



Streams are the freshwater circulation system of Northern Michigan, carrying rainwater, snowmelt, and groundwater into and out of lakes. Often overlooked due to the region's grandiose lakes, there are literally thousands of miles of streams in the tip of the mitt. As a natural resource, these streams are invaluable. They provide clean, cool water to lakes, offer seemingly endless recreational opportunities to anglers, paddlers, and others, and provide habitat to a wide variety of wildlife.

With so many stream miles, how can one or even multiple organizations monitor and safeguard the water quality of all these important streams? The simple answer is that they can't; however, with support from the volunteer community we can cover a lot more ground (water!). With this approach in mind, the Tip of the Mitt Watershed Council has enlisted volunteers to help monitor, and thereby protect, the extensive network of magnificent streams in our backyard.

Every spring and fall, dedicated and adventurous volunteers monitor water quality of streams in Antrim, Charlevoix, Emmet and Cheboygan Counties. Prior to monitoring, volunteers are trained by Watershed Council staff during a half-day session. The training includes both indoor and

outdoor components that cover all aspects of the monitoring program, including program history and goals, monitoring protocols, sampling methods, and basic aquatic macroinvertebrate (mayflies, crayfish, etc.) identification. One week after the training, teams of 3-6 volunteers are sent into the field to monitor two sites, where they collect a representative sample of macroinvertebrates, note general stream conditions, and grab a water sample to measure conductivity. A few weeks after the monitoring event, volunteers gather again at North Central Michigan College in Petoskey to sort their bug samples into like groups. Trained volunteer experts then identify all specimens to the family level.

The aquatic macroinvertebrate community paints a picture of 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 good diversity and high water quality. A sample with only pollution-tolerant aquatic worms and midges reveals a stream ecosystem that is likely suffering.

Results so far? Because our watersheds are in good condition, with little agricultural landuse and even less urban development, we have found excellent water quality in most streams monitored by volunteers. Typically, volunteers find a diverse aquatic macroinvertebrate community that includes a number of pollution-sensitive families. However, there are a few sites where diversity has been low; usually those located in or near urban areas.

It was a great year for our Volunteer Stream Monitoring program in 2011. In June, the Watershed Council was awarded a grant from the Michigan Clean Water Corps (MiCorps) to cover equipment costs and staff time to expand the Program into the Maple and Sturgeon Rivers. By September, eight new sites had been selected (four on each river) and all were monitored by volunteers, most of whom were new to the program. Currently, nearly 100 volunteers are monitoring 37 sites on 15 different rivers and creeks, an impressive number considering our humble beginnings in 2004 when the program's first four volunteers monitored just one stream.



*Janie Guiliani and Kevin Cronk, collecting samples from the Maple River. Thanks to a grant from the Michigan Clean Water Corps Program four sites on the Maple River were added to the monitoring program in 2011.*

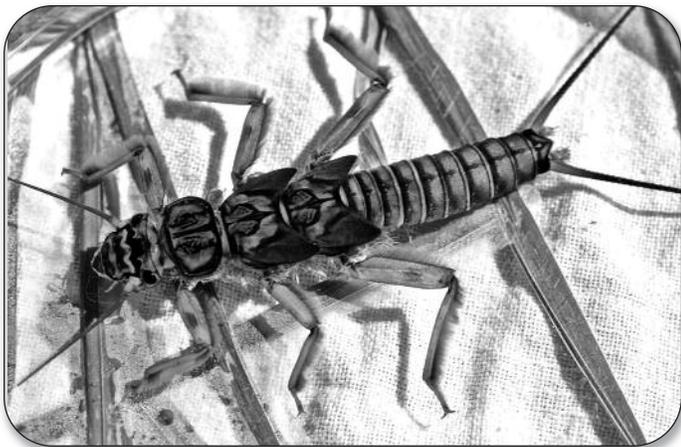
# Stream Reports

Stream ecosystem health at a specific site is determined using three different measurements of diversity (i.e., indices): **1) total taxa** = the total number of macroinvertebrate families found at the site; **2) EPT taxa** = the number of families in the most sensitive insect orders (mayflies, stoneflies, and caddisflies); and **3) sensitive taxa** = the number of families that are very sensitive to non-point source pollution as determined by PhD William Hilsenhoff. These indices are used in the following section to present findings from each stream monitored in our program. Scores for each stream are averaged using data from all monitoring events at that site and presented using the following format: (total, EPT, sensitive). For example, a site with a score of (20, 10, 5), means that it had an average of 20 total families, 10 EPT families, and 5 sensitive families.

