Current Reflections
SPRING 2017
Tip of the Mitt Watershed Council

Advocating for Michigan's Water Resources

Aquaculture in the Great Lakes

During the past few years, government agencies and others in Michigan have been discussing the future of net-pen aquaculture in the Great Lakes. Net-pen aquaculture, also known as fish farming, is the practice of raising fish in an underwater net or structure that serves as a pen. As a result of those discussions, State agencies concluded that fish farming should not be pursued in the Great Lakes due to the risks to water quality, our fisheries, public health, and tourism. In addition, the Michigan Attorney General recently released an opinion that current State law does not allow for net-pen operations in the Great Lakes. However, Michigan lawmakers, at any time, could introduce legislation to change State law and allow net-pen aquaculture in the Great Lakes. In fact, bills were introduced previously to do just that. The Watershed Council will remain vigilant to ensure that those bills are defeated. We will also work to advocate for sustainable, land-based aquaculture that fully treats wastewater and avoids the risks of traditional aquaculture.

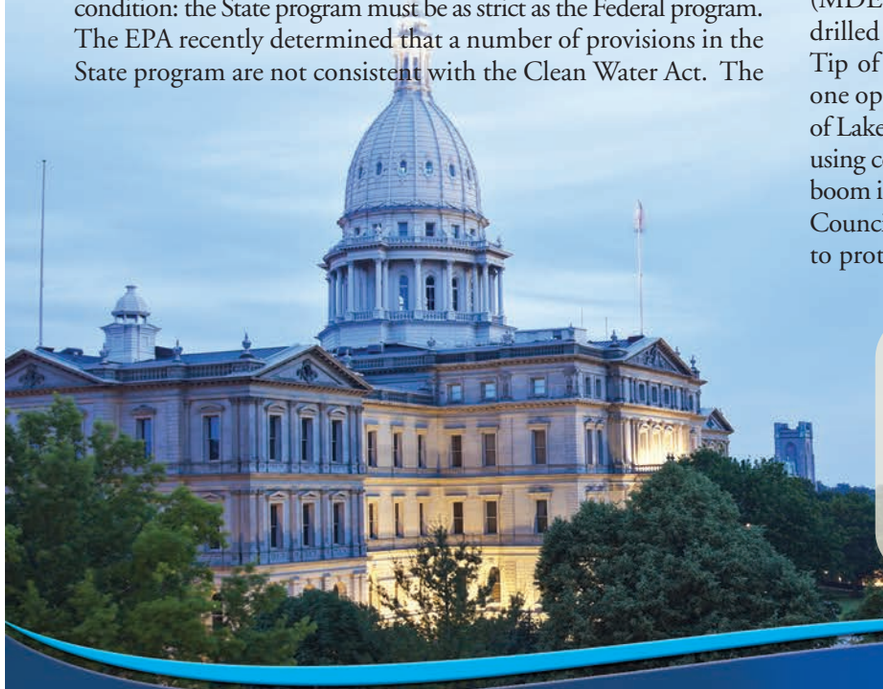
Michigan's Wetland Program

Big changes are coming to Michigan's Wetland Program. The U.S. Environmental Protection Agency (EPA) ruled that Michigan's program fails to meet Federal law. In 1984, Michigan received authorization to administer Section 404 of the Clean Water Act at the state-wide level. The authorization comes with one important condition: the State program must be as strict as the Federal program. The EPA recently determined that a number of provisions in the State program are not consistent with the Clean Water Act. The Watershed Council is preparing to fight to save not only Michigan's Wetland Program, but the State's wetland resources. We urge the Michigan Legislature to recognize that wetlands provide valuable services to the residents of Michigan and those benefits need to be preserved.

Hydraulic Fracturing

Hydraulic fracturing, the practice of pumping high-pressure liquids and chemicals deep underground to aid in petroleum and natural gas extraction, has negatively impacted water quality in other parts of the country. As a proactive measure, Tip of the Mitt Watershed Council, funded by Friends of the Jordan River Watershed, conducted extensive monitoring of the Jordan River and its tributaries to test for pollutants related to fracking. Surface water and sediment samples were collected at four strategic locations throughout the Watershed and analyzed for over 80 possible contaminants. These contaminants range from elevated levels of methane and sulfates to radioactive pollution such as radium and uranium. Preliminary results indicate that the Jordan River is free from fracking-related pollution, potentially due to lack of fracking activity in the Jordan River Watershed.

Despite fears, a boom in high volume hydraulic fracturing in Michigan has yet to occur, primarily due to low oil prices. Since 2008, the Michigan Department of Environmental Quality (MDEQ) has issued just over 50 permits and 36 wells have been drilled or completed using high volume hydraulic fracturing. In Tip of the Mitt Watershed Council's service area, there is only one operating well producing gas, located in the Elk River Chain of Lakes. Most of the recent oil and gas activity is located downstate using conventional drilling methods. However, a hydraulic fracking boom in Michigan could still come in the future and the Watershed Council will continue to work to strengthen Michigan's regulations to protect our valuable water resources.



Inside this issue:

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Cover photos:
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Reflections From Our Executive Director

Gail Gruenwald
Executive Director

The Watershed Council is endowed with loyal, generous supporters. Contributions from our members have made possible decades of water quality monitoring, education, policy initiatives, and advocacy on behalf of our waters. At the same time, we have relied on the State of Michigan and the Federal government to fund our large-scale watershed management planning and implementation work and our restoration actions. This work has been funded through the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service and other federal agencies. Many of the grants for watershed management projects were "pass-through" funds. These are grants that the EPA passes through to the State of Michigan. The Michigan Department of Environmental Quality then awards grants to worthy organizations through a competitive grant process. Most years, the Watershed Council is working on at least two or three such projects.

As many of you are aware, this may come to an end in the coming months. Proposed federal budget cuts include dramatic reductions in EPA funding for watershed management work, as well as eliminating funding of the Great Lakes Restoration Initiative (GLRI). The GLRI has received bipartisan support in Congress since its inception several years ago as a funding source for Great Lakes protection and restoration. Northern Michigan has benefited from hundreds of thousands of dollars in grant funds to support important restoration projects. The Watershed Council has completed several restoration projects including work on Tannery Creek, a new bridge over the Bear River, creation of a stormwater wetland at North Central Michigan College, and treatment of zebra and quagga mussels with Zequanox, among other things. Several other Northern Michigan organizations have also completed extensive restoration projects with GLRI funds.

These potential funding cuts concern us. Without these critical programs to provide support, it is unlikely that this work will continue in our region. Not only do the funds make restoration of our lakes and streams possible, but they bring much needed economic stimulus to our area through contracts with excavating companies, engineering firms, county road commissions and others. The Watershed Council will continue to seek private funds to support all of our work, but we will also need to identify new or significantly expanded funding sources to protect and restore our water resources through watershed management in the years to come.

Thank you all for your support of our work. Your contributions are needed now more than ever. Thanks for making a difference!

Watershed Council Receives Chairman's Award

Petoskey Regional Chamber of Commerce Board Chairman, Tom Adams, presents the Chairman's Award to Claire Rasmussen, Gail Gruenwald, and Lynn D. Buffington.

During the Breakfast of Champions event held in December, Tip of the Mitt Watershed Council received one of the community's highest honors – the Petoskey Regional Chamber of Commerce Chairman's Award. This award, chosen by the Chamber's Executive Committee, honors a person, business, or organization that has had a profound impact on the local area. We are honored to receive such a prestigious award for our commitment to the protection of the region's lakes, streams, wetlands, and groundwater through respected advocacy, innovative education, technically sound water quality monitoring, thorough research, and restoration actions. Thank you to the Petoskey Regional Chamber of Commerce for recognizing our long-standing commitment to protecting Northern Michigan's waters.

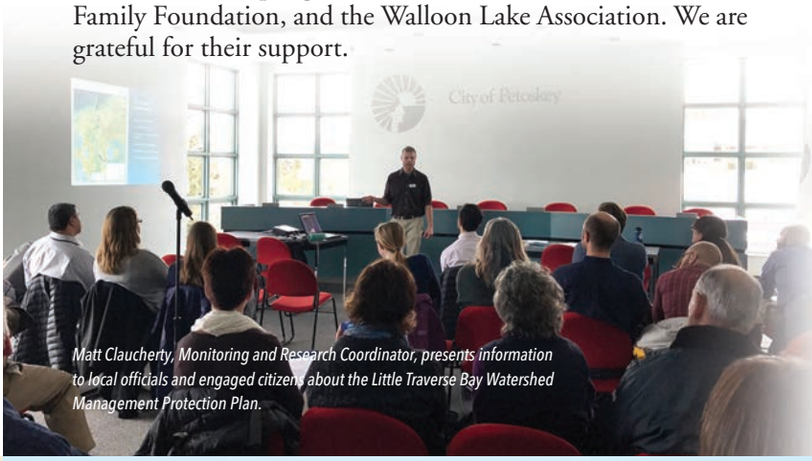
AQUAVIST NETWORK

Little Traverse Bay Watershed Protection Plan Event

On February 1, the Watershed Council hosted an event to present information to the public and our local officials regarding the update of the Little Traverse Bay Watershed Protection Plan. We also presented opportunities for participants to provide feedback on the new Plan.

