Deer Creek - Meridian Avenue
CE line SE SE Section 22-14N-4W
Oklahoma County
N 35º 40' 9.7"
W 97º 36' 9.9"
WBID # OK 620910-04-0120G

Blue Thumb Volunteer Monitoring Data Interpretation - February 2012
Written by Debbie Adams

Description of Watershed and Monitoring Site

Deer Creek is located just northwest of Oklahoma City and flows east, northeast into the Cimarron River. The headwaters of Deer Creek are southwest of the town of Piedmont. From its origin to the monitoring site at NW 192nd and Meridian Avenue, it winds through upper flatlands consisting mostly of farmland dotted with residential communities. There are several tributaries to the creek system, all entering upstream of the monitoring site. It is a third order creek by the time it reaches Meridian Avenue, which is where the monitoring takes place. Just eastward of the monitoring site the creek it is joined by Bluff Creek and bends northward until meeting with Cottonwood Creek, ultimately feeding into the Cimarron River. The overall watershed drainage area for the monitoring site on Deer Creek is approximately 74-78 square miles, most of the watershed being agricultural and acreage residences. Deer Creek is in the Central Great Plains ecoregion.

Stream Condition and Habitat Overview

The habitat assessment taken on 8/17/2009, scored an 85.1 overall, compared to the overall score of 77.6 for the average of high quality creeks in the Central Great Plains ecoregion. The canopy cover as well as instream and streamside vegetation is outstanding; tall trees line both shores and there are overhanging limbs to provide adequate cover and shade in some areas, while it is open to sunlight in others. In the time this creek has been monitored, the northern shoreline at the monitoring site has been severely eroding with the bank changing from a gradual slope to a steep-sided high bank. As a result, some of the vegetation that was present on the bank has been added as instream cover. The streamside vegetation ranges from tall grasses to saplings, but as stated previously, the banks are not very stable. Oftentimes the banks in places are being altered and eroded by periods of heavy rain, which interferes with the vegetative areas along the shoreline. The bottom of the creek being mud and sediment with some gravel, loose rock, coupled with a small amount of riffles and rocky runs contribute to the low scoring factors of the creek. There are a fairly decent number of deep pools which house a variety of organisms and the channel varies slightly, being changed when the stream rises which also contributes to the variability of organisms found here. Overall, Deer Creek has a wonderful habitat condition.

Biological Conditions

Fish

When compared to the Central Great Plains Reference Average, Deer Creek scores slightly lower, earning a 92% to the Reference Average's 100%. The total number of species found was greater at Deer Creek, indicating a greater diversity overall. The majority of the sample (95%) was made of fish species tolerant to pollution and sediment. There was one intolerant species found, that being the suckerhead minnow. There were four intermediate species collected; central stoneroller, spotted bass, black crappie and logperch. It is noted that the lack of intolerant benthic species (i.e. darters, madtoms, sculpins) indicates some degree of environmental stress present and therefore decreases the score of the fish collection. While the data does not score 100%, it is totally consistent with the concept of increased siltation causing these low numbers. On the positive side for the data accumulated, there was a higher diversity of sunfish species which would indicate that the pool quality, substrate and cover for spawning are fairly good. There is no previous data for this creek site to compare these numbers with, so any future fish collections will be very valuable to ascertain actual conditions at this site.

Benthic Macroinvertebrates

Macroinvertebrate collections have been performed at this Deer Creek monitoring site four times, winter and summer in 2003 and 2009. When the data is compared to the Central Great Plains Average, there is cause for cautious optimism about the quality of the water in Deer Creek. In terms of the number of different species, Deer Creek's raw data was higher than the Reference Average in three of the four collections, which is optimistic because the number increases with increased water and habitat quality. In the summer and winter collections of 2009, the number of species increased from that measured in 2003. Likewise, the EPT species (those sensitive to pollution/sediment) increased and was higher than the Reference Average. When metric scores are calculated using this data, Deer Creek is comparable or better to the Average in most areas, the only disappointment being in EPT Abundance/Population. Also, there is some concern for the HBI score, which measures invertebrate intolerance to organic pollution. A score of high 5's out of 10 was awarded each time, which is an indicator that the creek's water has some level of organic pollution (HBI increases as water quality decreases). The Central Great Plains Averaged a mid 5 HBI score for the winter and a high 4 HBI score for the summer. The number of tolerant species outnumbers the number of sensitive ones, but at this juncture, there are still sensitive species being found at this site.