## Water Quality Grading System\*

- A** = Excellent
- B** = Good
- C** = Moderate
- D** = Poor
- E** = Very poor

\*Grades based on a system that utilizes all three index scores.



Golden Stones from the family Perlidae persist in the lower Bear River in spite of polluted stormwater runoff from the Petoskey area.

### Bear River: Grade = B

Currently, four sites are monitored on the Bear River. The sites with greatest diversity are the east branch headwaters at Springbrook Road (20, 10, 5) and mid-river at Bear River Road (20, 8, 4). In contrast, the sites at Melrose Township Park by Walloon Lake (16, 4, 2) and at Mineral Well Park in Petoskey (14, 6, 2) show much less diversity. Lower diversity at Melrose Township Park may be natural due to warmer waters draining from the lake and a lack of stream-bank vegetation, whereas the Mineral Well Park site is probably affected by polluted stormwater and other stressors associated with the urban area of Petoskey. In spite of the lower diversity in Petoskey, volunteers continue to consistently find the beguiling golden stone(fly) from the family *Perlidae*.

### Boyne River: Grade = A

The Boyne River was initially monitored in 2005 at two locations: the South Branch to the south of Boyne Falls and near the river mouth in Boyne City. In late 2007, the Friends of the Boyne River helped expand monitoring to two more sites: the North Branch Preserve on Thumb Lake Road and mid-river at Dam Road. Diversity scores

from all sites are fairly similar from the top of the watershed (North Branch: 18, 10, 5 and South Branch: 16, 10, 6), to the middle (Dam Rd: 17, 9, 5), to the bottom (Boyne City: 16, 9, 5). Averaged total diversity scores may not be as high as one would expect, but both EPT and sensitive family diversity numbers are impressive at all sites monitored. Localized conditions that may be affecting the macroinvertebrate community include sedimentation at Dobleski Road, beaver activity at the North Branch Preserve, erosion at Dam Road and urbanization in the Boyne City area. Of note, the prehistoric-looking giant stonefly, *Pteronarcys*, has been found regularly at all sites on the Boyne.

### Eastport Creek: Grade = A-

Eastport Creek, which drains into the north end of Torch Lake, has been monitored at two sites off and on since 2005. Biological data from the upper reaches at Farrell Road show a diverse and healthy macroinvertebrate community (24, 10, 4). The site in the lower section near M-88 appears to be less healthy, though it still supports sensitive critters (18, 5, 2). Factors affecting the health of Eastport Creek include agricultural activity in the upper watershed and residential development in the lower.



Found at all sites on the Boyne River, the Giant Stonefly (*Pteronarcys*) is an herbivore that can reach 2-3”.

## Horton Creek: Grade = B+

Horton Creek flows into the north side of Lake Charlevoix and has been monitored every spring and fall since 2005. The Church Road site (16, 5, 1) in the headwaters is a slow section of the stream flowing through wetland areas, which results in the accumulation of decomposing organic matter (a.k.a, muck!) and warmer water temperatures. These natural circumstances contribute to the relatively low diversity scores. Several families found at this site, such as beetles from the family *Haliplidae* and scuds from the family *Hyaellidae*, are typical of slow-flowing waters. The picture is quite different downstream at Boyne City Road site (20, 11, 6), where stream flow is much faster and the stream bottom contains a wider variety of materials including gravel, rock, and wood. Record numbers of EPT families (15) were found at the Boyne-City Road site in 2008, which was a pleasant surprise as we did not expect so much diversity from such a small stream.



