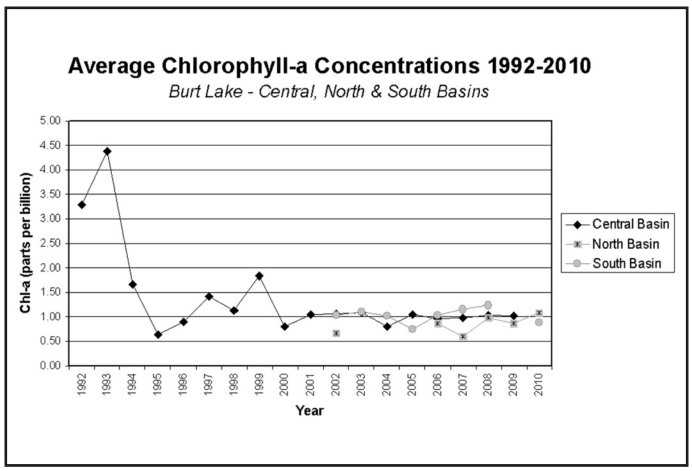
Secchi Disc

The Secchi disc is a weighted disc (eight inches in diameter, painted black and white in alternating quarters) that is used to measure water clarity. The disc is dropped down through the water column and the depth at which it disappears is noted. Using Secchi disc measurements, we are able to determine the relative clarity of water, which is principally determined by the concentration of algae and/or sediment in the water. The clarity of water is a simple and valuable way to assess water quality. Lakes and rivers that are very clear usually contain lower levels of nutrients and sediments and, in most cases, boast high quality waters. Throughout the summer, different algae types bloom at different times, causing clarity to vary greatly. Secchi disc depths have ranged from just a few feet in small inland lakes to over 80 feet in large inland lakes and Great Lakes' bays!



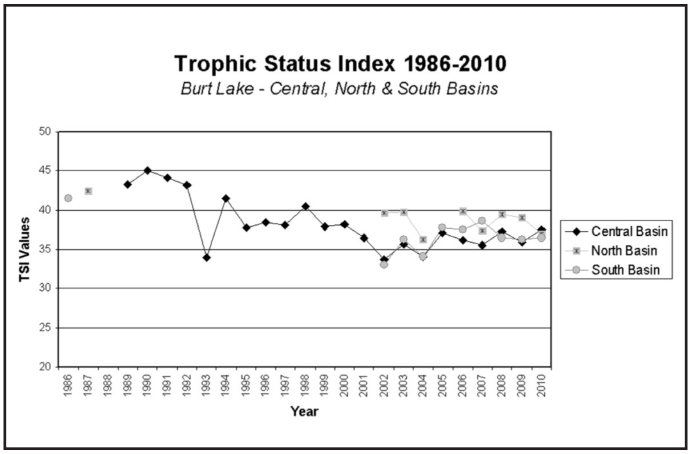
Chlorophyll-a

Chlorophyll-a is a pigment found in all green plants, including algae. Water samples collected by volunteers are analyzed for chlorophyll-a to estimate the amount of phytoplankton (minute free-floating algae) in the water column. There is a strong relationship between chlorophyll-a concentrations and Secchi disc depth. Greater amounts of chlorophyll-a indicate greater phytoplankton densities, which reduce water clarity and, thus, the Secchi disc depth as well. So why collect chlorophyll-a data? The chlorophyll-a data provides support for Secchi disc depth data used to determine the productivity of the lake, but it can also help differentiate between turbidity caused by algal blooms versus turbidity caused by other factors such as sedimentation or calcite.



Trophic Status Index

Trophic Status Index (TSI) is a tool developed by Bob Carlson, Ph.D. from Kent State University, to determine the biological productivity of a lake. Formulas developed to calculate the TSI value utilize Secchi disc depth and chlorophyll-a measurements collected by our volunteers. TSI values range from 0 to 100. Lower values (0-38) indicate an oligotrophic or low productive system, medium values (39-49) indicate a mesotrophic or moderately productive system, and higher values (50+) indicate a eutrophic or highly productive system. Lakes with greater water clarity and smaller phytoplankton



populations would score on the low end of the scale, while lakes with greater turbidity and more phytoplankton would be on the high end.

TSI values are an indication of a lake's biological productivity. Oligotrophic lakes are characteristically deep, clear, nutrient poor, and with abundant oxygen. On the other end of the spectrum, eutrophic lakes are generally shallow and nutrient rich. A highly productive eutrophic lake could have problems with oxygen depletion whereas the low-productivity oligotrophic lake may have a lackluster fishery. Mesotrophic lakes lie somewhere in between and are moderately productive.

Depending upon variables such as age, depth, and soils, lakes are sometimes naturally eutrophic. However, nutrient and sediment pollution caused by humans can lead to the premature eutrophication of a lake, referred to as "cultural eutrophication". Cultural eutrophication can affect the fisheries, lead to excessive plant growth, and result in algal blooms that can be both a nuisance and a public health concern.

(2009 TSI Values for all lakes on back page.)