Watershed plans bring together community partners to assess the health of the watershed and identify sources of stress that can impair water quality. These plans include implementation steps that will accomplish stated goals and objectives. Additionally, specific actions are included to help educate the public about ways to prevent pollution from stormwater runoff and address sources that contribute to nutrient and sediment pollution of Little Traverse Bay and its tributaries.

The updated Plan will go to the Michigan Department of Environmental Quality and the U.S. Environmental Protection Agency for approval. This Plan update was generously funded by the Petoskey-Harbor Springs Area Community Foundation, the Baiardi Family Foundation, and the Walloon Lake Association. We are grateful for their support.



Matt Claucherty, Monitoring and Research Coordinator, presents information to local officials and engaged citizens about the Little Traverse Bay Watershed Management Protection Plan.

Climate Change Resolution

Tip of the Mitt Watershed Council Board of Directors recently adopted a position statement regarding climate change and our role in combating its effects. The world's scientific community has concluded that the Earth's environment is warming at a rate that is unprecedented in the past 1,300 years. Since 1900, annual average air temperatures have increased by 2.0°F in the U.S. Great Lakes region. In Michigan, the climate is predicted to become considerably warmer over the next century, which will result in shorter winters, more frequent and extreme summer heat events, heavy rain, and more lake-effect snowfall.

Additionally, the Great Lakes are warming. Average Great Lakes ice coverage has declined 71 percent from 1973 to 2010. Lake Superior, the fastest warming of the Great Lakes, could have little-to-no open-lake ice cover during a typical winter within the next 30 years. Growing seasons will continue to lengthen, and by the end of the century, it may be four to nine weeks longer than over the same growing period between 1961 and 1990.

These climate changes are having, and will continue to have, a profound effect on the Great Lakes region's ecology and economy. Recognizing this, the Watershed Council incorporates and considers climate change impacts in our watershed management planning and implementation, restoration actions, outreach and education efforts, and all that we do to improve the resiliency of our water resources. The recently updated Board of Directors' position statement has formalized this commitment.

For more information, contact Grenetta Thomassey, Watershed Policy Director, at grenetta@watershedcouncil.org or (231) 347-1181 ext. 118 or visit the Aquavist webpage at www.watershedcouncil.org/aquavist-network.

ELk River Chain of Lakes Greenbelt Initiative

Are you a lakefront property owner on the Elk River Chain of Lakes? Is your shoreline in need of a greenbelt boost or makeover? If so, the Watershed Council may be able to help!

Thanks to a grant from the Michigan Department of Environmental Quality, the Watershed Council has funding to help eligible property owners install greenbelt projects. In 2017 and 2018, we will be overseeing the installation of ten residential shoreline projects. You could be one of the lucky recipients! For more information, contact Jen Buchanan, Watershed Projects Director at (231) 347-1181 x 112 or jen@watershedcouncil.org.

Funding available
for eligible property owners to install a greenbelt.

Watershed Council Youth Education
Expands to Middle Schools

Tip of the Mitt Watershed Council has received funding from the Great Lakes Fishery Trust to pilot a new middle school Water Resources Education Program. This funding will help provide water resources education to middle school students and support to teachers in Antrim, Charlevoix, Cheboygan, and Emmet Counties.

The Water Resources Education Program helps middle school students develop a sense of ownership and stewardship in their communities through place-based education. Students will be provided with the knowledge, tools, and resources to research a topic of concern and develop a plan to affect change in their behavior and communities.

2017 marks the third year of the Watershed Academy, the Watershed Council's successful high school stewardship program centered on stream monitoring. New middle school programming will support efforts at the high school level and provide a continuum of water resources education for area students, furthering the education of our future stewards.

If you would like more information about the Watershed Council's education programs or to learn how you can support our education efforts, contact Maria Affhalter, Water Resource Education Director, at maria@watershedcouncil.org, or Eli Baker, Education and Outreach Specialist at eli@watershedcouncil.org or call our office at (231) 347-1181.

Protecting Little Traverse Bay:
One Garden at a Time

The Watershed Council is excited to announce the launch of the Petoskey Rain Garden Project, thanks to the Petoskey-Harbor Springs Area Community Foundation. The Rain Garden Project will further our work to protect the water quality of Little Traverse Bay by installing 12 residential rain gardens and one public rain garden within the City of Petoskey.

Rain gardens are a smart and proven way of using landscaping to protect our water resources, enhance habitat, and beautify our homes and neighborhoods. A rain garden is a bowl-shaped garden designed to slow, filter, and absorb stormwater runoff from nearby impervious surfaces, such as roofs and driveways. Stormwater, which is the greatest source of pollutants to Little Traverse Bay, carries with it nutrients, sediments, bacteria, and other forms of nonpoint source pollution that can impact water quality, aquatic habitat, and public health.

Think you might have just the spot for a rain garden on your property? What if we told you we could help pay for it? That's right, the Rain Garden Project is a cost/share program. Property owners are responsible for a portion of the project costs, but the Watershed Council will help pay up to $1500 per rain garden! If you think this sounds like a great deal (and it is!) visit www.watershedcouncil.org for project and application information. You can also call or email Jen Buchanan, Watershed Projects Director at (231) 347-1181 x 112 or jen@watershedcouncil.org for more details.

City of Petoskey residents may be eligible for up to

$1500 to install a Rain Garden!

Tip of the Mitt Watershed Council

Volunteer Water Quality Monitoring Programs

2017 REPORT

COMPREHENSIVE MONITORING

LAKE MONITORING

STREAM MONITORING

Comprehensive Coverage for Valuable Water Resources

mon·i·tor

1. Observe and check the progress or quality (of something) over a period of time;
2. Keep under systematic review.

The dictionary definition of "monitor" conveys the basic premise of the Watershed Council's water quality monitoring programs. Our mission is to ensure Northern Michigan's waters remain clean, healthy, and continue to provide benefits for generations to come. Our waters are under threat from a myriad of issues: nutrient pollution and algal blooms, sedimentation and habitat loss, and toxic pollutants that persist in the environment for decades. The Watershed Council's programs assess impacts from these threats on 40 lakes and 24 rivers and streams throughout Northern Michigan.

Although the dictionary definition of "monitor" points us in the right direction, it does little to describe the breadth and depth of what it means to monitor water bodies. Lakes, rivers, and streams are dynamic features of our landscape. They are in constant flux with weather conditions. Rainfall, temperature changes, wind, sunlight, and other factors impart their own changes on our waters. Interactions between land uses and overland runoff also determine the quality of receiving water bodies at the watershed level. These waters support life, from top-tier predator fish down to the minute, unicellular algae. These organisms are dependent on high water quality, but may also impose their own changes within our waters.

COMPREHENSIVE WATER QUALITY MONITORING

To address the complex nature of aquatic systems, the Watershed Council implements a multi-faceted approach to water quality monitoring.

Physical Monitoring

Measuring the physical properties of water involves the most basic components of water quality.

Dissolved oxygen is perhaps the best indicator of water quality. Dissolved oxygen, often referred to as DO, is simply the amount of oxygen that is dissolved in the water. A dissolved oxygen level that is too high or too low can harm aquatic life and affect water quality. Levels of dissolved oxygen vary depending on factors including water temperature, time of day, season, depth, altitude, and rate of flow. Human factors, such as the addition of sewage and nutrients, water flow changes, raising the water temperature, and the addition of chemicals can also effect dissolved oxygen levels.

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. Significant increases in conductivity may be an indicator of pollution. Many products associated with human activities, such as de-icers, water softeners, fertilizers, and bleach contain chloride and other ions. Conductivity levels in lakes and streams tend to rise as population and human activity in a watershed increase.

Temperature is another important measurement that reflects water quality. Water temperature is a governing factor for aquatic

life: it controls the rate of metabolic and reproductive activities, and therefore, life cycles. Trout and other cold-water aquatic organisms require water below 68°F to thrive. Water temperature is also a driving force behind algae and plant growth, which provide the base of the food chain for all organisms. Vegetation removal, impoundment, and industrial use can raise water temperatures, resulting in impacts to aquatic ecosystems.

pH is a measure of the concentration of hydrogen ions. The pH scale ranges from 0 to 14, with a pH of 7 considered neutral. A pH of less than 7 is acidic and a pH of greater than 7 is basic. As a measure of alkalinity or acidity of water, pH tells us a great deal about our lakes and rivers. In lakes, pH can be lowered by decaying organic matter, which produces carbon dioxide (CO_2), an acidifying gas. Rivers and streams with high or low pH readings often indicate that acidic or alkaline pollutants are entering the water body. State water quality standards require Michigan waters to fall between 6.0 and 9.0.