*Haliplidae*, is a family of beetles, which often occur in slower waters, such as those of the Church Road site on Horton Creek.

## Jordan River: Grade = A

Pristine conditions throughout most of the Jordan River watershed and limited development along the river's edge result in a very healthy stream ecosystem. The high quality waters of the Jordan are evident in our biological assessment, which shows great diversity in the macroinvertebrate community and impressively high numbers of sensitive families. The Friends of the Jordan River help coordinate volunteer monitoring on the Jordan River, which began in 2007 and now rotates annually among four sample sites. As expected, diversity has been strong from upstream (Pinney Bridge: 20, 15, 10) to the middle (Webster Road: 21, 11, 6 and Rogers Rd: 20, 11, 6), to downstream near the spreads (Fair Road: 21, 11, 6). The Jordan River is currently the record holder for the greatest number of sensitive families with 11 found at the Pinney Bridge site in the spring of 2011!

## Kimberly Creek: Grade = A

Kimberly Creek is located to the east of Indian River, flowing through the small community of Afton before converging with the Pigeon River just upstream of Mullett Lake. Since 2005, two sites have been monitored on Kimberly Creek to keep tabs on residential, agricultural, and mining activity in the watershed. Upstream at Montgomery Road, the channel is only a few feet across and

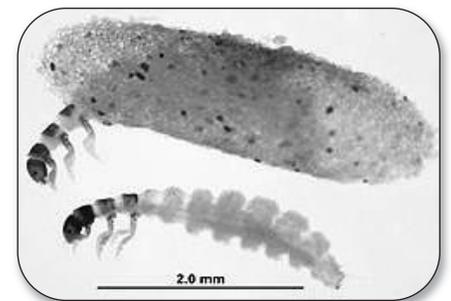
exposed (riparian vegetation removed) due to residential development, but healthy macroinvertebrate diversity persists (21, 7, 3). Between upstream and downstream sites, the stream flows through agricultural lands and a mining quarry, but data show that the stream ecosystem continues to flourish (Quarry Road: 21, 9, 4). In fact, the Quarry Rd site has one of highest total taxa scores where 32 families were found in 2007!

## Maple River: Grade = TBD

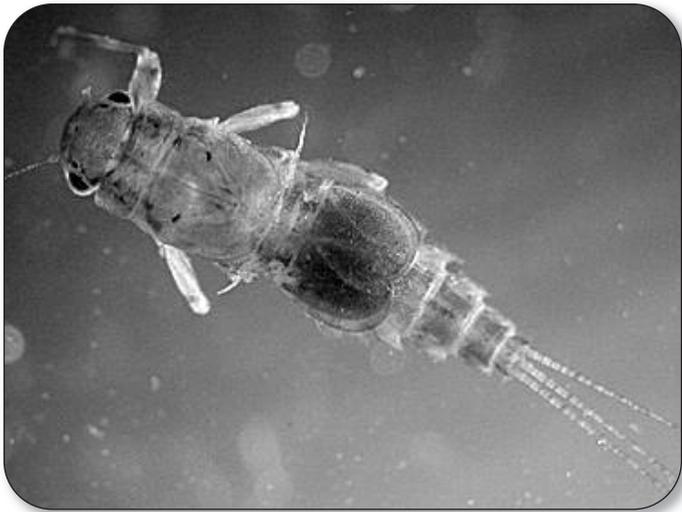
Simply put, the Maple is majestic; a hidden treasure that offers abundant angling, paddling and other recreational opportunities. Drainage from the Pleasantview Swamp and Larks Lake form the West Branch of the river while water flowing out of Douglas Lake forms the East Branch. The two branches converge at Lake Kathleen and then the main river flows southeast until emptying into Burt Lake. Four sites on the Maple River were added to the program in the fall of 2011 as a result of a grant awarded to the Watershed Council by MiCorps. Upstream, the Maple is monitored at Pleasantview Road (11, 3, 1), in Pellston at Robinson Road (21, 7, 4), immediately downstream of Lake Kathleen at Woodland Road (34, 12, 3), and at the last road-stream crossing before the mouth at Brutus Road (30, 14, 7). Typically, at least 3 years of data are needed to accurately assess stream health, but preliminary index scores suggest that the Maple River is doing well. Interestingly, the first round of data collection shows a marked trend of increasing diversity in a downstream direction. The low scores at the uppermost site (Pleasantview Rd) may reflect short-term impacts from bridge construction prior to sampling.

