

## **Nickel Creek: W 91<sup>st</sup> St.**

NE NW NW

Section 22-18N-12E

Tulsa County, Oklahoma

Latitude N 36° 01' 54.3"

Longitude W 96° 01' 39"

WBID# OK120420-02-0040G

Blue Thumb Volunteer Monitoring Data Review – October 15, 2013

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

Nickel Creek is a second-order stream located within the Cross Timbers ecoregion of Oklahoma in the NE corner of Creek County and SW corner of Tulsa County. The watershed begins around Oakhurst, north of the Turner Turnpike entrance, and flows southeast into Polecat Creek just east of US-75 and between West 96th Street and the Creek Turnpike. The upper region of the watershed is older residential and mixed commercial and industrial. The lower region of the watershed is new upper income residential. The estimated size of the watershed is 12 square miles.

The monitoring site is located just east of the intersection of West 91<sup>st</sup> Street and South 33<sup>rd</sup> West Avenue. The immediate surrounding area has been lightly developed over the last several years. It contains residential communities and open areas of non-native grasses that may be used for future development/construction. An established naturally-vegetated area (about 20-25 feet wide on either side) aligns the monitoring portion with trees, shrubs, and grasses. On most monitoring days, we collect a light amount of trash and litter (e.g. beverage containers, plastic bags), likely thrown into the creek from the 91<sup>st</sup> Street bridge.

### **Stream Condition & Habitat Overview**

The habitat assessment adheres to a modified version of the EPA Rapid Bioassessment Protocols (RBP) and is designed to assess a habitat's quality in relation to its ability to support biological communities in the stream. Habitat assessments were conducted on Nickel Creek starting at the monitoring site and going downstream for 400 meters in the summers of 1997, 1999, 2006 and 2010. Canopy cover and shading has been good for all years. In-stream cover increased to very good in 2010. Pool variability and streamside cover have stayed good since 1999. The banks along the monitoring site are somewhat steep and moderately stable except in 2006 when this category scored high enough to be at a good level. Bank vegetation has stayed at a moderate level for all assessments. The presence of rocky runs or riffles had been decreasing since the 1999 assessment, and no changes have been noted since then. The bottom substrate of the pools is often poor/unstable and layered with a large amount of silt and sediment but the

scores have increased since 1997 but still are in the poor level. The flow of water in the stream varies seasonally and is usually at base or low flow.

This report reviewed the raw data and metric scoring for each category. Nickel Creek appears to have a good habitat overall and has improved significantly since the middle-late 1990's. It does not seem that the development of the watershed has yet had a serious adverse effect on the habitat of the stream. In September 1997, the metric score recorded for the stream was 78.6; in July 1999, 86.3; in June 2006, 97.2; and in June 2010 the metric score was 94. The average score for high quality sites in the ecoregion is 84.0. The habitat at this site on Nickel Creek is very good and above average for the region.

## **Biological Conditions**

- **Fish**

Fish populations are used to assess stream health. Data from each collection are compared to identify trends in fish populations. Nickel Creek data are also compared to an average of high quality reference streams in the Cross Timbers ecoregion to assess relative stream health.

The fish collections were conducted in October 1996, July 1999, June 2006, and June 2010 in a 400 meter area starting at the monitoring site and going downstream. The data collected have consistently ranked the condition of the stream as a strong B (91% of reference conditions) except for the 1999 collection which scored a low B at 64% of reference conditions. The number of species present in the stream increased from fourteen to seventeen different species in the last collection (compared to Cross Timbers reference of 19 different species). The number of intolerant species (2) equals the reference conditions. There have been either 5 or 6 species of sunfish (7 for reference). However, the collections at Nickel Creek have only 2 sensitive benthic species (different darter species) while the average high quality stream has 4 sensitive benthic species. Population diversity at Nickel Creek is also lower than reference conditions and is made up of more tolerant species. These differences may be attributed to the silty conditions in many of the pools.

- **Benthic Macroinvertebrates (“Bugs”)**

Benthic macroinvertebrates (insects and other non-microscopic invertebrate animals living in the stream bed) are also used to assess stream health. Macroinvertebrates have been collected from riffles in the streams twice a year, winter and summer, since 1996. Some years, as in 2010 and 2011, summer conditions were too dry to collect samples.