Chemical Monitoring

Chloride, a component of salt, is naturally present at low levels typically < 5 milligrams per liter (mg/L), in Northern Michigan surface waters. Chloride is a reliable indicator of human activity in a watershed because many products associated with people contain chloride (e.g., de-icing salts, water softener salts, fertilizers, and bleach). Furthermore, chloride is not removed by chemical or biological processes in soil or water and therefore, persists over time.

Phosphorus is usually the most important nutrient in terms of aquatic ecosystems and nutrient pollution. Phosphorus is the limiting nutrient for algae and plant growth. It directly influences biological productivity in most of our lakes and streams. Excessive phosphorus inputs can cause problematic algal blooms and nuisance aquatic plant growth, which has led to legislation banning it in soaps, detergents, and fertilizers.

Nitrogen is an abundant element throughout the earth's surface and is a major component of all plant and animal matter. It is also generally abundant in our lakes and streams. Nitrogen can enter water through nonpoint source pollution including fertilizers. Measuring concentrations of total nitrogen in water bodies helps to detect nonpoint source pollution. Nitrate, a biologically-available form of nitrogen, can stimulate excessive plant growth.

Comprehensive Water Quality Monitoring
RESULTS AND TRENDS

Since 1987, the Watershed Council has tracked the health of Northern Michigan's waters, monitoring on a 3-year schedule. 2016 marked the 10th round of comprehensive water quality monitoring for water bodies in Northern Michigan. This extensive dataset now spans nearly three decades, and includes 57 different water bodies.

We are lucky to have some of the State's cleanest water, fed from abundant springs and pristine watersheds. On some water bodies, our data has remained consistent with the first readings taken in 1987. For these water bodies, the baseline of data serves as a tool to ensure future protection.

In other water bodies, impacts from human activities are evident, as pollutant values have increased over time. Some of the following water quality trends shed light on changes occurring in Northern Michigan.

Chloride Concentrations Continue to Increase in Many Surface Waters

Chlorides, as explained above, are a common pollutant associated with human activities. Road salt may be the largest source of chloride for many water bodies in close proximity to developed areas, but other sources, such as wastewater, agriculture, and industrial operations, contribute as well. Data from the groundwater-fed Silver Lake showed a recent uptick in chloride levels. It is possible that chloride in groundwater plays a role in this trend, as gradual and consistent change is generally observed in groundwater-influenced water bodies (Figure 1). Lake Bellaire, on the other hand, is fed mainly through surface runoff. Chloride levels fluctuate from one monitoring event to another, due to rainfall and subsequent runoff exerting a heavier influence on the Lake's water quality (Figure 2). Despite differences in hydrology, both of these lakes have shown increases in chloride concentrations over the past 20 years.

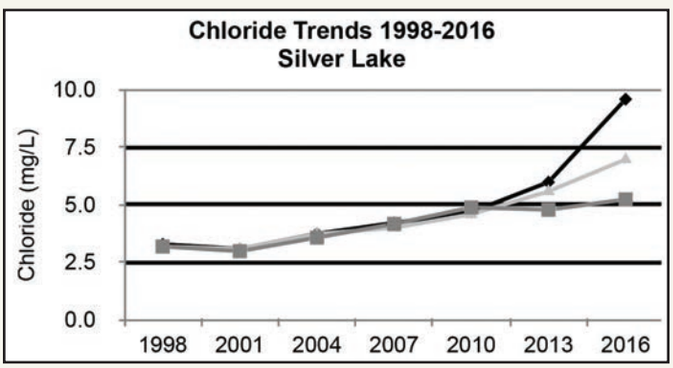


Figure 1. Chloride trends in Silver Lake, Cheboygan County.

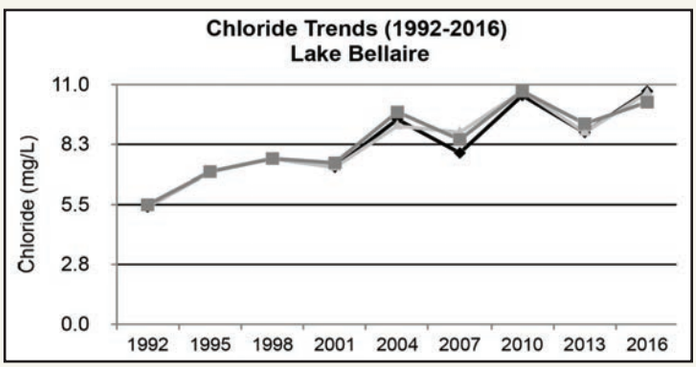


Figure 2. Chloride trends in Lake Bellaire, Antrim County.

Water quality data from the surface of all water bodies monitored in 2016.

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	4/13/2016	13.29	285.20	7.14	55.6	544	8.6	30.00
Bear River	4/28/2016	11.09	254.40	8.13	47.9	358	9.4	11.76
Bellaire Lake	3/29/2016	12.68	205.90	8.33	396.3	544	4.0	10.19
Ben-way Lake	4/15/2016	12.83	293.10	6.72	262.4	338	6.7	8.01
Birch Lake	4/13/2016	13.07	275.10	6.82	11.0	212	8.6	21.74
Black Lake	4/27/2016	11.50	250.30	8.30	49.5	255	5.4	5.01
Black River	4/27/2016	11.42	252.00	8.06	14.6	294	7.9	3.78
Boyne River	4/26/2016	10.98	344.60	8.39	381.6	912	10.0	11.30
Burt Lake	4/14/2016	13.08	260.00	8.26	119.4	343	7.6	10.52
Charlevoix, Main Basin	4/18/2016	13.30	259.10	7.13	421.6	537	3.9	11.50
Charlevoix, South Arm	4/18/2016	12.88	291.10	6.43	633.5	735	<1.0	8.86
Cheboygan River	4/26/2016	11.78	265.57	8.23	70.4	337	5.4	8.80
Clam Lake	3/29/2016	10.76	288.77	8.22	385.4	591	3.4	9.96
Crooked Lake	4/19/2016	12.48	296.80	7.65	271.1	363	6.4	9.31
Crooked River	3/30/2016	12.69	219.00	8.74	214.8	395	6.4	9.14
Deer Lake	4/18/2016	12.49	321.90	6.04	64.6	365	6.4	14.07
Douglas Lake	4/22/2016	11.48	184.50	8.25	56.1	852	6.5	6.85
Elk Lake	4/13/2016	12.74	225.80	8.39	234.6	548	12.4	10.10
Elk River	4/13/2016	13.13	227.70	8.30	240.2	921	2.2	10.54
Ellsworth Lake	4/1/2016	11.92	284.40	8.07	209.6	477	11.0	8.04
Hanley Lake	4/15/2016	12.02	307.10	no data	308.2	419	10.0	8.57
Huffman Lake	4/18/2016	11.46	278.80	8.18	88.9	227	3.0	4.60
Huron, Duncan Bay	4/27/2016	11.89	203.30	8.20	205.7	346	3.5	8.50
Indian River	4/14/2016	13.68	271.80	8.13	130.6	257	5.8	11.04
Intermediate Lake	4/15/2016	12.81	283.00	no data	434.5	483	5.9	10.75
Jordan River	4/26/2016	10.78	233.40	7.85	722.1	1195	13.2	7.63
Lancaster Lake	4/19/2016	9.99	152.30	7.49	16.7	176	5.2	6.32
Larks Lake	4/19/2016	10.37	179.30	8.40	86.0	222	4.5	4.22
Little Sturgeon River	4/26/2016	11.46	265.60	7.98	67.5	85	9.1	10.76
Long Lake	4/27/2016	11.75	245.00	6.79	55.6	354	6.4	8.80
Maple River	5/2/2016	11.21	225.40	7.97	193.4	367	7.4	6.22
Marion Lake	4/30/2016	11.98	278.20	8.42	5.3	348	8.7	20.89
Michigan, Bay Harbor	4/28/2016	13.24	262.60	8.29	308.6	432	3.1	16.11
Michigan, Grand Traverse Bay	4/13/2016	12.13	210.00	8.26	276.9	757	12.3	12.56
Michigan, Little Traverse Bay	4/29/2016	13.35	230.10	8.35	288.9	344	2.6	12.87
Mud Lake (Emmet County)	4/29/2016	11.71	504.63	8.28	138.8	990	9.2	58.31
Mullett Lake	4/14/2016	13.61	268.00	8.24	93.3	233	2.2	10.79
Munro Lake	4/19/2016	11.39	174.50	8.33	59.6	352	6.5	4.56
Nowland Lake	4/15/2016	13.11	178.40	8.20	32.3	349	5.5	4.85
Paradise Lake	4/22/2016	11.24	159.50	8.19	31.9	99	3.7	10.09
Pickerel Lake	4/19/2016	12.07	299.10	7.81	194.1	246	34.8	6.73
Pigeon River	4/26/2016	12.20	285.70	8.25	79.5	358	9.9	5.46
Pine River, Charlevoix	4/18/2016	13.47	258.40	7.60	401.7	552	5.0	14.81
Round Lake (Emmet County)	3/30/2016	13.67	214.20	8.39	104.7	781	12.5	24.29
Six Mile Lake	4/1/2016	11.36	271.70	8.20	278.6	407	7.0	5.62
Skegemog Lake	4/13/2016	12.19	228.20	8.36	290.7	690	61.8	10.11
Spring Lake	3/30/2016	13.34	222.20	8.44	1504.2	2476	2.8	94.49
St. Clair Lake	4/1/2016	11.26	287.67	8.06	190.9	675	4.4	6.55
Sturgeon River	4/26/2016	11.94	302.75	8.23	271.0	571	35.1	5.41
Susan Lake	4/20/2016	11.82	258.70	8.38	77.1	449	51.7	8.85
Tannery Creek	4/29/2016	11.55	461.20	8.44	430.9	565	7.8	35.52
Thayer Lake	4/15/2016	11.50	44.17	7.90	10.9	593	40.2	7.26
Thumb Lake	4/22/2016	11.83	176.10	8.46	42.5	60	7.5	6.40
Torch Lake	3/29/2016	13.21	220.50	8.48	208.7	741	1.5	12.06
Twin Lakes	4/27/2016	12.09	250.40	7.06	26.8	294	7.0	3.38
Walloon, Foot	4/23/2016	12.08	256.90	8.47	29.1	89	4.2	15.50
Walloon, Mud Basin	4/23/2016	11.35	293.90	8.58	31.4	269	8.5	22.67
Walloon, North Arm	4/23/2016	11.76	289.30	8.47	312.5	510	4.8	15.98
Walloon, West Arm	4/23/2016	12.71	250.00	8.26	184.6	158	3.3	13.88
Walloon, Wildwood Basin	4/23/2016	11.73	248.73	8.40	106.7	172	3.2	12.75
Wildwood Lake	4/14/2016	13.08	283.90	8.70	27.5	363	0.7	9.84
Wilson Lake	4/1/2016	11.79	303.17	8.17	494.1	1096	8.5	8.93