Results from Burt Lake

Due to its tremendous size, volunteers monitor Burt Lake water quality in three different locations; at the deep hole in the center of the lake and at the north and south ends. Volunteer monitoring began at all three sites in the late 1980s, but the initial monitoring in the north and south ends only lasted a few years. Impressively, the sample site in the middle of the lake has been monitored every year since 1989! Monitoring recommenced in the north and south ends of the lake in 2002.

The long-term Secchi disc and chlorophyll-a data from Burt Lake allow Watershed Council staff to assess water quality and examine changes over time. Average Secchi disc depths in Burt Lake have increased from an average of approximately 10 feet in the early 1990s to around 17 feet today, which shows that the water is now much clearer. Average chlorophyll-a concentrations decreased roughly in tandem with increasing water clarity. Chlorophyll-a levels dropped considerably during the 1990s, but seem to have reached an equilibrium, hovering around 1 PPB for the last 10 years.

These changes in water clarity and chlorophyll-a are probably the result of zebra mussels *(Dreissena polymorpha)*, which have been present in Burt Lake for a number of years. Zebra mussels are filter-feeders that prey upon algae and essentially clear the water column. Unfortunately, zebra mussels are not cleaning the water, but rather removing the algae that are the base of the food chain. This loss of primary productivity (i.e., algae) alters the entire food web, ultimately leading to a reduction in top predator fish populations, such as trout or walleye. On a positive note, shoreline property owners around Burt Lake report that the zebra mussels are no longer as common as they once were, which indicates that they may have passed their peak and that the lake ecosystem is approaching a new equilibrium.

Not surprisingly, data show that the trophic state of Burt Lake has changed. Trophic status index scores from the late 1980s and early 1990s showed that Burt Lake was mesotrophic (moderately productive), but dropped into the oligotrophic category (low productivity) where it has remained for the last 10 years. Data from the Comprehensive Water Quality Monitoring also attest to this decrease in biological productivity as total phosphorous concentrations have dropped considerably over the last few decades. Zebra mussels appear to have altered the Burt Lake food web and reduced its biological productivity, perhaps for the long term. However, data show that water quality remains high, with abundant stores of dissolved oxygen throughout the water column.

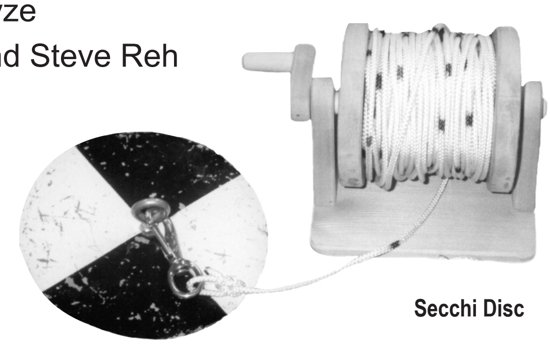
Clearly, volunteers are doing an excellent job of monitoring Burt Lake. Without their dedication and enthusiasm, we would have much less data to assess lake health and fewer eyes on our precious waters. Thus, we can not thank our volunteers enough for the critical roles they play in helping protect the lakes of Northern Michigan. We and the waters of Northern Michigan are eternally grateful! Of course, alternates are always needed, so please consider joining the program to help protect and preserve Burt Lake.

If you would like to get involved or would like additional information, please contact the program coordinator, Kevin Cronk, at (231) 347-1181 ext. 109 or by e-mailing kevin@watershedcouncil.org.

Thank you

Volunteer Lake Monitors on Burt Lake:

- John Hutto
- Dan Balesky
- Ann Swayze
- Margie and Steve Reh



Secchi Disc

*Unit descriptions: mg/l = parts per million, µg/l = parts per billion, µS = microSiemens per centimeter

Trophic Status Index (TSI) Values for Lakes Monitored in 2010

Lake	TSI*	Lake	TSI*	Lake	TSI*
Bass Lake	44	Lake Charlevoix, South Arm	37	Pickerel Lake	47
Black Lake	41	Huffman Lake	53	Six Mile Lake	45
Burt Lake, Central Basin	37	Lake Marion	39	Thayer Lake	42
Burt Lake, North	37	Lake Michigan, Bay Harbor	26	Thumb Lake	31
Burt Lake, South	37	Lake Michigan, Little Traverse Bay	31	Twin Lake	42
Crooked Lake	46	Long Lake, Cheboygan County	34	Walloon Lake, Foot Basin	37
Douglas Lake - Cheboygan	40	Mullett Lake, Center	38	Walloon Lake, North	44
Douglas Lake - Otsego	43	Mullet Lake, Pigeon Bay	37	Walloon Lake, West Arm	41
Elk Lake	34	Munro Lake	42	Walloon Lake, Wildwood	40
Lake Charlevoix, Main	34	Paradise Lake	46		

* TSI values range from 0 to 100. Lower values (0-38) indicate an oligotrophic or low productive system, medium values (39-49) indicate a mesotrophic or moderately productive system, and higher values (50+) indicate a eutrophic or highly productive system.

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