



# Technical Report

*compendium to the*

## Report Card on the Environmental Health of the Oak Ridges Moraine and Adjacent Greenbelt Lands

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## **Background**

This technical report reflects the detailed methodology followed by staff from the Otonabee Region Conservation Authority (ORCA) during the preparation of the “Report Card on the Environmental Health of the Oak Ridges Moraine and Adjacent Greenbelt Lands” published by the Conservation Authorities’ Moraine Coalition (CAMC) in 2015.

The purpose of the Report Card was:

- To provide science-based monitoring data and analysis to help inform the 10-year review of the Provincial land use plans for the Oak Ridges Moraine and Greenbelt.
- To report on the environmental health of the Oak Ridges Moraine and adjacent Greenbelt lands.
- To recommend on-the-ground actions and additional tools needed to maintain, improve or restore the environmental health of these important lands.

The data in the Report Card was generated by local monitoring efforts conducted by Conservation Authorities (CAs). Within ORCA’s jurisdiction, the data reflects the health of the three subwatersheds within that are located within the Oak Ridges Moraine and Greenbelt: Baxter Creek, Cavan Creek and Squirrel Creek.

Human health and well-being are affected by the quality of our natural environment. Monitoring increases our understanding of watershed health and helps target programs and activities to where they are needed most. It is also a tool used to track progress, identify changing conditions and target areas that require protection or enhancement.

## **Introduction**

Data from the ORCA Watershed Health Monitoring Program was used to complete the data analysis for the aquatic and forest condition sections of the Oak Ridges Moraine / Greenbelt Report Card project. Groundwater analysis was conducted by CAMC staff for the whole subwatershed rather than being completed by each individual CA. Results from this indicator can be found within the 2015 Report Card.

Within ORCA’s jurisdiction, all sites within the Oak Ridges Moraine (ORM) are also found within the Protected Countryside Area of the Greenbelt, and as such, no analysis by Greenbelt Designation was required.

Specific protocols were developed for the ORM/Greenbelt project by a technical team comprised of representatives from the 9 CAs across the ORM including ORCA. These protocols have been saved at: *P:\Oak Ridges Moraine Foundation\2013\_2014 Report Card Project\Technical Report and Data\ORMGB\_Technical Report\_Final.*

Supplied protocols included some flexibility to allow individual CAs to customize the analysis depending on data availability. As such, the following technical information is provided to document the methods used during ORCA’s data analysis. All tables in this memo are available in the workbook: *Qualifying Stations and DataFinal2015.xlsx.*

## Study Area and Stations

Table 1 outlines the number of ORCA sampling sites which are located within the geographical scope of the ORM/Greenbelt project for the following indicators measured by ORCA as part of this Report Card project:

1. Total Phosphorus (TP);
2. Benthic Macroinvertebrates (BMI);
3. Forest Conditions;
4. Fish Presence; and
5. Stream Water Temperature.

The geographical scope of the study area is defined as the first location where a primarily Oak Ridges Moraine influenced stream meets a primarily off-moraine stream (generally of a larger stream order). Where these confluences occurred, the geographical cut-off was located just upstream of the confluence. In the following three cases, the geographical scope was expanded to allow for the inclusion of data from slightly downstream and publicly accessible sampling locations:

1. Baxter Creek Tributary at County Rd. 10 (south of Larmer Line)
2. Cavan Creek at County Rd 10, and
3. Squirrel Creek at Hwy 28;

**Table 1. Number of monitoring sites by subwatershed**

Subwatershed	#BMI Sites*	# TP Sites	# Fish Sites	# Temp. Sites
Baxter Creek	6	1	8	5
Cavan Creek	3	0	2	0
Squirrel Creek	3	1	0	0
<b>Total</b>	<b>12</b>	<b>2</b>		

\*Note that *sites* differ from *data points*, as some sites were sampled over multiple years

## Trend Analysis

Where trend analysis was possible, trend information was noted for each indicator based on changes to the Conservation Ontario report card grading scheme. Results were based on the coding scheme below:

- **None/Baseline** = Fewer than 5 years of time series data available for the station, no historical data available or no data available to assess recent trends.
- **Improvement** = Improvement based on time series data.
- **No Change** = No clear change based on time series data.
- **Mixed** = Fluctuating or divergent trends based on time series data.
- **Deterioration** = deterioration of grade scores based on time series data.