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

Table 1. 2016 data for all sites in the Comprehensive Water Quality Monitoring Program.

Zebra Mussels Loosening Their Grip on Some Lakes

After the introduction of zebra mussels (*Dreissena polymorpha)* to the Great Lakes in the mid 1980's and their subsequent spread to our inland lakes, many water bodies saw a large decrease in biological productivity. As voracious filter feeders, zebra mussels consume vast quantities of algae and zooplankton from the water column. Watershed Council monitoring efforts documented this through plummeting concentrations of total phosphorus A few years later, quagga mussels *(Dreissena bugensis)* were introduced and rapidly spread throughout the Great Lakes and their connecting waterways, further depleting the base of the food web.

Over the past few years, anecdotal reports have provided some evidence that zebra mussel populations are in decline throughout Northern Michigan. Unnaturally high numbers of invasive mussels likely resulted in large-scale depletion of their food source, diminishing the population. Comprehensive monitoring results for 2013 and 2016 have shown rebounding total phosphorus concentrations for some lakes, which may be the result of less filter-feeding action by the invasive mussels. While this could be good news for aquatic ecosystems everywhere, the presence of zebra and quagga mussels will continue to impact our Great Lakes and inland lakes.

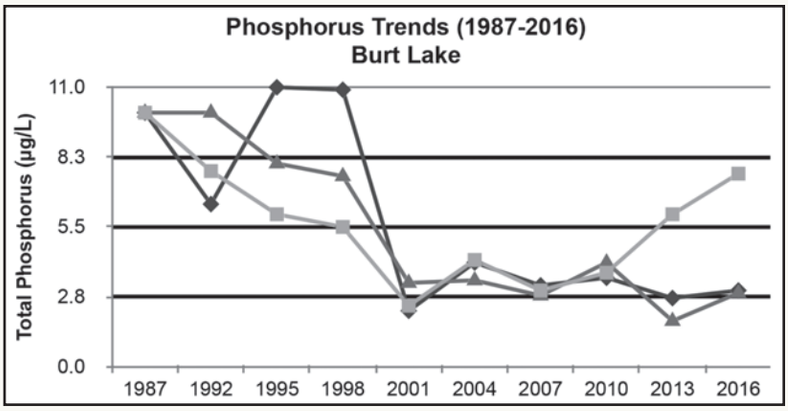


Figure 3. Total phosphorus trends in Burt Lake, Cheboygan County.

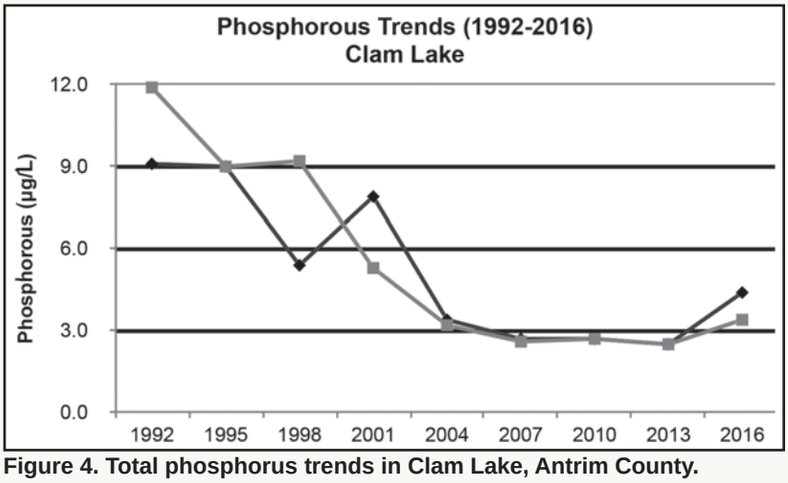


Figure 4. Total phosphorus trends in Clam Lake, Antrim County.

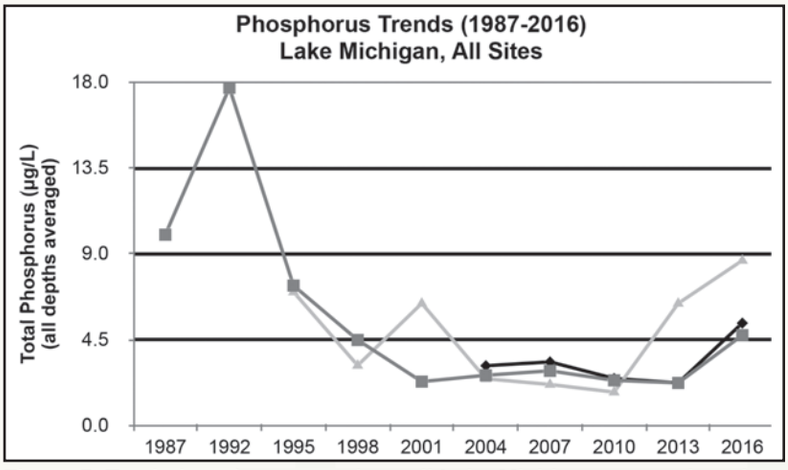
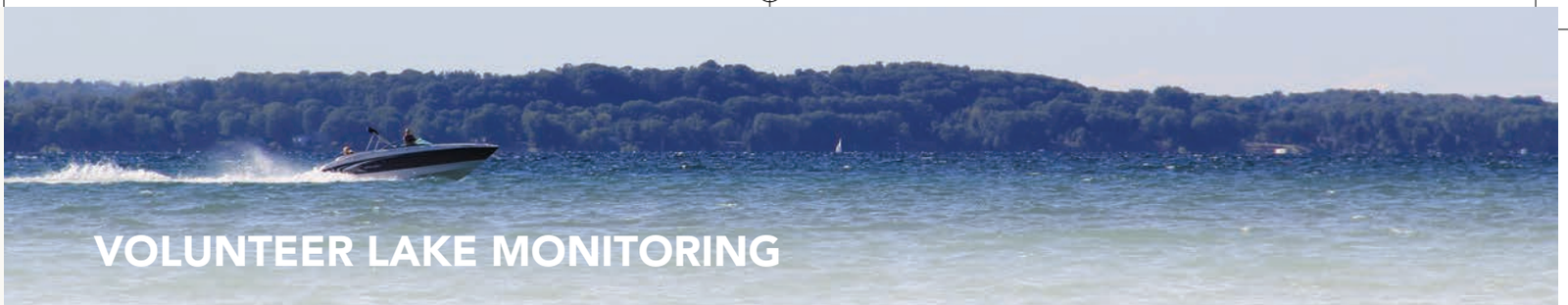


Figure 5. Total phosphorus trends at all Lake Michigan comprehensive monitoring sties.