## Milligan Creek: Grade = A

Milligan Creek is a tributary of the Black River near the village of Tower on M68. Two sites are currently monitored: upstream at M-68 (21, 10, 6) and downstream at Waveland Road (16, 9, 6). Similar to the Boyne River, total diversity numbers are not high, but both EPT and sensitive families are generally found in abundance. The Waveland Road site is unique among sites monitored in the program in that the stream bottom is composed nearly entirely of solid rock.



*Hydroptilidae*, a caddisfly family, is often overlooked because of its small size (2-5 mm), but has been found at sites on the Maple River and Milligan Creek.



*Mayflies from the family Caenidae that are adapted to slower waters are commonly found at the M-27 site on Mullett Creek.*

### **Mullett Creek: Grade = A-**

Mullett Creek flows into the northwest side of Mullett Lake and has been monitored consistently since 2005. Similar to Horton Creek, the two sites monitored are very different. Volunteers monitor upstream at Crump Road (20, 10, 5), where the narrow channel winds through dense woods, water flow is fast, and substrate is variable with a mix of sand, gravel, rock and wood. At the downstream site near the creek mouth on M-27 (22, 5, 1), flow is slower, the channel is much wider and exposed to the sun, the creek bottom is silty, and wetlands are common in the riparian area. In spite of the physical and ecological differences between sites, the total diversity is approximately the same. However, sensitive family diversity is much higher at the upstream site where flows are faster (probably resulting in higher dissolved oxygen levels), water temperature is cooler from shade, and where there is more variability in habitat.

### **Pigeon River: Grade = A**

The Pigeon River begins just northeast of Gaylord, flows through the heart of Pigeon River Country, and eventually makes its way to Mullett Lake. It is a premier destination for paddlers, anglers and others, thousands of whom recreate on, in, or near the Pigeon throughout the year. Due to water quality problems in the aftermath of an accidental release of large volumes of water and sediment from the impoundment at Song of the Morning Ranch in 2008, the Watershed Council added sites on the Pigeon River to the east of Vanderbilt at Sturgeon Valley Road (21, 8, 5) and to the east of Wolverine on Webb Road (17, 9, 5). Total macroinvertebrate diversity found at these sites is not stellar, but strong EPT and sensitive family diversity indicate that the Pigeon is indeed healthy. If the dam at Song of the Morning Ranch is removed in the future, we will be able to use the volunteer data to assess any impacts associated with removal.

### **Russian Creek: Grade = C**

Russian Creek is a small feeder tributary of the Bear River that drains the Natural Area at North Central Michigan College. Since 2008, staff and students from the college have monitored the creek at one site near the mouth (14, 4, 2). Diversity is lower compared to most streams we monitor, but actually quite similar to the nearby Bear River site at Mineral Well Park. The lower numbers may simply be due to the small size of the creek, but could also be the result of stormwater pollution from surrounding agricultural and urban areas.

### **Stover Creek: Grade = C**

Monitored since 2004, Stover Creek holds the distinction of being the first stream to be included in our program. Volunteers currently monitor Stover at the Brookside Cemetery on M-66 (19, 7, 4) and downstream near the mouth at Irish Boat Shop (14, 2, 0). Despite the lack of natural vegetation along the stream banks, data from the cemetery site show that the stream ecosystem remains healthy. The high diversity at this site may be the result of fast flow, shade from trees set back from the creek, and complexity of in-stream habitat (mixture of woody debris, rock, and gravel). Of particular interest at this site is the occurrence of a rare caddisfly family: Goeridae. The downstream site at the mouth is one of the most impacted sites monitored in the program. Although only a ½-mile away from the cemetery site (as the crow flies), diversity scores plummet near the mouth. Total diversity is not extremely low, but only one specimen from a sensitive family has been found in eight years of monitoring. We have not yet determined the cause of this dramatic decrease, but suspect that it is related to urban stormwater impacts.