Further information on trend analysis and data delimitations is provided within this report for each indicator.

## Surface Water Quality

Water quality is based on two indicators: total phosphorus (TP) and benthic macroinvertebrates (BMI).

## **Total Phosphorus**

Fifty (50) total phosphorus (TP) data points from 2008 – 2013 were used in the analysis across two subwatersheds: Baxter Creek and Squirrel Creek. All sites were located on ORM/Greenbelt lands or those found immediately downstream of the Oak Ridges Moraine boundary. No sampling sites within the Cavan Creek subwatershed were located within the geographical scope of the ORM/Greenbelt project.

TP was monitored at 1 station within the Baxter Creek subwatershed from 2008-2012, which yielded 43 data points. In order to fill a data gap for this project as well as ORCA's overall Watershed Report Card program, an additional TP sampling site was established where Squirrel Creek crosses Hwy. 28, within the slightly expanded geographic scope for the project. This site was sampled monthly from June – November 2013 and yielded 7 data points for the Squirrel Creek subwatershed. This data has been incorporated into the analysis for grading, but note that it deviates from the recommended minimum data standard of 30 or more data points over 5 years.

Generally, TP was sampled once per month during the ice-free period (April - October). The 75<sup>th</sup> percentile TP values along with the associated score are presented in Table 2.

**Table 2. Total phosphorus 75th percentile concentrations (mg/L) for 2 sites within the ORM/Greenbelt study area.**

<b>Subwatershed</b>	<b># TP Data Points</b>	<b>75th Percentile Total Phosphorus (mg/L)</b>	<b>TP Score</b>
Baxter Creek	43	0.018	5
Squirrel Creek*	7	0.057	3

\*Sampling began spring 2013.

## **Benthic Macroinvertebrates**

Nineteen (19) benthic macroinvertebrate (BMI) data points from 2008 – 2013 were used in the analysis across three subwatersheds: Baxter Creek, Cavan Creek, and Squirrel Creek. All of these sites were located on ORM/Greenbelt lands or within the slightly expanded geographic area just downstream of the Oak Ridges Moraine boundary.

Benthic macroinvertebrates (BMI) were collected using the traveling kick-and-sweep method prescribed by the Ontario Benthos Biomonitoring Network protocol (OBBN). Sample identification was completed in the field to the coarse 27-group taxonomic level, the minimum level of identification required for OBBN.

Conservation Ontario (2011) recommends using the Hilsenhoff 1988 Family Biotic Index as modified by New York State (Smith et al. 2009) to analyze surface water quality based on benthic macroinvertebrates. The taxon tolerance values used in this index requires at minimum, 'Family' level identification, which was not available. As a result, benthic macroinvertebrate samples were analyzed using a locally modified "Family Biotic Index" (FBI, Appendix A), which is based on published taxa tolerance values from Stanfield (2003), Mandaville (2002), Smith et al.(2009), and Hilsenhoff (1988).

Using the above-noted tolerance values, an index value was calculated for each sampling station. The average “FBI” for each subwatershed along with corresponding scores are presented in Table 3.

**Table 3. Average “FBI” values and associated scores per subwatershed**

Subwatershed	# Data Points	Average “FBI”	Score
Baxter Creek	10	5.16	3
Cavan Creek	6	4.85	4
Squirrel Creek	3	5.68	3

### **Overall Surface Water Quality and Data Delimitations**

Using the Conservation Ontario Watershed Report Card methodology (CO, 2011), the overall surface water quality scores were determined by averaging the total phosphorus score and the BMI score and converting this average to a corresponding point score using Table 1 found in Appendix B.