Other Parameters Indicate High Water Quality in Most Water Bodies

For all 57 water bodies monitored, only six showed any signs of low dissolved oxygen. This indicates most water bodies are making it through the winter without life-inhibiting oxygen depletion (oxygen depletion is usually the cause of winter fish kills). Although chloride concentrations are increasing in many lakes, they are still, on average, roughly 10 to 20 times lower than chronic toxicity levels identified by the United States Environmental Protection Agency. Readings of pH tell us that almost all water bodies in the Northern Lower Peninsula are slightly alkaline, and all fall within the range of 6.0 – 9.0, the state-mandated range for Michigan's surface waters.



VOLUNTEER LAKE MONITORING

The Tip of the Mitt Watershed Council has coordinated our Volunteer Lake Monitoring program (VLM) since 1986. During the summer of 2016, 46 volunteers helped monitor water quality at 30 stations on 23 lakes. All data collected by volunteers are available at www.watershedcouncil.org/lake-monitoring. The following section summarizes monitoring parameters and program results.

Secchi Disk

The Secchi disk is a weighted black and white disk used to measure water clarity by lowering it into the water and recording the depth at which it disappears. Water clarity, which is principally determined by the concentration of algae and/or suspended sediment in the water column, 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, are high quality waters. Throughout the summer, different algae types bloom at different times, causing clarity to vary greatly. Secchi disk depths ranged from just a few feet in small inland lakes to over 80 feet in the Great Lakes!

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. Higher chlorophyll concentrations indicate greater phytoplankton densities, which reduce water clarity. The chlorophyll-a data provides support for Secchi disk depth data used to determine a lake's biological productivity, but it also helps differentiate between turbidity caused by algal blooms versus other factors such as sediments or calcite (calcium carbonite).

Trophic Status Index

Trophic Status Index (TSI) is a tool developed to rank the biological productivity of a lake. 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 lower phytoplankton densities score on the low end of the scale, while lakes with greater turbidity and more phytoplankton score on the high end.

Oligotrophic lakes are characteristically deep, clear, nutrient poor, and have abundant oxygen. Eutrophic lakes are generally shallow and nutrient rich, which, depending upon variables such as age, depth, and soils, can be a natural state of a lake. 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 lead to nuisance plant growth, problematic algal blooms, water quality degradation, and fish and invertebrate mortality.

Table 2. 2016 data for all lakes in the Volunteer Lake Monitoring Program.

Lake/Station	TSI Score 2016*	Secchi Depth 2016 (feet)*	Chlorophyll-a 2016 (µg/L)*
Ben-Way Lake	46	9[i]	1.15[i]
Black Lake	39	14	3.02
Burt Lake, Central	36	17.5	0.20
Burt Lake, South	35	19.5	3.92
Burt Lake, North	37	16	3.15[i]
Crooked Lake	45	9.5	5.22
Douglas Lake, Cheboygan	40	13.5	*6.01*
Douglas Lake, Otsego	37	16	4.34
Elk Lake	37	16	0.93[i]
Ellsworth Lake	47	8	ND
Huffman Lake	49	6	6.00
Intermediate Lake	41	14	1.14
Lake Charlevoix, Main	37	17	1.98
Lake Charlevoix, S. Arm	37	16	4.19
Lake Charlevoix, West	34	20	1.93[i]
Lake Charlevoix, East	37	17	0.14
Lake Marion	38	15	5.98
Lake Skegemog	40	13.5	4.77
Larks Lake	32	9	1.59
Long Lake, Cheboygan	34	20.5	2.67
Mullett Lake, South	37	16.5	1.40
Paradise Lake	47	8.5	1.52
Pickerel Lake	45	10	4.55
Round Lake	50	7	16.09
Thayer Lake	45	9	4.12
Thumb Lake	31	25	3.25
Twin Lakes	38	15	1.15
Walloon Lake, Foot	42	12	3.17
Walloon Lake, North	49	14	ND
Walloon Lake, West	43	11	0.94
Walloon Lake, Wildwood	42	11.5	0.47[i]

**scores are seasonal averages, ND=no data, i=insufficient data, ug/L=micrograms per liter.*

2016 Results and Discussion

During the summer of 2016, lake monitors took to their lakes on a weekly basis, tracking the above described lake characteristics. The results of their work provide continued long-term data that can be used not just by the Watershed Council, but by lake associations, government agencies, and private entities to evaluate lake conditions and changes over time. The Watershed Council regularly supplies Michigan Department of Natural Resources fisheries biologists, federal and state water quality programs, and various academic institutions with data collected by our volunteers. As resources to investigate water quality become more scarce (usually in the form of state and federal budget cuts), volunteer monitoring programs ensure that environmental changes in and around lakes don't go undocumented.

Those who spent a healthy amount of time outdoors during the summer of 2016 will recall abundant sunshine and above average temperatures. Accordingly, lake monitors documented above average water temperatures in many lakes throughout the summer. Many larger lakes' surface temperatures reached the upper 70's (°F) and a few lakes made it into the 80's (°F). Coinciding with higher water temperatures, a marked increase in chlorophyll-a concentrations was observed in nearly every lake. Although many factors influence chlorophyll-a concentrations (including the presence of zebra and quagga mussels or nutrient pollution), elevated temperatures encourage photosynthesis, the main form of energy production in algae cells. Although algae is often considered a nuisance, and can even pose a public health hazard in the case of toxin-producing cyanobacteria, not all algae is bad. Phytoplankton are considered algae and contribute to chlorophyll-a concentrations in water. They play a large role in the aquatic food web as primary producers, which larger organisms depend upon. It is likely that increased lake productivity in 2016 may have resulted in better growth conditions for macroinvertebrates, game fish, and even aquatic mammals.

Although photosynthesis is the primary source of energy for all aquatic organisms, too much photosynthesis that results in algal blooms or excessive plant growth can lead to cultural eutrophication. As development increases within a watershed and shorelines become developed, unnaturally high amounts of sediment and nutrients find their way into lakes. These pollutants stimulate excessive plant and algae growth. When the plants and algae die and begin to decay, respiring bacteria remove oxygen from the water column, resulting in oxygen depletion and endangerment of aquatic life. Monitoring a lake's dissolved oxygen throughout the summer and fall is the best way to evaluate this condition, and has been employed on ten lakes in the Volunteer Lake Monitoring program. Many Northern Michigan lakes boast consistently high dissolved oxygen levels. Continued monitoring helps to ensure cultural eutrophication is identified early and addressed through watershed management actions.

VOLUNTEER STREAM MONITORING

Streams are the freshwater circulation system of Northern Michigan, carrying rainwater, snowmelt, and groundwater into and out of the region's lakes. Our streams provide recreational opportunities to anglers, paddlers, and others, as well as habitat to a wide variety of wildlife. Fortunately, many Northern Michigan residents recognize the value of these streams. In 2016, over 160 volunteers helped monitor 44 sites on 24 different rivers and creeks!

Volunteer stream monitors perform biological monitoring, collecting aquatic insects and other macroinvertebrates that are used to assess stream ecosystem health. Community diversity and species sensitivity are key factors in determining water quality. A variety of pollution-sensitive stoneflies, mayflies, and caddisflies portrays a healthy ecosystem with high water quality, while a sample with only pollution-tolerant aquatic worms and midges reveals a stream ecosystem that is likely suffering. We usually find excellent water quality in Northern Michigan streams because of limited agricultural and urban land cover in their watersheds. However, there are a few sites in or near urban areas where diversity is low.

The ecological health of streams is assessed using three different measurements of diversity: 1) Total Taxa = total number of macroinvertebrate families found at a site; 2) EPT taxa = number of families in the three pollution-sensitive insect orders (mayflies, stoneflies, and caddisflies); and 3) Sensitive Taxa = number of the most sensitive macroinvertebrate families. Scores for each sample site are averaged using data from all monitoring events and presented using the following format: (Total, EPT, Sensitive). For example, a site with a score of (20, 10, 5), indicates an average of 20 total families, 10 EPT families, and 5 sensitive families.

Table 3. Results from the Volunteer Stream Monitoring Program.

Stream Name	Total Taxa Average	EPT Taxa Average	Sensitive Taxa Average
Bear River	17.1	6.7	3.0
Boyne River	16.1	8.8	4.9
Eastport Creek	19.2	7.0	2.8
Horton Creek	17.4	7.8	3.5
Jordan River	21.5	11.8	6.9
Kimberly Creek	20.9	7.7	3.8
Maple River	22.0	9.6	4.0
Milligan Creek	20.0	10.0	6.5
Mullett Creek	20.2	8.2	4.8
Pigeon River	21.4	10.6	6.5
Stover Creek	15.2	4.6	1.7
Sturgeon River	20.9	10.7	6.9
Tannery Creek	15.1	6.0	2.4
ALL	18.5	8.2	4.4

Changing of the Guard: New Sites Added, Several Retired

Our Volunteer Stream Monitoring Program is now in its 13th year of operation. This year, we retired some of our monitoring sites because better sites, located on the same body of water, have been identified. What makes a site "better" than another? Sites containing highly diverse habitat (woody debris, cobble, etc.) often host a macroinvertebrate community that better represents the water quality of a stream. Monitoring at these locations provides the best data – all the while tracking changes related to possible habitat degradation.

