

Galilee Lake Association

Small Scale Surface Water Grant Summary



Background

Situated in the Penokee Hills in northwestern Wisconsin, Lake Galilee is a drainage lake in the Bad River watershed. The 213 acre lake has a maximum depth of 23 feet with a mean depth of 11 feet. Lake Galilee supports fishing, boating, swimming, other recreational activities and a summer camp.

The Galilee Lake Association was formed in 1998 with the stated purpose “to maintain, enhance and protect the quality of the lake and its surroundings in such a way as to preserve both human and environmental values, and to foster a sense of community among people living and/or conducting business in the area of the lake.”

In order to preserve and protect Lake Galilee for the future, the Association recognized that baseline water quality data is needed. The baseline data will be used to assess trends in the future. In addition to collecting the water quality data, a study of the aquatic invasive species is necessary for the purpose of planning and control.

To further its purposes and goals, the Galilee Lake Association applied for and was awarded a Wisconsin DNR Small Surface Water Grant on April 6, 2015.

Water Quality Monitoring

In preparation for initiating the water quality testing, meetings were held with the Ashland County Land and Water Conservation Department. Tom Fratt and Todd Norwood reviewed the grant goals and objectives and discussed how to best approach the water testing. They made specific suggestions for the types of devices to purchase for the samplings that can be used long-term. Monthly meetings with Todd Norwood were held to monitor progress on the grant. Todd Norwood set up the equipment and provided instructions for each piece of equipment to Jim and Ruth Brennan, who conducted the sampling.

Todd Norwood presented information at the Annual Lake Association meeting. He spoke about water quality issues and also aquatic invasive species. Samples of plants were available to help attendees differentiate purple loosestrife from similar appearing plants.

Members of the Lake Association also met with Kris Larsen of the Wisconsin DNR Citizen Lake Monitoring Network (CLMN). Volunteers are trained throughout the state to test for water quality data on lakes, streams and wetlands. Six members of the Galilee Lake Association attended this meeting and were trained on the methods used to test for water quality. The results of the sampling: water clarity, chemistry, physical and biologic data are then entered in a state database called SWIMS. The specific water quality testing results from the 2015 Galilee Lake Association grant are available on the DNR SWIMS website.

Methods and Procedures

Water sampling was done at three specific locations: at the water inlet to the lake, the outlet, and the deep-water hole. The sites were located by a global positioning unit.

The water chemistry was completed at intervals recommended by the CLMN. The samples were packaged in ice and sent to the State Hygiene Laboratory for analysis. Chlorophyll was tested in June, July and August. Phosphorus was tested May through August.

Results

Water Clarity

A Secchi disk is a white and black disk (colors divided in quarters) that is lowered into the water and measures the depth at which the disk is no longer visible. This is one measure of water clarity. The water clarity can be affected by many factors, including the tannins in the water. Tannins are naturally occurring from dissolved organic matter that can stain the water a dark brown color.

The deep water location in Lake Galilee was sampled from May, 2015 through October, 2015. The water was described as clear and brown. The average reading for clarity was at a depth of five feet which was likely affected by the tannins in the lake.

pH

The pH of water measures the concentration of hydrogen in the water. A pH of 7 is neutral. If the lake water is too acidic, it can be lethal for fish and other aquatic organisms. The average pH tested for Lake Galilee was 7.6 at the deep hole.

Temperature

The surface water is affected by the outside temperature. Fish and other aquatic organisms have a preferred temperature range. Some species prefer cooler water while others prefer a warmer temperature.

The temperature of the water was tested using the dissolved oxygen instrument. The surface water was tested as well as at three foot intervals until hitting the bottom of the lake. The water temperatures were warmest in July. The greatest variance in water temperature between the surface water and the temperature of the deepest water occurred in July.

Dissolved Oxygen

The measurement for oxygen in the water available for fish and other aquatic organisms to breathe is known as dissolved oxygen. Factors affecting the amount of dissolved oxygen in the lake include the temperature of the water, the amount of plants and algae, water movement and the lake bottom surface. The readings for dissolved oxygen are done using a piece of equipment that must be calibrated to ensure accurate readings. Ashland County Land and Water Conservation Department was very helpful in ensuring the accuracy of the equipment. The dissolved oxygen readings throughout the summer were greatest at the surface and lowest at the deeper levels.

Phosphorus

If the phosphorus level increases, the amount of algae increases as phosphorus is the food for algae. Phosphorus can be found in lawn fertilizers. Phosphorus was tested four times from spring through fall. The level of phosphorus averaged 0.0275.

Chlorophyll

Testing for chlorophyll determines how much algae is present. If the chlorophyll level is high, there is a large amount of algae in the lake.

Chlorophyll was tested three times during the summer and sent to the State Laboratory for analysis. The average summer chlorophyll level was 7.9. The northwest Geo-region summer average was 19.1ug/l. (WI DNR)

Trophic State Index

The Trophic State Index (TSI) is a tool used to summarize several parameters of water quality into one number and can be used over the long term for future data to assess the health of the lake. The TSI serves as an indicator for assessing changes in the lake and planning lake management strategies.

The trophic state index calculated by the Wisconsin DNR for the Deep Hole in Lake Galilee was 50, based on the results of the water testing by the Galilee Lake Association. “The TSI suggests that Lake Galilee-Deep Hole was mesotrophic. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.” (WI DNR)

Aquatic Invasive Species

Monitoring for aquatic invasive species was completed by members of the Lake Association and formal testing was completed by the Wisconsin DNR. Two types of aquatic invasive species were identified by the Wisconsin DNR: purple loosestrife and the banded mystery snail.

Laboratory analysis for spiny water fleas and zebra mussels were negative.

Visual monitoring for purple loosestrife along the lake shore identified 8 locations on the lake with plants.

In July, two members of the Lake Association met with Todd Norwood and interns from Northland College. In an area where Ashland County Land and Water Conservation Department

had been working to eradicate purple loosestrife, the *Galerucella* beetle was harvested and then released on loosestrife plants on Lake Galilee to attempt eradication of the loosestrife plants.

Aquatic invasive species is a concern for the Galilee Lake Association. At the neighboring Gile Flowage, spiny water fleas continue to be identified. Many boats fish on one lake and then fish on other lakes, including Lake Galilee. There is no boat wash station at the boat landing on Lake Galilee. Currently twelve lakes in Wisconsin have identified spiny water fleas.

Purple loosestrife continues to be a problem despite efforts at eradication through bio control measures.

Discussion and Future Directions

The Small Scale Surface Water Grant received by the Galilee Lake Association enabled the Association to begin baseline water quality testing and purchase equipment that will be used in the future. Ashland County Land and Water Conservation Department provided education and support throughout the grant period. Water testing was completed on 9 different dates. All testing data was entered into the SWIMS database. Chemistry testing can be analyzed in the future as part of the CLMN program. Aquatic invasive species will require ongoing monitoring.

Northland College received a Large Scale Lake Planning Grant this year. Their grant includes chemistry testing, an assessment of the shoreline habitat, aquatic plant assessment, and groundwater flow assessment. The Galilee Lake Association and Northland College will share data and reports and cooperate in the water quality efforts for Lake Galilee.