Because ORCA’s watershed health monitoring program was designed to monitor aquatic health on a watershed scale rather than the current focus on the ORM/Greenbelt area, Cavan Creek did not have a TP data site within the study area. As a result, the final surface water quality grade for Cavan Creek is based solely on benthic results and should be interpreted with caution as it does not present a complete assessment of water quality.

Furthermore, the TP grade for Squirrel Creek was based on *only seven sampling visits* between 2012-2013. This sampling frequency falls short of the recommended 30 data points for TP analysis, and thus results should be interpreted with caution. Final water quality scores and grades by watershed and subwatershed are presented in Table 4.

**Table 4. Final surface water quality scores and grades by subwatershed and watershed**

Subwatershed	# BMI Data Points	Mean “FBI”	BMI Score	# TP Data Points	TP 75th Percentile	TP Score	Final Score	Final Grade	Roll Up: ORCA Study Area Score	Roll Up: ORCA Study Area Grade
Baxter Creek	10	5.16	3	43	0.018	5	5.5	A	4.66	A
Cavan Creek	6	4.85	4	0	-	-	4.0*	B*		
Squirrel Creek	3	5.68	3	7**	0.057	3	4.5	A		

\*Based only on BMI data (no water chemistry)

\*\*Falls short of the 30 data points recommended by CO’s 2011 methodology.

### **Surface Water Quality Trend Analysis**

No trend analysis was possible for the surface water data presented in this report – all stations were assessed as ‘None/Baseline’. For surface water, trends were assessed based on station-specific time-series data for benthic macroinvertebrates rather than changes in the overall subwatershed score. Both the biological and chemical indicators were considered critical for

trend analysis and thus, trends were only assessed if both indicators of surface water quality were available (e.g. TP somewhere in the subwatershed and five years of benthic data from one site).

### **Forest Condition**

The 2011 Conservation Ontario Watershed Report Card methodology (CO, 2011) did not include prescriptive enough language for GIS practitioners to consistently follow when analyzing forest conditions. As a result, the analysis of this indicator was open to misinterpretation. The detailed methodology below outlines the details of ORCA's forest conditions indicator analysis which has been conducted according to the standardized steps prescribed by the updated methodology for the Oak Ridges Moraine and Greenbelt project, thus ensuring consistency between Conservation Authority analyses across the study area.

### ***Data Source***

The analysis of forest conditions completed by ORCA used the Southern Ontario Land Resource Information System (SOLRIS) version 1.2 vector forest cover product (released 2008).

### ***Percent Forest Cover***

This indicator was analysed using the following methodology:

1. Clip the ORCA subwatersheds to the ORM & Greenbelt planning area.
2. Select SOLRIS forest cover that intersects with the results. Add a search buffer of 1000 meters.
3. Union the selection to the clipped ORCA subwatersheds.
4. Start editing the result: a) Remove any polygons that are not within the subwatersheds.  
b) Remove any polygons not within wooded area.

**Table 5. Percent forest cover data for those portions of the subwatersheds in the ORM/Greenbelt study area**

<b>Area of Interest</b>	<b>Total Area: km<sup>2</sup></b>	<b>Forest Cover: km<sup>2</sup></b>	<b>Percent Forest Cover</b>	<b>Indicator Score</b>	<b>Indicator Grade</b>
<b>Roll Up Values ORCA</b>	<b>134.60</b>	<b>60.32</b>	<b>44.81%</b>	<b>5</b>	<b>A</b>
Baxter Creek	46.17	22.60	48.96%	5	A
Cavan Creek	72.40	33.10	45.72%	5	A
Squirrel Creek	16.03	4.61	28.78%	4	B

### ***Percent Interior Forest***

This indicator was analysed using the following methodology:

1. Select SOLRIS version one forest cover that intersects with the ORCA administration area. Add a search buffer of 1000 meters.
2. Select from that selection, features that intersect with the ORM & GREENBELT area. Add a search buffer of 1000 meters.

