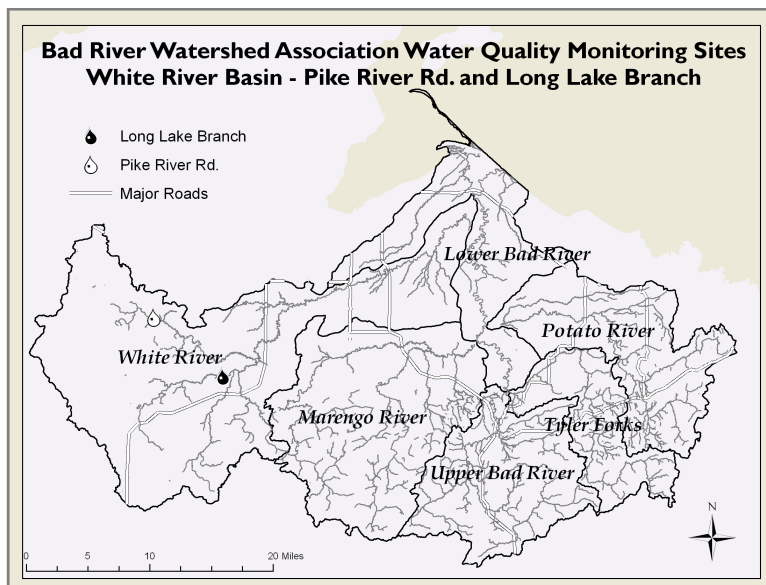




Baseline Water Quality Monitoring Report: White River Basin at Pike River Road & Taylor Lane, 2009

The mission of the Bad River Watershed Association (BRWA) is to promote a healthy relationship between the people and natural communities of the Bad River watershed by involving all citizens in assessing, maintaining and improving watershed integrity for future generations.

A key piece of implementing this mission is BRWA's Volunteer Water Quality Monitoring Program (VWQMP), initiated in 2002. The program involves local citizens in collecting water chemistry, macroinvertebrate, and *E. coli* data from streams throughout the Bad River watershed. The goal of the VWQMP is to establish at least a 4-year baseline of water quality data from sites in the watershed. The data will be used for determining the overall health of the watershed, to track changes over time, and to make informed decisions about protecting the health of the watershed. The following report establishes baseline water quality conditions at BRWA's Pike River Road & Long Lake Branch sites in the White River Basin using the first four years of data collected from these sites.



WI. Trout Stream Classification

Class 1:

- * High quality trout waters
- * Sufficient natural reproduction to sustain populations
- * No stocking



Class 2:

- * Some natural reproduction, but not
- * Stocking is required to maintain a desirable sport fishery.



White River, Pike River Rd.

Trout Stream

Upstream: Class I
Downstream Class 2

WI Water Classification

Outstanding resource water upstream of site.
Exceptional resource water downstream of site.

Volunteer Monitors

Karen Danielsen, Dale & Sean Thomas,
Dec. 2003– Aug. 2009



Long Lake Branch, Taylor Ln.

Trout Stream

Class I up & downstream of site

WI Water Classification

Outstanding up & downstream of site

Volunteer Monitors

Dane Bonk & Family
May 2003 - Present

Water Chemistry

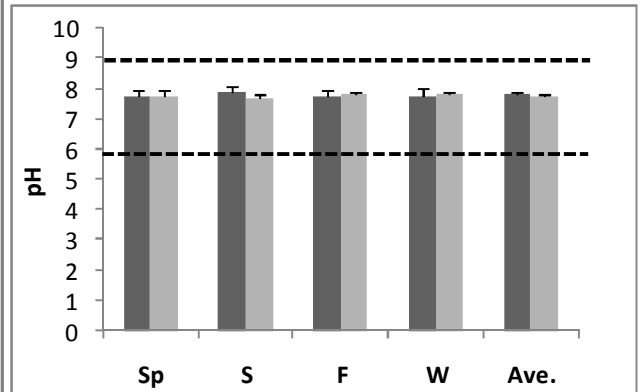
Dissolved oxygen, pH, chloride, turbidity, nitrate, and phosphate were collected by BRWA volunteers on the first Saturday of each month using LaMotte Surface Water Monitoring Kits. In addition to the training that volunteers receive with chemistry kits, an annual quality control session ensures volunteers collect good data. Baseline conditions are established using the first 4 years of data collected at each site. Data are summarized as overall averages and by season: spring (SP) March –May, summer (S) June–August, fall (F) September–November, and winter (W) December–February. Lines above bars indicate one standard deviation.

pH

Information: pH is a measurement of how acidic water is, with 7.0 being neutral. The pH of the stream will affect what type of organisms can live in the stream.

