

Minnehaha Creek: Canton  
SW SE NE  
Section 9-18N-13W  
Blaine County  
Lat N 36.05155°  
Long W 98.5857°  
WBID#: OK520530-00-0190C

Blue Thumb Volunteer Monitoring Data Review – February 27, 2012  
Written by Tina Rogers

### **Description of Watershed and Monitoring Site**

Minnehaha Creek is a small creek in Northwest Oklahoma that begins with its headwaters 5 miles west and 2.3 miles south of Canton, OK in Blaine County. The elevation at this point is 566 ft above sea level. Minnehaha Creek has a drainage basin of 12 square miles and flows approximately 6 miles through primarily an agricultural area consisting of native grass pasture, cultivated wheat fields, and native black jack oak/eastern red cedar forest. The direction of flow is generally northeast until the creek crosses Canton's city limits where it turns due east until it flows into the North Canadian River. There is a city park being developed on the north bank of the creek as it runs through town. Our monitoring site is located 400 meters (a quarter mile) downstream from the park development where the town's sewage pipe runs over the creek. Minnehaha Creek is the first creek emptying into the North Canadian River 2.5 miles downstream from Canton Lake. The elevation at the mouth of the Minnehaha Creek is 480 ft above sea level resulting in a slope of 86 ft in 6 miles.

### **Stream Condition and Habitat Overview**

The habitat assessment at Minnehaha Creek scores high in relation to other high quality reference streams in the Central Great Plains ecoregion in the areas of canopy cover shading and streamside cover. The banks of Minnehaha have a wide variety of trees, shrubs, vines, and grasses that not only shade the water below but also offer terrestrial vegetation along the banks to provide habitat as well as food sources for aquatic wildlife. However, there is much need for improvement in multiple areas. There is not as much instream cover as is needed to shelter and protect the stream's inhabitants and the bank stability is falling short at preventing erosion of the riparian area that is so essential for wildlife in the area. Minnehaha does not vary in depth much exhibiting a very low, shallow flow over a sandy bottom with very few pools as well as no rocky runs or riffles. The bottom of the stream is very soft and sandy indicating that a lot of sediment is traveling down the channel. Furthermore, with high frequencies of channel alteration (presence of sand bars) and low sinuosity (meaning the 400 meters of the creek that was assessed was very straight), great amounts of sediment cave in from the banks following large rain events leading to further siltation of the stream floor. The overall habitat score (48.3%) is significantly less than the average high quality stream and is definitely lacking some of the components needed to have a healthy, thriving underwater community.

## **Biological Conditions**

### **Fish**

The fish collection at the Minnehaha Creek took place on June 26, 2009. There were only 6 species of fish collected; no sensitive benthic species or intolerant species found, 1 species of sunfish (a largemouth bass), 1 species of intermediate tolerance (sand shiner), and 4 species of tolerant fish (red shiner, yellow bullhead catfish, plains killifish, and mosquitofish). The lack of sensitive benthic species and intolerant species is a very good indicator of conditions that make this environment inhospitable such as heavy siltation and unstable stream substrate. A full 98% of the fish collected in this sample were tolerant individuals. These species of fish are opportunistic and can live in very poor habitat and water quality. This extremely high percentage of tolerant species alone characterizes this stream as a low quality stream. The overall fish assessment for Minnehaha Creek was a rating of an "E" for its fish conditions, the lowest possible score when compared to high quality reference streams.

### **Benthic Macroinvertebrates (bugs)**

Benthic macroinvertebrates have been collected from Minnehaha Creek in both the winter and summer of 2009. Seeing that no rocky riffles were available, bugs were collected from woody debris in the creek. The winter sampling collected 8 various taxa and no sensitive to pollution bugs found. The species richness was less than expected due to loss of sensitive bugs resulting in a community structure less than reference conditions and an overall rating of a "B" (60%). The summer collection scored significantly higher with 19 various taxa and 9 of these taxa were sensitive to pollution. The richness of this sample along with the frequency of sensitive species found increased the rating in this collection to an "A" (129%) in comparison to reference streams in this ecosystem. The summer collection was above comparable to the best situations expected within the ecoregion exhibiting balanced trophic and community structure for this stream size.