In 2015, youthful vitality was breathed into the program, with the participation of the Watershed Academy students. The Watershed Academy is the Watershed Council's environmental education initiative, engaging high school students in place-based, hands-on learning. After classroom training sessions, groups of 5 – 12 high school students embark on a field day of macroinvertebrate collection in a stream near their school. Students learn collection and identification techniques from experts and use the data to make stream-side inferences about water quality. Macroinvertebrate samples are then taken and identified to family level by experts. Dedicated groups of adult volunteers have also added new sites in 2016. Multiple years of data are needed before inferences can be made about water quality with grades assigned. Stay tuned for next year's monitoring report, detailing results from 12 new sites (Table 4).

Many rivers and streams in Northern Michigan rank among the best in the State for water quality. Notable rivers such as the Jordan, Pigeon, Maple, and Sturgeon all host diverse and sensitive macroinvertebrate populations. Should these rivers begin to undergo impacts from large-scale degradation, our "canaries in the coal mine"- stoneflies, caddisflies, and mayflies- will begin to disappear. Tracking macroinvertebrate communities on a biannual basis allows us to keep our thumb on the pulse of the rivers and streams included in the Volunteer Stream Monitoring Program.

Table 4. New volunteer stream monitoring sites for 2015 and 2016.

River	Location
Boyne River, South Branch	Boyne Mountain Road
Boyne River, North Branch	US-131
Birney Creek	Rogers Family Nature Preserve
Shanty Creek	Creekside Road, Shanty Creek Resort
Bissell Creek	Moore Road
Five Mile Creek	Five Mile Creek Nature Preserve
Stony Creek	North Allis Highway
Oden Creek	Oden State Fish Hatchery
Mill Creek	Historic Mill Creek Discovery Park
Maple River, West Branch	Ely Bridge Road
Cedar River	Schuss Mtn. Road
Bessie Creek	Ingleside Road

Alternatively, many of our urbanized streams have low diversity and host only pollution-tolerant organisms. These streams could support sensitive organisms, but development-related impacts suppress the population. Stormwater outfalls deluge large quantities of warm, pollutant-laden water with every rain storm. Eroding banks yield sediment that smothers the vital interstitial spaces of cobble and gravel substrate. Banks devoid of vegetation reduce habitat diversity and allow the water to warm on hot days. Fortunately, there are methods to mitigate these impacts. For example, rain gardens and other stormwater treatment methods keep untreated stormwater out of streams, and restoration projects can restore habitat viability. Many other solutions exist as well. As water quality improves, monitoring programs can track the progress. Many of these projects are already underway, as the Watershed Council and other conservation organizations work to protect and improve our waters.

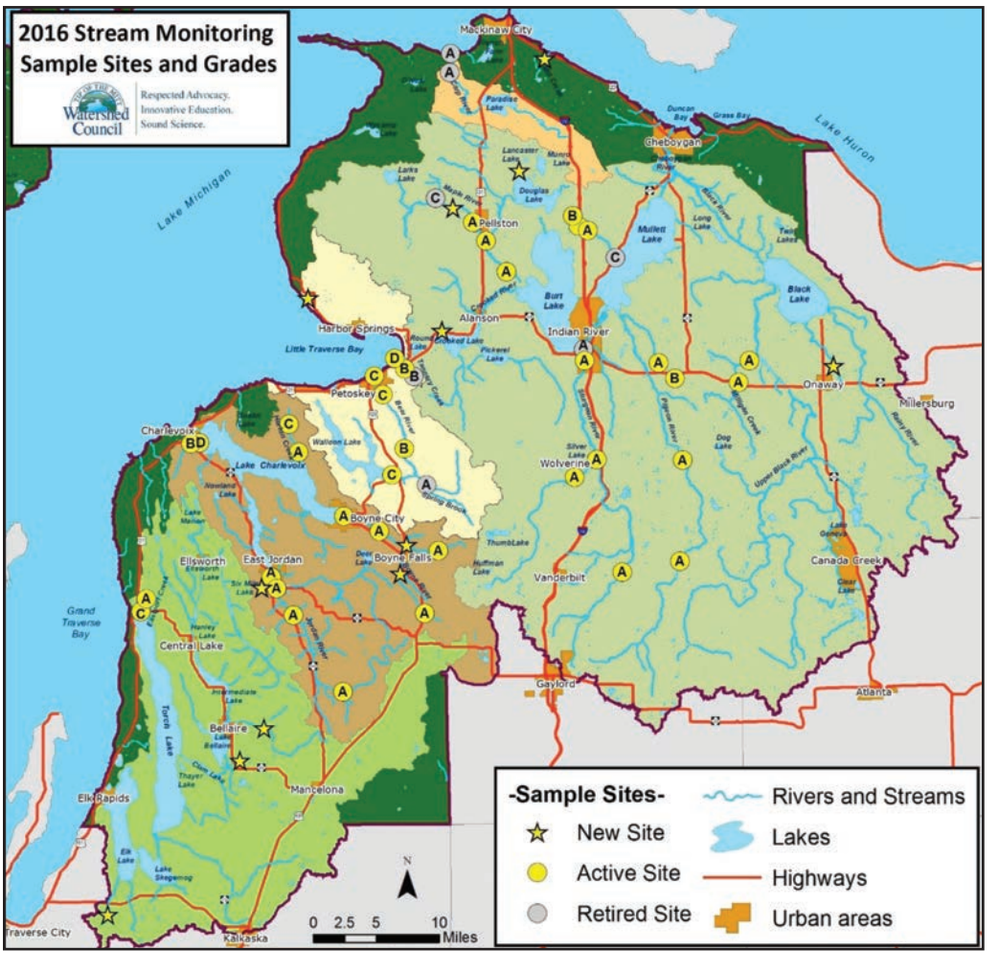


Figure 6. Volunteer stream monitoring sites with grades.

Grades are assigned to each monitoring site using a numeric scoring system based on total taxa, EPT taxa, and sensitive taxa indices (Figures 7 and 8). A poor grade does not always indicate poor water quality, but rather the presence of a pollution-tolerant macroinvertebrate community. In some streams, such as Horton Creek at Church Road, the slow-flowing nature of the stream does not provide the habitat necessary to support sensitive species.

Water quality grades at each stream monitoring site.

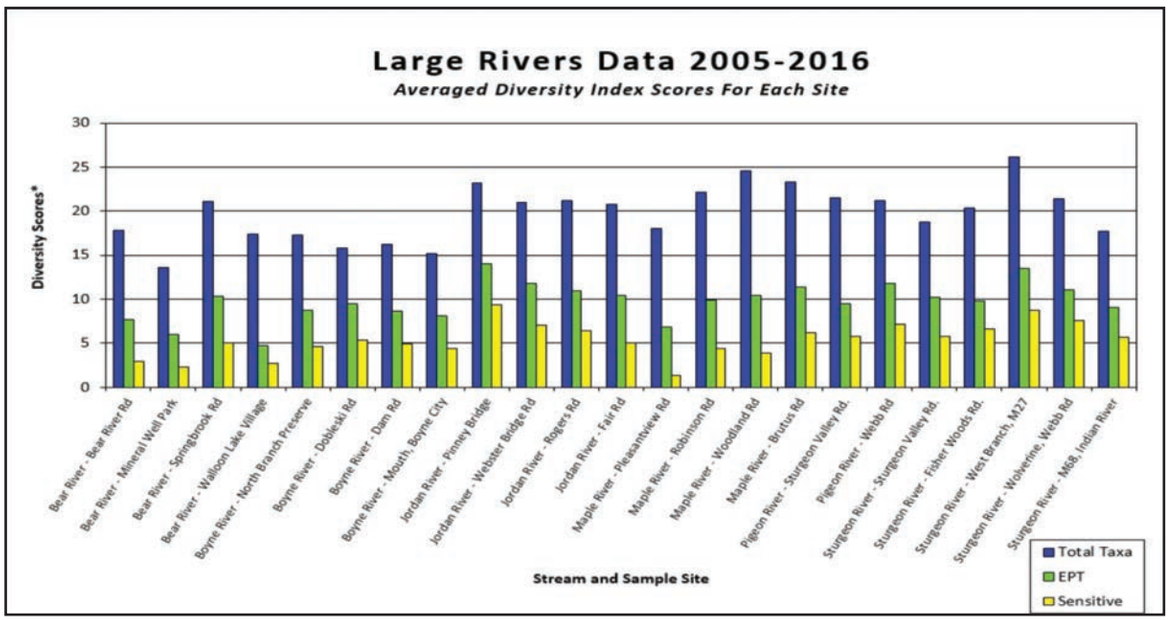
A
Boyne River – all sites
Eastport Creek, Farrell Road
Horton Creek, Boyne City Road
Jordan River– all sites
Kimberly Creek, Quarry Road
Maple River– all sites
Milligan Creek– all sites
Mullett Creek, Crump Road
Pigeon River– all sites
Sturgeon River– all sites