*Goeridae, a rare caddisfly family found in Stover Creek.*

## Sturgeon River: Grade = TBD

The Sturgeon River flows from headwaters at Huffman Lake (West Branch) and Gaylord through Wolverine and Indian River until emptying into Burt Lake. The Sturgeon is renowned for its robust trout fishery, high gradient and fast flows; conditions that attract anglers and paddlers from throughout the state. Four sites on the Sturgeon were added in the fall of 2011, as a result of a grant awarded to the Watershed Council by MiCorps that funded expansion of the stream monitoring program. Upstream, the Sturgeon is monitored to the east of Vanderbilt at Sturgeon Valley Road (19, 10, 5), on the West Branch at a roadside park on M27 (29, 15, 9), after the confluence of the two main branches in Wolverine (15, 8, 4), and near the mouth in Indian River (18, 8, 5). Typically, at least 3 years of data are needed to accurately assess stream health, but preliminary index scores suggest that the Sturgeon River is in good shape. This is probably largely due to the pristine status of much of its watershed, though expanding residential development in the lower Sturgeon is a concern.

## Tannery Creek: Grade = C

Tannery Creek is located just to the east of Petoskey and flows into Lake Michigan at Little Traverse Bay. Volunteer monitoring of Tannery Creek began in late 2007 at two sites. Upstream, the creek is monitored at Boyer Road (18, 8, 3), and downstream near the mouth behind the Glens shopping plaza (11, 3, 1). Similar to Stover Creek, the lower site on Tannery is impacted by urban development. Stormwater runoff from parking lots, roads, and rooftops



*Volunteer Stream Monitors, Thea Murray and Larry Dyer, monitor Tannery Creek in Petoskey.*

flushes directly into the stream instead of gradually filtering through soils into groundwater. Chemical pollution from stormwater can reach toxic levels for aquatic life in the creek while sediments in the runoff suffocate fish and aquatic insects by clogging gills. Runoff warmed by pavement increases water temperatures and lowers dissolved oxygen concentrations. In addition, unnaturally high volumes of water enter the creek, eroding the stream channel and degrading in-stream habitat. The removal of stream-bank vegetation has only exacerbated the problem; stream banks are more prone to erosion, lack of shade pushes water temperatures even higher, and in-stream habitat is further reduced because less woody debris falls into the creek.