### **Bacteria**

Bacterial counts of *Escherichia coli* and fecal coliforms were taken during the months of May, June, July, and August from 2009-2010 and in June of 2011 (July and August of 2011 were dry and no flow of water in the creek). *Escherichia coli* counts were all significantly high each summer ranging for 888 - 1516 CFU/100 ml in the summer of 2009 and 466-777 CFU/100ml for the summer of 2010. The summer of 2011 began with our highest number to date of 1622 CFU/100 ml. Fecal coliforms consistently measure "too numerous to count" throughout all tested dates. Clearly, the number of *Escherichia coli* and fecal coliforms present during the summer months are significantly high. This bacterial presence in the water could be attributed to livestock and/or wildlife accessing the streambed area for water, and their subsequent deposition of animal waste into the stream during the sampling period. In addition, the increase in the water temperature during this time would facilitate bacterial growth.

## **Chemical Conditions**

### **DO (Dissolved Oxygen)**

The oxygen saturation level generally follows a summer to winter variation with high values in the colder months and slight dips in the warmer months. The percent oxygen saturation was below 80% only 8 times out of 34 months tested. The lowest value of 57% occurs on September 4, 2008 shortly after monitoring of this creek began and has not since that date reached that low of value. The highest value of 138% occurs on February 23, 2011. The mean DO saturation level at the sampling site was 97%. This is within the normal range of 80% to 130%.

### **pH**

The pH of this stream ranges from 7.5 to 8.5. The stream water is slightly basic (7.0 being neutral), but is well within normal limits for this ecoregion.

### **Estimate of Soluble Nitrogen**

An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Levels of soluble nitrogen ranged from below detection to 2.18mg/L. Normal range is considered anything under 0.8mg/L, caution is advised for stream ranging from 0.8-1.5mg/L, and anything measuring above 1.5mg/L is considered poor stream quality. From this we can consider this stream's levels to be of moderate concern. The seasonal highs could be attributed to yearly application of fertilizers both on residential lawns and agricultural areas. Furthermore, runoff from a local agricultural supplier of fertilizer could also account for our higher values. This supplier is within two blocks of Minnehaha Creek and the town does not have a drainage system except for the roads and sidewalks leading to the creek.

### **Phosphorus**

Phosphorous amounts in the stream were determined by detecting the level of orthophosphate. Normal ranges between 0.00mg/L and 0.05mg/L, caution between 0.05-0.1mg/L and poor above 0.1mg/L. The levels of orthophosphate at the sampling site ranged between 0.020mg/L and 0.233mg/L, with the mean level at 0.1085mg/L. This value is above the caution range. These readings lead one again to speculate that fertilizers and pesticides may be the non-point pollutants that are the contributing factors. Furthermore, without a local plan for collecting and treating the community's run-off, activities such as washing cars both in drives and at the commercial car wash will add to the already high levels of phosphates in the water system.

### **Chloride**

The chloride readings range from 15-45mg/L with a mean value of 30mg/L. These readings are well within the normal limits for a high quality stream in this ecoregion.

## **Synopsis**

Minnehaha Creek is not an isolated body of water. It is a reflection of the people, the activities, and the watershed in which it occurs. Although the macroinvertebrate collections show that this creek can sustain a healthy population of bug species, there are many other concerns that leave a lot to be desired when comparing this creek to other high quality creeks in this Central Great Plains ecoregion. The habitat assessment uncovered unstable banks, low instream cover, and high levels of channel alterations leading to significant sediment in the streambed and siltation in the water. The fish collection yielded very low diversity with 98% of the fish collected being tolerant species. The bacteria tests resulted in values well above the normal for both *Escherichia coli* and fecal coliforms. Furthermore, the chemical analysis showed cautionary to poor conditions of soluble nitrogen and phosphates in the water. It appears that during warmer seasons Minnehaha Creek may be getting some additional nutrients from residential lawns, agricultural applications, livestock/wildlife wastes, and local runoff. Plans for improvement of this watershed should include control of the runoff by the community and the local residents, protecting the existing riparian area, and plantings on the banks of the stream to increase terrestrial vegetation.