Chemical Conditions

Chemical testing has been performed on Deer Creek at Meridian Avenue off and on since 8/30/2001 for a total of 30 samples contributing to this analysis.

Dissolved Oxygen (DO) - The oxygen saturation shows variation in the data, with no real trends to ascertain. There were four occasions where it dipped below 50% (a critical low level for biological life), these numbers being seen in summer months with high water temperatures. The overall average is 82.5% which is an acceptable level. There were many factors contributing to these cautionary levels, drought conditions and extreme high temperatures are just two factors that we know of for certain. The lowest values were a 2% on 9/27/2011 and 5% on 8/30/11, both times of extreme drought, where the creek level was so low that flow had ceased and pool temperatures were high. There were two occasions where DO saturation was above 120%, a critical high level for biological life.

pH - The pH of Deer Creek has remained stable throughout the sampling period, ranging from 7.5 to 8.5, achieving an average of 8 which is within the normal range.

Nitrate Nitrogen - The results for this test have ranged from below detection to 2.0mg/L N with the higher levels being recorded most recently, but not exclusive to this time frame.

Nitrite Nitrogen - The results for this test have ranged from below detection to 0.3mg/L N with the higher levels being recorded mostly in 2009, but not exclusive to this time frame.

Ammonia Nitrogen - There have been only 7 occasions of the 30 samples when there was any detectable amount of ammonia nitrogen, averaging 0.3mg/L N.

Soluble Nitrogen - Soluble Nitrogen is the combination of Nitrate, Nitrite and Ammonia. Well over the majority of the samples were above the normal level of 0.8mg/L N. The mid-range of the samples was at 0.98mg/L N. This is of some concern and it is not known where these nutrients are coming from.

Orthophosphate Phosphorous - The average value of 0.143mg/L P for orthophosphates is in the poor range, above 0.1mg/L P. There is wide variety in the values obtained, appearing to fluctuate with seasonal trends, being low in the winter months and higher in the summer. The highest value found was 0.670mg/L P on 9/24/2009. It is a hypothesis that fertilizer has entered the creek through the spring/summer months, which is not surprising given the watershed area through which Deer Creek flows.

Chloride - An average of 82.5mg/L Cl has been found for Deer Creek, with the lowest value recorded being 30mg/L Cl on 11/25/2008, while the highest value was 210mg/L Cl on 3/3/2003. The highest readings of chloride generally occurred in the winter months when runoff from salted roads is entering the creek. Fortunately the elevation of the chloride levels is temporary and is not trending upward.

Coliforms - Samples of water are cultured during the summer months to test for the presence of coliforms. Remarkable amounts of E. coli have not been found and are not considered an issue to be concerned with to date. This is encouraging, since the creek runs through agricultural areas and residential acreages.

Synopsis

The overall picture for Deer Creek is cautiously optimistic. Since its watershed is a combination of residential and agricultural, there is bound to be some periodic fluctuations in certain chemicals and conditions, but the creek maintains a rather healthy environment. In addition, there are several tributaries entering Deer Creek so analysis of their watersheds would also be prudent to get a full picture of what is occurring here. Several years ago Deer Creek was listed as a polluted body, but based on more recent observations and tests; the analysis shows signs of improvement over time. The macroinvertebrate species are showing a trend upward, which is ultimately an indicator of the overall health of the creek.