B
Bear River, Bear River Road
Kimberly Creek, Montgomery Road
Mullett Creek, Indian Trail
Stover Creek, Brookside-Cemetery
Tannery Creek , Country Club Road

C
Bear River, Mouth-Mineral Well Park
Russian Creek, Mouth
Bear River, Walloon Lake Village
Eastport Creek, M88
Horton Creek, Church Road

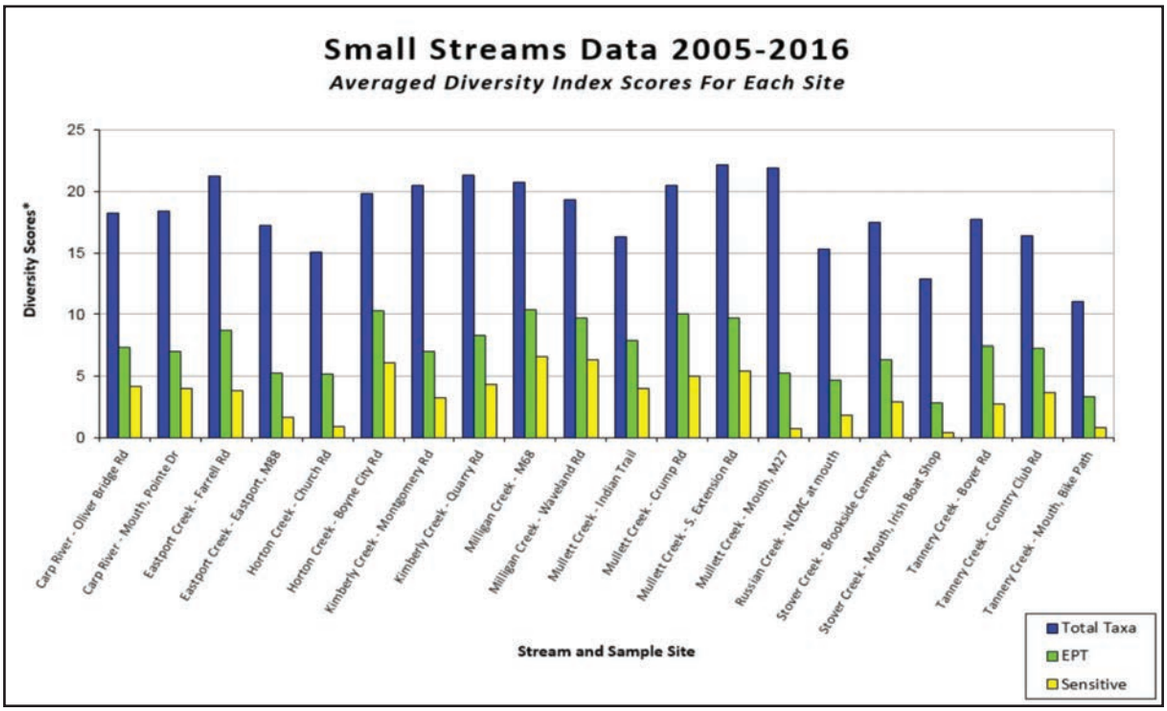
D
Stover Creek, Mouth
Tannery Creek, Mouth

Figure 7. Averaged diversity index scores for large rivers, 2005-2016



*Total taxa: total number of macroinvertebrate taxa; EPT taxa: taxa from pollution-sensitive insect orders (mayflies, stoneflies, and caddisflies); sensitive taxa: taxa most intolerant of pollution

Figure 8. Averaged diversity index scores for small streams, 2005-2016



*Total taxa: total number of macroinvertebrate taxa; EPT taxa: taxa from pollution-sensitive insect orders (mayflies, stoneflies, and caddisflies); sensitive taxa: taxa most intolerant of pollution

Volunteer Botulism Monitoring Program

For visitors and full-time residents alike, common loons are an iconic symbol of Northern Michigan. Unfortunately, in recent years, these beloved birds, along with others such as scoters, grebes, and piping plovers, have faced a very serious threat in the form of an unseen toxin.

Avian botulism is a paralytic disease caused by ingestion of a toxin produced by the bacteria *Clostridium botulinum*. Avian botulism has resulted in more than 100,000 bird deaths in the last half century, according to the Journal of Great Lakes Research. The botulism toxin is produced in low-oxygen conditions in decaying algae along the shorelines and bottom of lakes. The toxin reaches lethal levels in birds, due to biomagnification in the aquatic food web.

Since 2007, the Watershed Council has recruited volunteers – Beach Rangers – to document bird fatalities along the Lake Michigan shoreline in Charlevoix and Emmet Counties. This data collection effort contributes to a lake-wide research program coordinated by Michigan Sea Grant and the Michigan Department of Natural Resources. There is still much to learn about factors affecting the highly variable, and at times localized, bird die-offs. Most accounts point to zebra mussels, nutrient pollution, and warmer waters contributing to algae growth, which in turn results in decaying algae layers prime for producing the botulism toxin.

In 2016, the Watershed Council's Beach Rangers surveyed an impressive 136 miles of Lake Michigan shoreline, documenting 410 dead birds. Many of these were likely killed by avian botulism. Sadly, this was the highest rate of mortality since 2012. Hardest hit were common loons and long-tailed ducks, and the west and northwest facing shorelines (primarily outside of Little Traverse Bay) saw the greatest number of bird carcasses.

Although algae appeared to be lighter, warmer than average water temperatures persisted well into the fall season, which likely resulted in conditions conducive to production of the botulism toxin. In early to mid-November, we saw the greatest number of documented fatalities (Figure 9). The largest mass die-off reported by the Beach Rangers was located in Greene's Bay on Beaver Island with 39 birds, most of which were long-tailed ducks. This was relatively small compared to several larger, localized die-offs documented by Common Coast Research near Gulliver, MI (over 600 birds) and Sleeping Bear Dunes National Lakeshore (239 birds).

A big thank you goes out to our 2016 volunteers. Thirty seven concerned citizens contributed to this program between September and December. If beach walking in the name of science appeals to you, contact Matt Claucherty at (231) 347-1181 or matt@watershedcouncil.org. The annual Beach Ranger Training will be held during late summer 2017. For more information on this program, see www.watershedcouncil.org/avian-botulism-monitoring

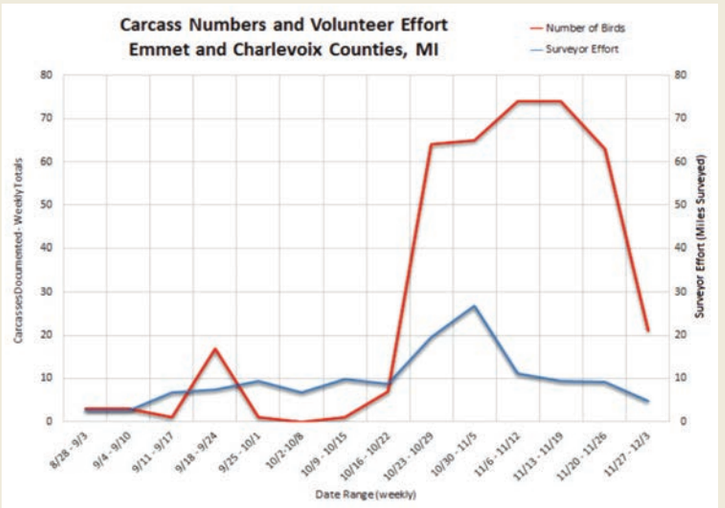


Figure 9. Weekly carcass totals and shoreline miles surveyed.

Generosity that will live on for generations

Virginia generously gifted the Watershed Council with her two cottages and their contents to support our organization's important work.

Virginia Durand, in white swim suit, enjoying Mullett Lake with friends.

Last fall, Tip of the Mitt Watershed Council received word that a long-time member bequethed us her two cottages in Topinabee, Michigan, along with their contents. Although we had only met her briefly, we felt compelled to learn more about her life. After many hours of sifting and sorting through her countless photos, journals, travel itineraries, and artifacts, we have gained a better understanding and appreciation of her remarkable life. Virginia Durand was devoted to her family and friends, had an insatiable curiosity for learning and travel, and a deep love for Northern Michigan.

Virginia was born to Joseph and Lillie Durand in 1918. An only child, she never married nor had any children. She grew up in the Greater Detroit area, attended the University of Michigan and Wayne State University, and worked as a public school teacher. Virginia spent her last years at Henry Ford Village in Dearborn, until her passing on June 18, 2016.

She was a patron of the arts, community volunteer, devoted friend, and world traveler. Her cottages, hundreds of postcards, countless photos, and letters of correspondence with her travel companions are clear evidence of her love for other people and places. Virginia's extensive travels took her to Denmark, Great Britain, Thailand, Spain, Chile, Greece, Italy, Indonesia, and Hungary, to list only a sampling of the places she visited. She kept copious notes documenting the museums, monuments, cathedrals, shrines, and wild places of her travels, but she always returned to her beloved Topinabee.