Water Quality Standards: A healthy range for natural waters is between a pH of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum. Standard from the water quality standards for WI surface waters.

Results: pH at both sites was consistently within a healthy 6 to 9 range, indicating good water quality (*Graph 1*). Continued monitoring will determine if pH at these sites changes more than 0.5 units from the baseline.



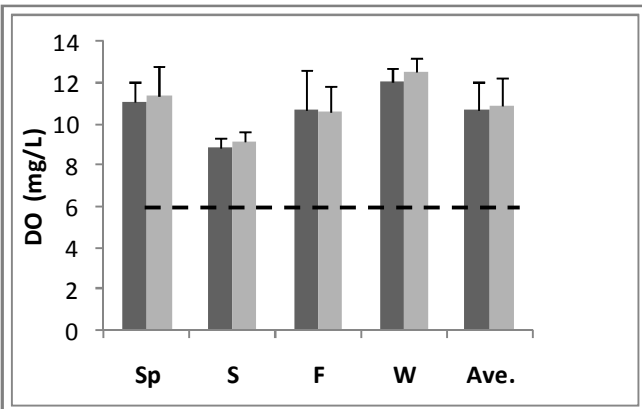
Graph 1 (above): Seasonal & overall pH average at Pike River Rd. (dark bars) & Taylor Ln. (light bars) sites. The area in between the dashed lines indicates the State of WI pH standard.

Dissolved Oxygen

Information: Dissolved oxygen (DO) is a gas found in water that is critical for sustaining aquatic life. DO concentration is especially important to the success of trout spawning, because trout eggs need well oxygenated waters to survive.

Water Quality Standards: 6.0 mg/L minimum for trout waters & 7.0 mg/L minimum during trout spawning seasons (fall). Standard set by the water quality standards for WI surface waters

Results: Average DO concentrations were above the 6mg/L & 7 mg/L standard (the dashed line) at both sites, which indicates favorable conditions for trout & trout spawning (*Graph 2*).



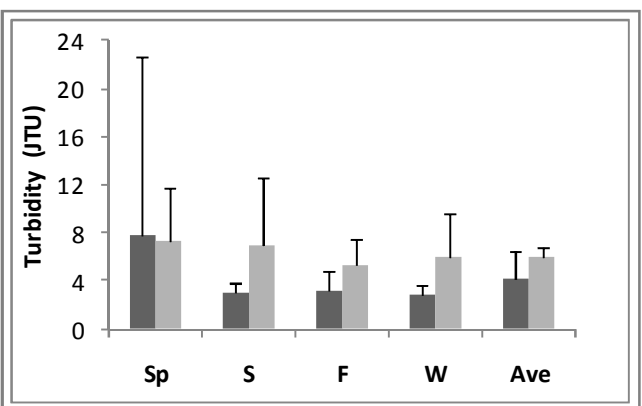
Graph 2 (above): Seasonal and overall average DO averages at Pike River Rd. (dark bars) & Taylor Ln. (light bars) sites. The dashed bar indicates the 6mg/L State of WI DO minimum standard for trout streams.

Turbidity

Information: Turbidity is a measure of how much sediment is suspended in the water, which can give an idea of where erosion may be a problem.

Water Quality Standards: There are currently no established benchmarks for turbidity. The goal of BRWA's monitoring is to establish a baseline from which future changes can be compared.

Results: Seasonal average turbidity concentration ranged between 3 and 8 JTU (Jackson Turbidity Units, *Graph 3*). During the spring season at Pike River Rd, the turbidity was generally greater more variable than the other seasons & at Taylor Ln. Undoubtedly a result of sediment contribution during spring run off. This finding warrants additional monitoring.