3. Dissolve the selected forest cover features. Do not check the 'Create Multipart Features' checkbox as that will slow down the analysis in the next step.
4. Apply a -100 meter buffer to the dissolved forest cover.
5. Apply a Union between the subwatershed boundaries and the interior forest.
6. Start editing the result. Remove any polygons that are not within the subwatersheds. Remove any polygons not within wooded area.
7. Clip the edit to the ORM & GREENBELT area.

**Table 6. Percent interior forest data for those portions of the subwatersheds in the ORM/Greenbelt study area**

Area of Interest	Total Area: km <sup>2</sup>	Interior Forest: km <sup>2</sup>	Percent Interior Forest	Indicator Score	Indicator Grade
<b>Roll Up Values ORCA</b>	<b>134.60</b>	<b>24.18</b>	<b>17.96%</b>	<b>5</b>	<b>A</b>
Baxter Creek	46.17	12.50	27.07%	5	A
Cavan Creek	72.40	10.76	14.86%	5	A
Squirrel Creek	16.03	0.92	5.74%	3	C

***Percent Riparian Zone Forested***

This indicator was analysed using the following methodology:

1. Select the Ontario Hydrographic Network (OHN) watercourses within the clipped subwatersheds. Add a search buffer of 1000 meters.
2. Place a 30 meter buffer on the selection.
3. Select OHN waterbody within the clipped subwatersheds. Add a search buffer of 1000 meters.
4. Place a 30 meter buffer on the selection.
5. Union the two buffers together.
6. Union the result and the OHN waterbody selection together.
7. Start editing the result. Remove any polygons that exist within the OHN waterbody.
8. Apply a union between the clipped subwatersheds and the edited results.
9. Start editing the result. Remove any polygons that are not within the subwatersheds. Remove any polygons not within edited results. Once completed this is the total riparian zone within the ORM and Greenbelt planning area.
10. Clip the result to the SOLRIS version one wooded area.

**Table 7. Percent riparian zone forested data for those portions of the subwatersheds in the ORM/Greenbelt study area**

Area of Interest	Total Riparian Zone: km <sup>2</sup>	Riparian Zone Forested: km <sup>2</sup>	Percent Riparian Zone Forested	Indicator Score	Indicator Grade
<b>Roll Up Values ORCA</b>	<b>10.74</b>	<b>6.09</b>	<b>56.73%</b>	<b>4</b>	<b>B</b>
Baxter Creek	3.96	2.66	67.06%	5	A
Cavan Creek	4.52	2.44	53.90%	4	B
Squirrel Creek	2.26	1.00	44.29%	4	B



### **Overall Forest Condition**

Using the Conservation Ontario Watershed Report Card methodology (CO, 2011), the overall forest condition was determined by averaging the percent forest cover, forest interior and riparian forested scores and converting this average to the corresponding final grade Appendix B).

**Table 8. Final forest conditions scores and grades by subwatershed and watershed**

<b>Area of Interest</b>	<b>Percent Forest Cover</b>	<b>Percent Forest Interior</b>	<b>Percent Riparian Zone Forested</b>	<b>Average Score</b>	<b>Final Forest Condition Grade</b>
<b>ORCA</b>	<b>44.81%</b>	<b>17.96%</b>	<b>56.73%</b>	<b>4.7</b>	<b>A</b>
Baxter Creek	48.96%	27.07%	67.06%	5.0	A
Cavan Creek	45.72%	14.86%	53.90%	4.7	A
Squirrel Creek	28.78%	5.74%	44.29%	3.7	B

### **Forest Conditions Trend Analysis**

Forest cover was derived from SOLRIS data developed by the MNR from 1998-2005 and represents a snapshot of land cover information from that time period. As a result, no trend analysis was possible to show changes over time and the trend was assessed as 'None/Baseline'.