Her childhood summers were spent with her parents, aunts, and numerous life-long family friends at the cottage. They swam in the lake, picked wild berries, tended to their vegetable garden, played cards, and enjoyed the long daylight hours of summer. In retirement, Virginia lived full-time in Topinabee where she built a smaller, single-story cottage next to the original cottage. Years later, both cottages remain filled with antique books, quilts, fabrics, figurines, paintings, and more. These items were likely passed down to her from family, as well as collected over her ninety-eight years, as mementos of her happy childhood and life that followed.

Without any close relatives to leave her property, Virginia generously gifted the Watershed Council with her cottages and their contents with the understanding that we would use the funds generated from their sale to support our organization's important work. We are truly humbled by her gift. We are honored that of all the other worthwhile organizations making a difference in the world, she chose us. It is with our most sincere gratitude that we accept her gift and pledge our continued commitment to our mission, not just for Virginia, but for all who love Northern Michigan's waters.

Honoring Our Passed Members

We have been saddened these past few years to see the passing of so many devoted members. Below is the list of our members that we lost in 2016. This list includes some of our founding members, board members, volunteers, and partners. We thank them all for their contribution to protecting Northern Michigan's waters. We will miss them.

Ronald Babcock
Maureen Babcock
Mrs. Evelyn Bare
Dr. Arnold G. Bauer
Viola Bickley
Mr. Samuel A. Bowman
Ms. Mary J. Buhr
Esther Buskirk
Ms. Agnes Cressy
Rollin Dart
Mr. William K. Davenport
Mr. William DeRoo
Ms. Barbara C. Devor
Ms. Virginia A. Durand
Mrs. Ruth Dyer
Ms. Eloise L. Elkington
Mrs. Rose Elzinga
Mrs. Helen Faes
Mrs. Grace M. Fairbanks
Mr. Daniel C. Fisher
Mrs. Marilyn Gardner
Dr. David M. Gates
Mrs. Evelyn Gidley
Mr. Thomas Gleason
Bunnie Goss
Dr. Gordon Guyer
Mrs. Lynn Halusek
Mr. John M. Harrington
Ms. Harriet Hatch
Ruth M. Huber
Mr. and Mrs. Donald Hunt
Mr. Donald Hunt
Ms. Theresa Korneffel
Mrs. Rhoda Lampert
Mr. Ray A. Latimer
Mrs. Dorothy Laurain
Mr. Frederick Lesh
Mrs. Betty Lou McAlvey
Mrs. Martha Peet McAndrew
Mr. Merrick F. McCarthy Jr.
Isabelle McCarthy
Mrs. Sally McKenzie
Mrs. Clara L. McPhall
Mrs. Mary Beth Mellen
Peggy Midener
Mrs. Joane Miller
Barbara. R. Murbach
Barbara. R. Murbach
Mr. David C. Muzzall
Mrs. Mildred C. Nolan
Mr. James W. Ochs
Ms. Virginia S. Peery
Mr. George G. Rinder
Mrs. Pauline Russell
Allyn Shepard
Mrs. Marjory Spalding
Mrs. Rosemary Stankewitz
Mrs. Sarah Stoppel
Mrs. Elmira Weaver
Mrs. Barbara Wheelock

Thank you for your support!

10/1/16 - 3/21/17

New Members

Mrs. Dorothy M. Basmaji
Dr. and Mrs. Max Burr
Mr. James Campbell
Tom Chapman
Mr. and Mrs. John C. Clark
Mr. and Mrs. James Digiovanni
Mr. and Mrs. Daniel E. Dimond
Dr. and Mrs. Michael Disher
Mr. and Mrs. Mark Eckstein
Thomas W. and Debra Erickson
Douglas and Heidi Evans
Philip Ficks
Great Lakes Tissue Company
Alison Hagen
Mr. Nelson Howe II
Huff Pharmacy
Douglas P. Jarrold
Ms. Florence Johnston
Mrs. Connie Kabbe
Mr. Steven Katz
Cynthia Blue Shaw and Thomas Kirvan
Mr. and Mrs. Philo Lange
Mr. and Mrs. Richard J. Lehmann
Mr. and Mrs. Jim Macintyre
Mr. and Mrs. Duane Miller
Ms Laura L. Powers
Mr. and Mrs. James F. Rade
Tom and Suzi Richards
Jane and Gary Roe
Thomas and Vickie Ross
Mr. and Mrs. Rocco Russo Jr.
Mr. and Mrs. James G. Sak
Dorothy Broomfield, Judith Noye and Cleo M. Silver
Ms. Linda Solomon
Mr. and Mrs. Mark G. Stanley
Mr. Robert Stetler
Toski-Sands Market and Wine Shop
Mr. Matthew Trecha
Amy Horton and Steve VanAndel
Donald Vanitvelt
Esther F. Walsh
Mr. Walter Ward
Mr. Charles Webber
William Davidson Foundation
Robert Wilson
Dr. and Mrs. Mark Young

Memorial Gifts

In Memory of Bettie Buffington
Lindy and Gary Buffington

In Memory of Joan Fedus
Scott and Jamie Kennard

In Memory of John "Harry" Harrington
Lindy and Gary Buffington

In Memory of Marilyn "Clem" O'Neil
Andrea and Ronald Shafer

In Memory of Jack and Betty Young
Dennis and Carol Kautzmann

Honorariums

In Honor of Gary Fedus
Mitchell Graphics, Inc

In Honor of Mr. and Mrs. David Frey
David M. Culver

In Honor of Mr. and Mrs. A.W. Hallett
Charles Forsberg

In Honor of Amy Dye Janssens
Virginia Woolworth

In Honor of Barbara Kauper
Charles Forsberg

In Honor of Ethel Knepp
Joellen and Jim Rudolph

In Honor of Nancy and Brian Nowitzke
Linda Heller

In Honor of Randy and Christine West
Randall West

In Honor of Sally Wilson
Linda Heller

Many Thanks to...

Charlie MacDonald, Policy & Advocacy Intern for Fall 2016 – Winter 2017. Many of you have had the chance to meet and work with Charlie. He is a great person to know and his work products have been spectacular. Thank you for a job very, very well done!

Alan Beyer for assisting with odd jobs around the office, data entry, and shoveling this winter.

Roast & Toast for providing delicious coffee for our events.

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This newsletter contains information worth sharing. When you're done reading it, don't throw it out. ***Pass it on!***

SAVE THESE DATES

For details, visit www.watershedcouncil.org/attend-an-event

May 13	Volunteer Stream Monitoring - Training Day
May 20	Volunteer Stream Monitoring - Field Day
May 25	Volunteer Lake Monitoring - Training Day
June 4	Volunteer Stream Monitoring - Indoor ID Day
July 15	Whale of a Sale
July 20	38th Annual Membership Meeting
July 22	Painted Lands Screening Fundraiser at Bay View Association
August 19	Waganakising Bay Day *(During Festival on the Bay)*
August 20	Bear River Cleanup

POD EVENTS

Prescription and Over-the-Counter Drug Drop-off

For locations and times, visit www.pillsinthepod.com

May 20	POD Drop-off – Antrim County
June 16 & 17	POD Drop-off - Charlevoix County
August 5	POD Drop-off – Emmet County
September 23	POD Drop-off – Antrim County
October 19	POD Drop-off – McLaren Northern Michigan, Petoskey Campus
October 25	POD Drop-off – McLaren Northern Michigan Cheboygan Campus

Get recognized for your good management practices.
Take the survey at **www.mishorelandstewards.org**

Michigan Shoreland Stewards Program

It has been nearly a year since the Michigan Natural Shoreline Partnership launched the Michigan Shoreland Stewards Program. Tip of the Mitt Watershed Council, along with numerous Northern Michigan lake associations, played a key role in the development of the program. We are happy to report that we have exceeded all of our first year goals for the program, thanks to the many interested property owners and lake associations who recognize the importance of lake stewardship.

The Michigan Shoreland Stewards Program is a web-based survey that allows participants to rate their shoreline property, while learning about best management practices to protect water quality and the lake ecosystem. Survey participants receive a gold, silver, bronze, or starter level rating based on their answers. Participants also receive a personalized certificate, access to natural shoreline management resources, and the option to purchase a shoreland steward sign.

Since the program's launch, over 30,000 feet of shoreline have been assessed by survey respondents! Of the 400 people who have taken the survey, 99 participants qualified for a gold rating, 103 received a silver rating, and 90 scored at the bronze level. There are also 19 lake associations throughout Michigan that have registered on the website.

If you own lakefront property and are interested in being recognized for your good management practices or you want to see how your property rates, take the Michigan Shoreland Stewardship Program survey at: www.mishorelandstewards.org. If you would like to learn more about the Program, contact Eli Baker at eli@watershedcouncil.org or (231) 347-1181 x 119 for more information.

Since the program's launch,
over 30,000 feet of shoreline
have been assessed by survey respondents!