Over the years, the number of taxa collected in the summer has varied. The average number of taxa collected from 1996–2000 was 14. The average number of taxa collected from 2003–2006 was 18. The average number of taxa collected from 2007–2009 was 16. Mayflies, stoneflies and caddisflies are often viewed as macroinvertebrate species that are most sensitive to changes in stream health. The average abundance of these taxa in 2007–2009 increased to 25% from 15% in 2003–2006. The average species number of these invertebrates for 2007–2009 remained the same

as 2003-2006. However, Nickel Creek still has about half of the sensitive species found in the average high-quality stream. The summer macroinvertebrate metric scores for Nickel Creek have consistently been lower than the reference scores. Summer bug collections since 1997 have usually been scored as B, higher than the C score in 1996, but lower than the A reference score. Nickel Creek did score an A of 107% in summer 2005 and 100% in summer 2007.

The winter bug collections from Nickel Creek also indicate improvement since the first years of monitoring. There is often some score variability, but this can sometimes be attributed to seasonal variability in stream flow and volume. The number of taxa collected has usually been greater than the reference number. For the 2008-2011 winter collections, the average number of taxa was 18 compared to the reference of 16. Other 2008-2011 metric scores for the Shannon-Weaver Diversity index, the HBI (sensitivity to organic pollution), and the contribution of dominant taxa were usually comparable or better than the reference scores. However, the metrics concerning the sensitive taxa were often lower than the reference scores. The scores for the average number and percentage of sensitive mayflies, stoneflies and caddisflies for 2008-2011 remained the same as the 2003-2006 period (two taxa and 15% of the sample), still higher than the first five years of monitoring. Overall, the winter bug collections scored an A for 2008-2011.

The fish and macroinvertebrate metric scores indicate that Nickel Creek is one of the healthy streams within the ecoregion.

## **Chemical Testing**

Chemical data have been collected monthly from Nickel Creek since May 1996. There is a break in the data from February 2006 until November 2007 when there was not a team monitoring regularly. Recently there was a break from April 2012 until February 2013 in which there was no monitoring team.

- **Dissolved Oxygen**

Dissolved oxygen saturation shows when there are problems with the amount of oxygen available in the water for aquatic life. Too little or too much are indicators of problems. In the period of 2009-2013, there was considerable variation in the amount of dissolved oxygen, though the average (82.5%) was still within an acceptable range (higher than 80%). The wide range of dissolved oxygen readings may be related to seasonal variation (slower stream flow and higher water temperature would result in lower dissolved oxygen). The worst scores were in 1999-2003 with an average of 71% and the majority of the readings in the caution range (80-50%). However the wider variation in the recent years is considerable and may require further analysis.

- **pH**

The median pH in Nickel Creek is 7.5, well within normal values.

- **Nitrogen**

An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. The median values of soluble nitrogen were historically below the detection levels of our tests. However there has been an increase in the nitrogen levels since 2008. From 2009 to 2013, the median amount of available nitrogen was 0.7mg/L N, still below the 0.8mg/L N cautionary level, but there were many monitoring days when the readings were within the cautionary levels. The increased nitrogen trend has existed since the first years of monitoring. Analysis of this trend should be considered in the context of the lower dissolved oxygen, higher amounts of silt and sediment, and lower than average collections of benthic fish species. It is possible that these trends relate to the increase in residences in the ecoregion (i.e. effects of runoff from lawns or disposal of fertilizers).

- **Phosphorus**

The orthophosphate phosphorus showed an increase around 2003 and 2004. The median for 2004-2008 and 2009-2013 was 0.03mg/L P; also well within normal values (below 0.05mg/L P). However, there has been an increase in the days when readings were higher than normal and in the cautionary value range. This should also be considered in a trend analysis as described above.

- **Chloride**

The median chloride value was 60mg/L Cl in 2009-2013, lower than the 2004-2008 median value of 85mg/L Cl, and still not of concern.

## **Synopsis**

Even though the watershed of Nickel Creek is developing, the habitat at the site is very good and appears to be improving over the last decade. Fish collections have been almost comparable to the healthiest streams in the Cross Timbers ecoregion, but have lacked some sensitive benthic species and diversity. Summer benthic macroinvertebrate collections often scored lower than average, but this may be due to seasonal low flow. Winter macroinvertebrate collections regularly score high. The water chemistry at Nickel Creek is generally within acceptable ranges. However, further investigation into the trend noted for nitrogen, dissolved oxygen, and phosphorous would be worthwhile. Nickel Creek is not quite pristine, but is still healthy, especially considering the development in the watershed. The new priority may be to teach residents in the Cross Timbers watershed the basic water management practices so that Nickel Creek can maintain its health and value to the life within the stream and downstream into Polecat Creek.