### **Coldwater Fish Data**

Twelve (12) fish collection records (data points) from ten (10) sites sampled between 2008 and 2013 were used in the presence/absence analysis of sensitive, cold-water fish within the Baxter and Cavan Creek subwatersheds. All 10 of the sampling sites were located on ORM/Greenbelt lands or within the slightly expanded geographic area downstream of the Oak Ridges Moraine boundary.

Fish collection records noted that sampling was conducted by minnow trapping, dip netting or electrofishing, and records include government reports (MNR) as well as direct sampling results from Conservation Authority, non-profit stewardship group and consultant survey efforts.

**Table 9. Coldwater fish sampling sites**

<b>Fish Sampling Date</b>	<b>Subwatershed</b>	<b>Name of Waterbody</b>	<b>UTM Zone</b>	<b>UTM Easting</b>	<b>UTM Northing</b>
27-Jul-2010	Baxter Creek	Little Creek	17	704092	4891723
29-Jul-2010	Baxter Creek	Little Creek	17	704092	4891723
19-May-2011	Baxter Creek	Baxter Creek	17	703499	4890176
19-May-2011	Baxter Creek	Baxter Creek	17	703412	4890075
19-May-2011	Baxter Creek	Baxter Creek	17	703284	4889984
19-May-2011	Baxter Creek	Baxter Creek	17	703551	4890176

19-May-2011	Baxter Creek	Baxter Creek	17	703474	4890130
19-May-2011	Baxter Creek	Baxter Creek	17	703331	4889984
20-Sep-2011	Baxter Creek	Baxter Creek	17	703433	4890038
02-Jun-2010	Cavan Creek	Cavan Creek	17	696469	4894847
14-Jun-2011	Cavan Creek	Cavan Creek	17	698568	4896858
30-Jun-2011	Cavan Creek	Cavan Creek	17	698568	4896858

Fish records indicating the presence of either Brook Trout and/or Sculpin species during at least one sampling event were noted as having these sensitive species 'present'. Data was recorded on a site-by-site basis.

Of the 12 fish collection records between 2008-2013 within the study area's subwatersheds, 100% of the 10 sites sampled had sensitive cold-water species present in the watercourse. Baxter Creek contained the highest number of collection records within the study area, with 9 fish collection events recorded at 8 sites, while no fish collection records for Squirrel Creek met the qualifying area or year parameters for this study, and only 3 records at 2 sites were noted for Cavan Creek.

**Table 10. Coldwater fish presence/absence results**

<b>Subwatershed</b>	<b># Fish Collection Records</b>	<b># Sites Sampled</b>	<b>% of Sites With Coldwater Fish Present</b>
Baxter Creek	9	8	100%
Cavan Creek	3	2	100%
Squirrel Creek	0	0	n/a

### ***Coldwater Fish Trend Analysis***

No long term data monitoring at the included study sites has been completed to permit trend analysis, and the trend based on current data is assessed as 'None/Baseline' at this time.

Traditional statistical trend analysis is not appropriate for presence/absence data. However, simple statistics such as change in the percentage of sites or the number of sites that have lost Brook Trout or Sculpin sp. (i.e., no longer present) or have gained Brook Trout or Sculpin sp. can provide important information over time and guide further analysis.

## **Stream Temperature**

To investigate the predominant thermal regime at sampling stations within the Oak Ridges Moraine study area, stream temperature data was collected using HOBO Water Temp Pro temperature loggers. These temperature loggers were programmed to record water temperatures on an hourly basis and have an accuracy of +/- 0.2°C at 25.0°C. Data loggers were attached to weights and placed in the middle of the channel, ensuring that their placement was not in close proximity to groundwater upwellings, or in an area where warm water inputs would have an impact on the data collected.

