

## **Lake Water Quality Remains Stable**

**January 2009**

**Tom Osborn, Water Quality Chair**

This past year continued to be a good water quality year for Pentwater Lake, although very high runoff in early June from the same series of storms that raised so much havoc in Mason County had some early temporary impact. We also have curiously high coliform levels in the North Branch of the Pentwater River. We've expanded our sampling considerably along the length of the stream but have yet to see a clear explanation for its elevated levels. All in all the lake continues to be in good shape.

The PLA Water Quality volunteers again took water samples monthly in early June, July, August, and September 2008. Two permanent lake sites were once again sampled, one over the deepest basin (in about 50 feet of water) about mid-lake off the village boat ramp, and a second further up the lake, not far off the township boat ramp. We also sampled both the North and South branches of the Pentwater River above their confluence during each sampling period. This year, in a continuing attempt to understand the elevated coliform readings in the North Branch, as many as 9 additional samples were taken upstream on the North Branch and on two of its tributaries.

One of our biggest long-term concerns for the lake is nutrient loading, which may have a powerful impact on lake quality and accelerate lake eutrophication. Again for 2008, no negative trends in nutrient loading were observed. The average lake nitrate nitrogen levels of 0.47 mg/l are virtually the same as last year and at the lower end of the long term average. The average North Branch nitrate concentration of 0.76 mg/l and South Branch concentration of 0.93 mg/l are each lower than last year and in the lower range of historical averages.

We are very sensitive to phosphorus levels due to our belief that its scarcity limits algae growth and, therefore, phytoplankton blooms in the lake. Available or reactive phosphorus, or phosphate, continues to be found at about its lab detection limit of 0.005 mg/l (or 5 ppb) when it's detected at all, showing that when it is available, it's taken up almost immediately by algae. A slight exception was our sampling of June 13, shortly after the heavy June rainstorms, when the stream values were measured at 0.012 mg/l in the N. Branch and 0.016 mg/l in the S. Branch. Total phosphorus levels continued to average 0.030 mg/l or less at each sampling location, within historical norms. Our other disturbance indicators, chlorides and sulfates, each were measured within our long term averages. Chlorides averaged less than 40 mg/l at each site and sulfates averaged below 20 mg/l at each site.

Water clarity, as measured by Secchi disk readings, ranged from about 4 to 5 feet at the beginning (early June) and end (early September) of the sampling season, to a maximum of about 7.5 feet through July. This range in clarity is about the same as the 2007 season, but, interestingly, the pattern is almost exactly inverse. In 2007 we experienced our clearest water in early June and again in August, with our least clear water during July. We experienced a drop in clarity in late August and September in both years. Of course this past June we had the very heavy rains in early June which brought a lot of turbidity into the lake, decreasing clarity considerably. In 2007, we experienced a fairly significant algae bloom in July which decreased the water clarity. Incidentally, this bloom was probably caused by blue-green algae (technically a type of bacteria—Cyanobacteria) which are selectively avoided by our zebra mussel friends. The zebra mussels do a very effective job of filtering the less onerous green algae, leaving little competition for the blue-green algae, which they don't eat. In some lakes, such as Muskegon Lake, very nasty, foul blooms can result. If we experience an increase in phosphorus, unpleasant blue-green blooms can be the result.

This concern about phosphorus levels is one of the main reasons the PLA Board has taken an interest in the plans for a new Pentwater sewage treatment system. We asked Jim Miller, village manager, and Terry Bartells, of Wade-Trim Engineering to address our concerns regarding whether the new system would be protective of lake water quality and Mr. Bartells gave an informative presentation at our November 2008 board meeting. Many of our concerns were addressed and discussed. Hopefully this presentation will make its way to the village web site. We will continue our monitoring of the project and are confident the village will be open to further discussions with us. Of course, our ongoing water quality monitoring program will take the new project into account for baselining pre-construction water quality and for monitoring water quality impacts after operations begin.

E.coli bacteria levels in the lake itself are typically extremely low, and that was the case for 2008, except in early June during the very high storm runoff period. Our lake samples in June found colony counts of from 55 to 61 per 100mL of sample. While by far the highest we have ever found in the lake, they are still well below the safety standard for swimming or recreation. Coliform bacteria, while used as indicators of the presence of fecal matter, also exist naturally in soils and other materials that wash into streams and lakes during rainfall events. So these elevated readings after such a severe runoff event are not unexpected. Something that is unexpected, and which we frankly have not been able to figure out yet, is the elevated coliform levels we are consistently finding in the North Branch Pentwater River samples, even during low flows when there has been no runoff. In July, at the Monroe Rd. (Bus. 31) bridge, we found counts of 1046, while the South Branch only had counts of 96. These counts remained in the 400 to 550 range, without a clear pattern, in four more samples we took several miles upstream, to well east of Oceana Drive. The counts for August, while lower at nearly 300 at the Monroe Rd. site, were still clearly elevated. Our upstream sampling was

extended even further upstream and still showed elevated readings, yet with no discernable up or down pattern. In September we sampled at intervals all the way upstream to near the headwaters in the Manistee National Forest in south-eastern Mason County. We also sampled two N. Branch tributaries, Dumaw Creek and Cedar Creek. The Monroe Rd. bridge site, the furthest downstream, had a count of 365, yet the second furthest upstream site, just outside the national forest, had a count of 435. All the sites in between ranged from 130 to 260, yet with no obvious pattern. Both tributaries were elevated also, with a count of 460 for Dumaw Cr. and 230 for Cedar Cr. All N. Branch samples were higher than the S. Branch sample with a count of 67. Prior to starting our coliform testing in 2007, we assumed the S. Branch, with Hart Lake, the City of Hart, and considerable agriculture, would have the higher coliform counts. We are still confused by the higher counts in the N. Branch and will continue our quest for the truth come next year.