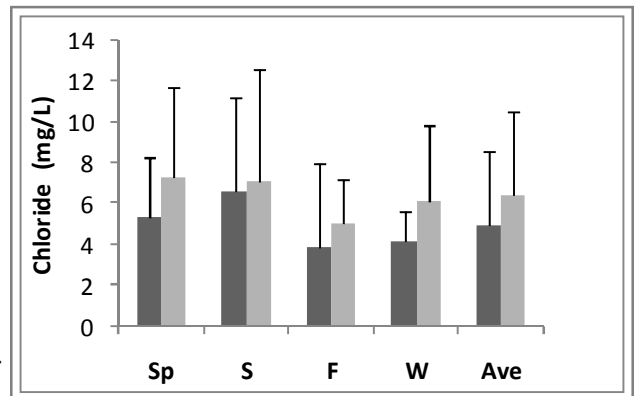
Graph 3 (above): Seasonal and overall turbidity averages at Pike River Rd. (dark bars) & Taylor Ln. (light bars).

Chloride

Information: Chloride is related to salt in the water, which can indicate pollution from improperly maintained septic systems and is often present during spring runoff in areas where road salt is used.

Water Quality Standards: There are currently no established benchmarks for chloride. The goal of BRWA's monitoring is to establish a baseline from which future changes can be compared.

Results: Although, seasonal averages ranged between 5 and 7 mg/L, chloride data results were highly variable indicating the need for additional monitoring (Graph 4).



Graph 4: Seasonal and overall chloride averages at Pike River Rd. (dark bars) & Taylor Ln. (light bars).

Nutrients

Information: Nitrate and phosphate are critical for plant growth and occur naturally in water. Elevated nutrient concentrations are an indication of pollution such as, agricultural runoff, failing septic systems, and storm water runoff. Rather than establishing a baseline concentration for nutrients, we are establishing the percentage of samples that exceed the USGS benchmark. This will allow us to determine if nutrients are consistently detected above the benchmark, which may warrant additional testing to know if nutrients are a problem at the sties.

Water Quality Standards: BRWA uses USGS benchmarks for phosphate (0.1 mg/L) and nitrate (1.0 mg/L) as we await the development of nutrient standards specific to the Lake Superior region of Wisconsin.

Results: Pike River Rd nitrate concentrations exceeded the benchmark 0% of sample events. Taylor Ln. concentration exceeded the benchmark 13.0% of sample events. Phosphate concentrations at Pike River Rd exceeded the benchmark 1.7% of sample events. Taylor Ln. phosphate concentrations exceeded the benchmark 6.5% of sample events.



Figure 1 (above): Shows BRWAS volunteers participating in a water quality control session.

Macroinvertebrates

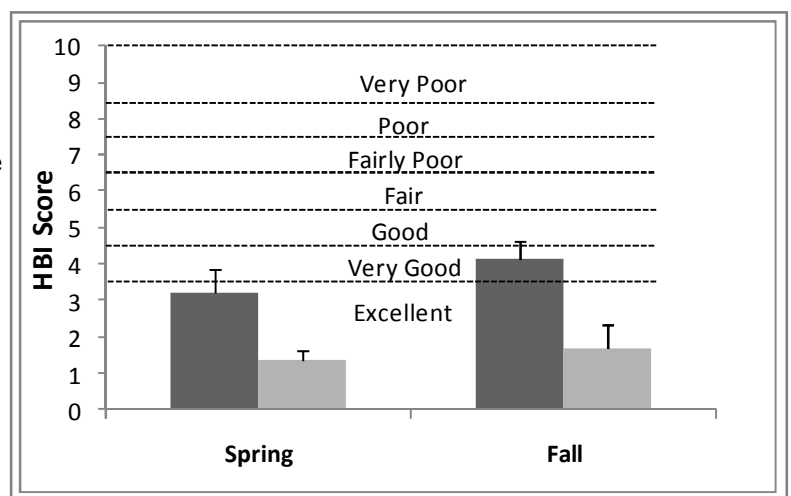
BRWA generally collects macroinvertebrates from sites in May (spring) and September (fall), with a goal of collecting at least 100 individuals at each site. The macroinvertebrates are identified, given a tolerance score, and the scores are used to calculate the Hilsenhoff Biotic Index (HBI).

Macroinvertebrates

Information: Macroinvertebrates provide important long term information about the quality of water in a stream because they typically spend a large part of their lives in the water.

Water Quality Standards: The lower the HBI score, the better the water quality at a site.

Results: The average HBI value for Pike River Rd. is 3.8, indicating "Very Good" water quality. The average HBI for Taylor Ln. is 1.5 , indicating "Excellent" water quality. Values did not differ between seasons (Graph 5).



Graph 5: Average spring & fall HBI values at Pike River Road (dark bars) and Taylor Ln. (light bars).