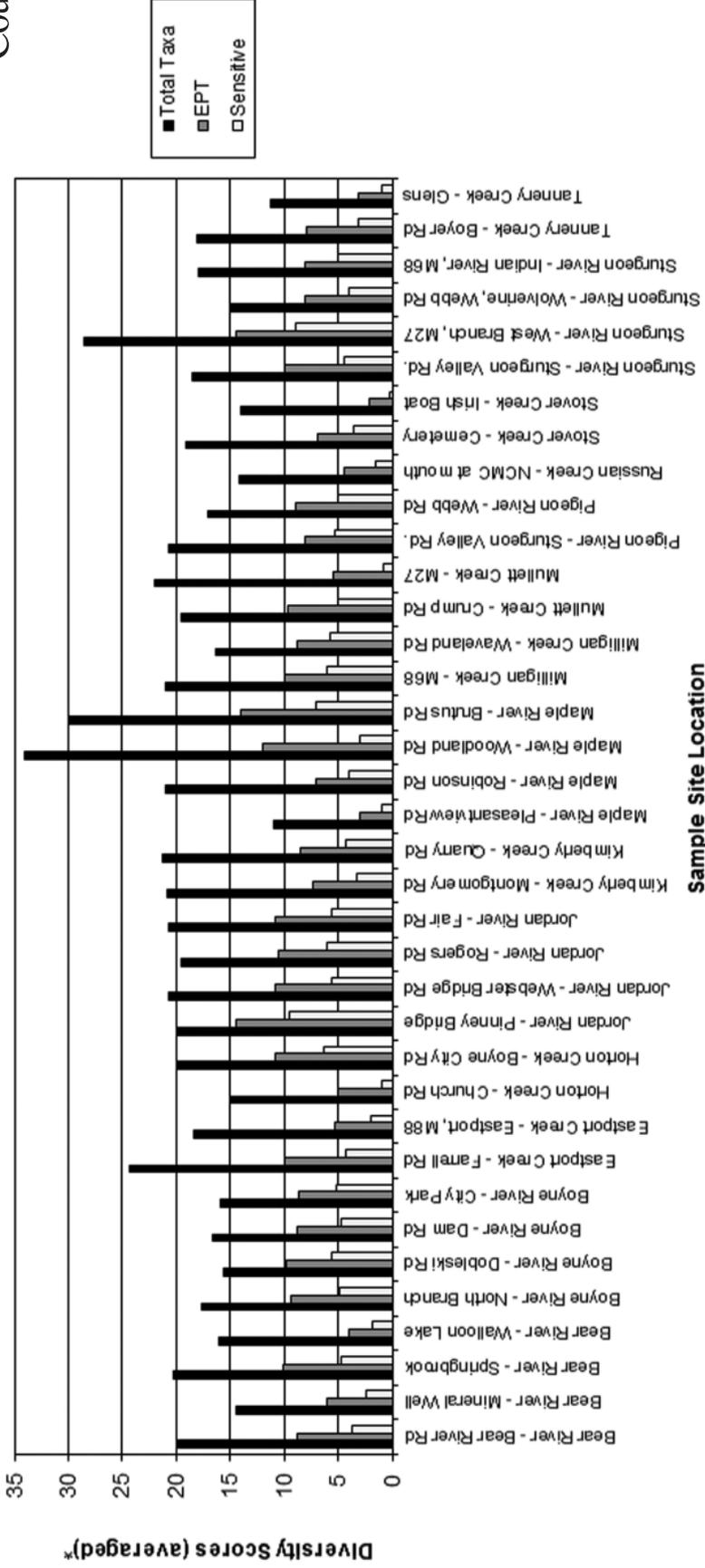
## Averaged index scores for all sites on each river or creek.

Stream Name	Total Taxa Average	EPT Taxa Average	Sensitive Taxa Average
Bear River	17.6	7.2	3.2
Boyne River	16.4	9.1	5.1
Eastport Creek	21.3	7.7	3.2
Horton Creek	17.5	8.0	3.7
Jordan River	20.2	11.6	6.7
Kimberly Creek	21.0	7.9	3.8
Maple River	24.0	9.0	3.8
Milligan Creek	18.6	9.4	5.9
Mullett Creek	20.7	7.5	3.0
Pigeon River	18.8	8.5	5.2
Russian Creek	14.1	4.4	1.6
Stover Creek	16.6	4.5	1.9
Sturgeon River	20.0	10.1	5.6
Tannery Creek	14.7	5.5	2.1



*Janie Guiliani, volunteer taxonomic expert, helps identify specimens collected by volunteers in the field.*

## Tip of the Mitt Volunteer Stream Monitoring Program Results Averaged Diversity Index Scores For Each Site (2005-2011)



\* 1) Total taxa = the total number of macroinvertebrate families found at the site; 2) EPT taxa = the number of families in the most sensitive insect orders (mayflies, stoneflies, and caddisflies); and 3) Sensitive taxa = the number of families that are the most sensitive to non-point source pollution as determined by PhD William Hilsenhoff.

**Are you a member of the V-TEAM?**

Tip of the Mitt Watershed Council is always looking to recruit volunteers to assist with our monitoring programs. If you enjoy spending time on the water and are passionate about protecting our vital water resources, then **WE WANT YOU!**

**Consider joining one of these teams today:**

- VOLUNTEER Stream Monitoring
- VOLUNTEER Lake Monitoring
- VOLUNTEER Avian Botulism Beach Ranger

For more information contact Dan Myers at 231-347-1181 or dan@watershedcouncil.org