Delaware Creek: Hwy 97

NE SE NE
Section 33-21N-11E
Osage County
Latitude N 36° 15' 19.6"
Longitude W 96° 7' 18"
WBID# OK 121300-01-0150M

Blue Thumb Volunteer Monitoring Data Review – 3-Dec-2007
Written by: Jill Sutton

South of Zink Ranch and north of Shell Lake in Osage County is where one can find the Delaware Creek watershed. This watershed is an area of land which encompasses approximately 12 square miles in the Osage Hills. The black oaks and hickories share this watershed with ranches, farms and other rural dwellers. From the headwaters northeast of Shell Lake, Delaware Creek heads north/northeast towards highway 97. It continues east from highway 97 crossing into Tulsa County just north of Turley before merging with Bird Creek. Where Delaware Creek crosses highway 97 is the monitoring site for this creek. The monitoring site is flanked by banks as high as 20 feet of mostly thin bedded sandstones of 1-3 inch thickness with numerous soft sediment deformation beds and cross-bedding zones. Most of the depositional cycles end with 6-12 inch massive sandstone layers. Here is where the samples, measurements and assessments of monthly samples giving information and understanding of the health of the stream ecosystem are collected.

The physical condition of the stream at the monitoring site is noted each month as well as an in-depth assessment performed every five years on 400 meters of the creek. This stream has been allowed to meander resulting in undercut banks, root wads, submerged logs and other cover required to support life in this stream community. The creek bank shows minimal signs of erosion affording the diverse flora along the bank a stable place to grow. This in turn provides a fine source of food and shade to the aquatic community. Delaware Creek benefits from a fairly even mix of pool depths providing aquatic organisms a healthy and diverse habitat. However, the evidence of the recent drought is apparent with the decrease in flow, and the decrease in rocky runs and riffles. The pool bottoms show signs of increased deposition which is less favorable habitat for the small bugs that are necessary to sustain the fish. The habitat has been assessed on Delaware Creek three times, 1996, 2001 and 2006. All three times the physical habitat was better then the average high quality stream in the Cross Timbers ecoregion.

Physical evaluations are a cheap way to monitor stream health. Still another inexpensive tool to use is biological monitoring (fish and bug collections). There have been three fish collections since the summer of 1996. The fish were collected, and either identified and released or kept for identification by a professional taxonomist. Statistics were computed and compared with an average of high quality streams in the Cross Timbers ecoregion. Delaware Creek received an overall score of B+ for the summer collection of 2006, meaning it is almost comparable to pristine conditions. There were 21 species of fish collected compared to 19 in the reference stream conditions. There were three darters collected (orangethroat darter, redfin darter and logperch.) The presence of these sensitive benthic species is a good indictor of past and present conditions at this site. Sunfish dominated the fish collection with nine different species, reflecting desirable habitat. The number of intolerant species collected was low, whereas a high quality stream will have several members of the fish community that are intolerant to environmental stress. The proportion of tolerant fish (mosquito fish, channel catfish, etc.) and the proportion of insectivorous cyprinid fish (blackstripe topminnow, brook silverside, etc.) were low for both Delaware Creek and the reference conditions.

Bugs (benthic macroinvertebrates) have been collected in both the winter and summer periods since 1997. There were no collections performed from the summer of 1998 till the winter of 2004 due to no flow, with the exception being the winter of 2000. The samples were preserved and the bugs were picked and sent to a professional taxonomist for identification. Data was compiled, computed and compared to the high quality

stream scores. Delaware Creek has received and overall score of A for the winter collections since 1997. For the summer period the scores have been B's except for the summer of 2005 which received a C. This stream rates well in the indices that measure the evenness of the bug population, the total bug population's sensitivity to pollution, and the total number of different types of bugs within the population. Although the bug community is diverse, this stream typically has large numbers of one dominant species. This can be an indication of increasing pollution killing more and more species. This site has always been able to produce mayflies, stoneflies and caddisflies. Since these insects are sensitive to pollution, their presence is always a good sign. During the summers of 2005/2006 the total number and different types of these insects were low, but the other collections revealed adequate to excellent results. The benthic macroinvertebrate collections from Delaware Creek are comparable to the best situation expected within the ecoregion.

Bacteria testing was performed during the summer months of May through September to determine the total number of coliforms and the total number of fecal coliforms or *E. coli*. A desirable stream should have less than 400 E.coli CFU/100 mL. Delaware Creek has had high levels of fecal coliform totals in the past, but has not exceeded 400 since a reading of 2401 on 16-September-2004.

Chemical data were collected monthly between 7/24/01 and 05/28/07. Six different assays were performed on the water sample. Oxygen is a very important dissolved chemical and is needed by all plants and animals. Oxygen is not very soluble in water so decreasing amounts of dissolved oxygen could have a dramatic impact on the stream life. Delaware Creek has adequate to good dissolved oxygen values, with the low levels attributed to low flow. The median amount of dissolved oxygen is 72% saturation. The pH is another important test since many pollutants like pesticides and heavy metals have pH-dependent toxicity. Delaware Creek has had a pH range of 7.23-8.00 which is well within optimal levels. Macronutrients - nitrogen and phosphorous- can be major pollutants because of their growth-stimulating properties. Nitrate, nitrite, ammonia and orthophosphate were measured, and this stream has always tested low or below detectable levels. Chloride is present naturally in all streams, but can be used as a water pollution indicator. Chloride levels at Delaware Creek were consistently low and measured between 10mg/L and 50mg/L.

The Delaware Creek is not an isolated body of water. It is a reflection of the watershed in which it occurs. Overall Delaware Creek is a healthy stream and healthy implies life. When comparing this creek to other streams in the area, Delaware Creek shows good recovery of fish and bugs and excellent chemical testing results.