Water temperature data records between 2008-2013 were only available for Baxter Creek around the area of the Millbrook Valley Trail System south of the town of Millbrook. The thermal classification of the sampling stations is shown in the table below, per the five-class system ranging from cold to warm water systems, as developed by Chu et al. (2009).

**Table 11. Stream temperature classification of subwatersheds in the study area**

<b>Subwatershed</b>	<b>Location</b>	<b>Year Sampled</b>	<b>Easting</b>	<b>Northing</b>	<b>Stream Temperature Classification</b>
Baxter Creek	Baxter Creek at Needler's Lane (under road bridge)	2008	704174	4891730	coolwater
Baxter Creek	Baxter Creek at Needler's Lane (Millbrook Millpond Park)	2008	704144	4891665	coolwater
Baxter Creek	Baxter Creek Upstream of Millbrook Dam (Medds Mountain)	2008	704138	4891536	coolwater
Baxter Creek	Baxter Creek Upstream of Millbrook Millpond Dam	2008	704072	4891362	coolwater
Baxter Creek	Baxter Creek at Millbrook Valley Trails	2008	703951	4891030	warmwater
Cavan Creek	-	-	-	-	n/a
Squirrel Creek	-	-	-	-	n/a

### ***Stream Temperature Trend Analysis***

Five years of data was required to permit trend analysis. Since the study area only included sampling from 2008, no trend analysis was completed and the trend based on current data is assessed as 'None/Baseline'.

### **Summary of Findings**

While the current report card process doesn't take into account data or conditions from the entire subwatershed, it does provide an opportunity to characterize the upper reaches of each watershed and compare these findings with the watershed as a whole. It is the upper stream reaches of Baxter, Cavan and Squirrel Creeks that are located on the Oak Ridges Moraine and Greenbelt lands. Each subwatershed was evaluated wholistically as part of ORCA's 2013 Watershed Report Card (WRC) which used Watershed Monitoring data spanning the years 2007-2011.

A summary table is included below which reflects the grades obtained through the current ORM/Greenbelt report card process both on a subwatershed and overall study area basis.

**Table 12. Summary table of indicator grades per subwatershed and overall ORCA ORM/GREENBELT study area for the ORM/Greenbelt Report Card**

Subwatershed	Surface Water Grade	ORCA Surface Water Grade	Percent Forest Cover Grade	ORCA Forest Cover Grade	Percent Interior Forest	ORCA Forest Interior Grade	Riparian Zone Forested Grade	ORCA Riparian Zone Forested Grade	Forest Conditions Grade	ORCA Forest Conditions Grade	Sites with Coldwater Fish	Stream Temperature Classification
Baxter Creek	A	A	A	A	A	A	A	B	A	A	100%	Cool
Cavan Creek	B*		A		A		B		A		100%	n/a
Squirrel Creek	A		B		C		B		B		n/a	n/a

*\*Based only on BMI data (no water chemistry)*

### **Surface Water Quality**

Based on comparisons between the 2013 WRC and the current ORM/Greenbelt analysis, only Cavan Creek showed consistent water quality values from its upper subwatershed compared to the subwatershed as a whole (both with grades of B). The Cavan Creek subwatershed was graded solely on benthic macroinvertebrate data for the ORM/Greenbelt report, as no surface water sampling location was located within the study area. This points to the value of ongoing benthic sampling. Indeed, throughout the ORM project, it became clear that ongoing macroinvertebrate benthic sampling is one of the most complete point-specific data sets available to Conservation Authorities compared to other indicators of aquatic health.

The upper reaches of both Baxter and Squirrel Creek had better surface water quality grades within the ORM/Greenbelt area (both A grades) when compared with the subwatershed as a whole (B and C respectively in the 2013 WRC).