E. coli

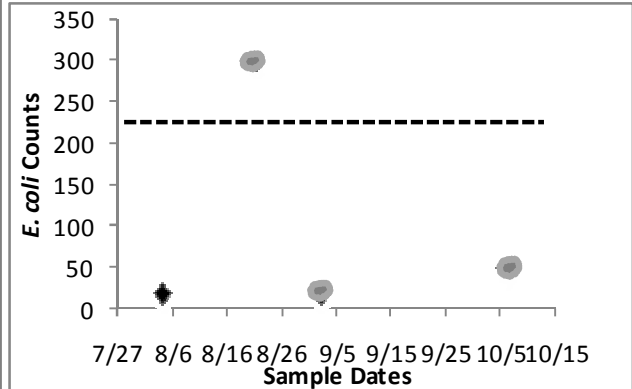
Beginning in 2006, *Escherichia coli* (*E. coli*) samples are collected from several sites on the first Saturday of each month and during rain events. 5mL of water sample was added into 100mL of a agar broth solution, incubated for 24-48 hours after which the colonies were identified by color and counted.

E. coli

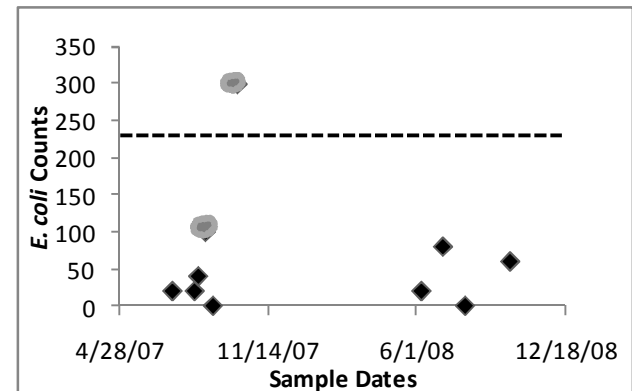
Information: *E. coli* short for *Escherichia coli* is, a type of fecal coliform bacteria found in the intestines of most mammals, including humans. The presence of *E. coli* in water is a indicator of contamination from sewage or animal waste. During rain events or snow melts, *E. coli* may be washed into the stream.

Water Quality Standards: BRWA compares its *E. coli* data to the U.S. Environmental Protection Agency (EPA) standard of 235 CFU/mL (colony forming units per mL).

Results: At Pike River Rd *E. coli*, data was collected four times, including three during rain events, only in 2007. One of the rain event samples (25% of the total samples) exceeded the EPA standard. Ten samples (two from rain events) were collected over two years at Taylor Ln. One rain event sample (10% of the total samples) exceeded the EPA standard. Wildlife can also contribute to *E. coli* found in rivers, so it is not surprising to find an occasional sample above the EPA standard at these two sites. Continued monitoring will help to determine whether the standard is consistently exceed .



Graph 6: Shows each *e.coli* sampling event at Pike River Rd. One sample exceeded to EPA standard of 235 CFU mg/L (indicated by the dash line). Rain events are indicated by a cloud symbol.



Graph 7: *E.coli* counts for each sampling event at Taylor Ln. One sample exceeded the EPA standard of 235 CFU mg/L (indicated by a dash line). Rain events are indicated by a cloud symbol.

Summary

The White River at the Pike River Road & Taylor Lane sites, are considered to be either a class 1 or class 2 trout stream with outstanding or exceptional Wisconsin water classification. These classifications are important parameters in determining how the BRWA monitors and analyzes each site. The results for the water chemistry data, suggest that the over all water quality is within the standards set forth by the State of Wisconsin, indicating good water quality. The Hilsenhoff Biotic Index results indicate very good water quality at Pike River Road, and excellent water quality at Taylor Lane. More monitoring of *E. coli* is needed before a conclusion can be made about the results.

This baseline report will be used as a reference to assess the fluctuations in water chemistry, macroinvertebrates, & *E. coli*, to determine if there is a need for more sensitive investigation which will help maintain and improve the Bad River Watershed integrity for future generations.

Site Highlights

Pike River Road

- * Good water quality ~ pH average of 7.8
- * Favorable conditions for supporting trout ~ DO average of 10.7 mg/L
- * Very Good water quality ~ HBI score of 3.7

Taylor Lane

- * Good water quality ~ pH average of 7.8
- * Favorable conditions for supporting trout ~ DO average of 10.9 mg/L
- * Excellent water quality ~ HBI score of 1.5