### **Forest Conditions**

Forest conditions in the Squirrel Creek subwatershed received a grade of B in the ORM/Greenbelt analysis compared to a 'poor' (D) grade for the subwatershed as a whole via the WRC, suggesting that the upper reaches support much higher proportions of forest cover than downstream sections.

Both Baxter and Cavan Creeks received forest condition scores of A within the ORM/Greenbelt study area, and scores of B for the subwatersheds as a whole, which is reflective of the protective designations through the ORM Conservation Plan and development pressures within upper vs. lower reaches of the subwatersheds.

The current analysis and comparisons show that subwatersheds with better surface water quality are generally those associated with a greater extent of forest and riparian cover.

### ***Coldwater Fish and Stream Temperature***

Temperatures in surface water creeks generally tend to increase along a gradient from upstream to downstream. The coldwater thermal regimes and sensitive fish species found within the streams of the study area are consistent with the upper reach / headwater position of the creeks which tend to have colder temperatures and groundwater inputs.

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## Appendix A: Modified HBI taxon tolerance values

Invertebrate Taxon	Pollution Tolerance Value
Coelenterata (Hydra)	5
Platyhelminthes (Flatworms)	4
Nematoda (Roundworms)	5
Oligochaeta (Aquatic Earthworms)	8
Hirudinea (Leeches)	8
Isopoda (Aquatic Sowbugs)	8
Pelecypoda (Clams)	8
Amphipoda (Scuds)	6
Decapoda (Crayfish)	6
Acarina (Water Mites)	6
Ephemeroptera (Mayflies)	5
Anisoptera (Dragonflies)	5
Zygoptera (Damselflies)	7
Plecoptera (Stoneflies)	1
Hemiptera (True Bugs)	5
Megaloptera (Fishflies, Alderflies)	4
Trichoptera (Caddisflies)	4
Lepidoptera (Aquatic Moths)	5
Coleoptera (Beetles)	4
Gastropoda (Snails)	7
Chironomidae (Midges)	7
Tabanidae (Horse and Deer Flies)	6
Culicidae (Mosquitos)	8
Ceratopogonidae (No-See-Ums)	6
Tipulidae (Crane Flies)	3
Simuliidae (Black Flies)	6
Other Diptera (Msc. True Flies)	5
Ostracoda (Seed Shrimp)	7

## Appendix B: Grading conventions per Conservation Ontario 2011

### Surface Water Quality

<b>Total Phosphorus (mg/L)</b>	<b><i>E. coli</i> (cfu/ 100 mL)</b>	<b>Benthic Macroinvertebrates (modified Family Biotic Index)</b>	<b>Point Score</b>	<b>Grade</b>	<b>Final Point Score</b>	<b>Final Grade</b>
<0.020	0-30	0.00 - 4.25	5	A	>4.4	A
0.020 - 0.030	31 - 100	4.26 - 5.00	4	B	3.5 - 4.4	B
0.031 - 0.060	101 - 300	5.01 - 5.75	3	C	2.5 - 3.4	C
0.061 - 0.180	301 - 1000	5.76 - 6.50	2	D	1.5 - 2.4	D
>0.180	>1000	6.51 - 10.00	1	F	<1.5	F

### Forest Conditions

<b>% Forest Cover</b>	<b>% Forest Interior</b>	<b>% Riparian Zone Forested</b>	<b>Point Score</b>	<b>Grade</b>	<b>Overall Forest Condition</b>	
					<b>Final Points</b>	<b>Final Grade</b>
>35.0	>11.5	>57.5	5	A	>4.4	A
25.1 - 35.0	8.6 - 11.5	42.6 - 57.5	4	B	3.5 - 4.4	B
15.1 - 25.0	5.6 - 8.5	27.6 - 42.5	3	C	2.5 - 3.4	C
5.0 - 15.0	2.5 - 5.5	12.5 - 27.5	2	D	1.5 - 2.4	D
<5.0	<2.5	<12.5	1	F	<1.5	F