

Blue Thumb Monitoring Report 2004-2007
Little Deep Creek, Weatherford
NE SE NE, Section 17-12N-14W, Custer County
N 35° 31' 06.7"
W 98° 42' 00.3"
WBID#: OK520620-06-0040C

A. Monitoring Team

Little Deep Creek is monitored by a team of volunteers from Southwestern Oklahoma State University in Weatherford. Faculty monitors include Steven O'Neal, Peter Grant, and Les Ramos. Students have included Amy Aldrich, Stephanie Altenhofel, Kristi Cooper, and Justin Griffith. Monitoring began in summer 2004.

B. Monitoring Site Description

Little Deep Creek is a second order stream in the Central Great Plains ecoregion that drains approximately eight square miles of watershed above the monitoring site. The monitoring site is located south of Interstate 40 and southwest of the City of Weatherford Waste Water Treatment Plant. The manager of the plant has kindly maintained a rough access trail down to the site. The monitoring site on Little Deep Creek is approximately 100 m upstream from the plant effluent. It is noteworthy that regular monitoring of the effluent is performed by plant staff. The monitoring site is downstream from an old landfill that we suspect was active during the early and middle 1900s. As a result, most of the trash that is observed in the stream includes older bottles, cans, and broken porcelain and china.

C. Habitat Assessment

Little Deep Creek runs along the base of a bluff and is fairly straight in this area. It has a good variety of deep and shallow pools connected by a few rocky runs and riffles. The banks are fairly stable with good vegetative cover, though the pool bottoms are soft indicating sediment deposition from upstream erosion.

In August 2006, Little Deep Creek received a habitat assessment score of 84.8 which is above the habitat average of 77.6 in the high quality streams in this ecoregion. Pool variability, canopy cover, and streamside cover were rated as good. Instream cover, the presence of rocky runs and riffles, and bank stability were considered to be moderate. Stream characteristics that were rated poor included pool bottom substrate, flow, channel alteration, channel sinuosity, and bank vegetation stability. Channel alteration and channel sinuosity received the lowest scores of the assessment.

D. Collections

1. Macroinvertebrate Collections

Since summer 2004, macroinvertebrates have been collected from a rocky riffle in Little Deep Creek twice yearly, summer and winter. When compared with the average high quality streams in this ecoregion, the winter collections have had as many different taxa, but there have been fewer of the sensitive mayflies, stoneflies and caddisflies (EPT taxa). The summer collections are also missing many of the EPT taxa. Every collection is lacking in the diversity of sensitive species even though the population of sensitive bugs is very comparable to the high quality streams. The average of the winter collections is a little more tolerant to pollution. Overall

population diversity is better than the high quality streams. Some of these scores may be reflecting the drought conditions found during these years.

2. Fish Collections

Fish were collected from Little Deep Creek on August 17, 2006. This is the only collection since monitoring was initiated. There were a total of 948 fish collected representing 12 different species (0 darter/benthic species, 4 sunfish species, 1 long-lived species, and 1 intolerant species). The Shannon's Diversity Index was 1.77. The proportion of tolerant was 0.59, omnivores 0.35, insectivorous cyprinids 0.41, and piscivores 0.01. Red Shiner was the most common species (32%), followed by Sand Shiner (29%), Longear Sunfish (13%), and Suckermouth Minnow (11%). The fish collection at this site is 83% of the average of the high quality streams due entirely to the absence of sensitive benthic species. Little Deep Creek received a score of "B."

E. Water Chemistry

Water samples were collected from Little Deep Creek 34 times from June 2004 to April 2007. The mean value of *Dissolved Oxygen* during this period was 9.7 mg/L with a low of 6 mg/L in July 2006 and a high of 16 mg/L in January 2006. The % *oxygen saturation* was within the normal range with two exceptions, 135% saturation in June 2006 after a high flow event and 74% saturation in July 2006 during low flow. In respect to *pH*, values were relatively consistent and stable during this period between 7.7 to 8.0. Since monitoring began in the summer of 2004, *nitrate nitrogen* measurements have been consistently high. Of the 34 measurements during this period, 16 of the nitrate nitrogen measurements were ≥ 3.0 mg/L. Nitrate nitrogen ranged from a low of 0.5 mg/L in July 2004 to a high of 5.2 mg/L in December 2004. The mean nitrate nitrogen for this period was 2.9 mg/L. Except for measurements of 0.2 mg/L on five occasions during 2006, *nitrite nitrogen* has been below detectable limits. Of the 34 measurements during this period, *ammonia* was found to be between 0.0 and 0.2 mg/L in 29 of the samples. On one occasion (June 2005), ammonia was detected at 0.4 mg/L. An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite nitrogen. Obviously, the amount of soluble nitrogen is quite high. During this period, *orthophosphate phosphorus* ranged from a low of 0.007 mg/L (January 2005, April 2006, March 2007) to a high of 0.12 mg/L (November 2004). The mean orthophosphate phosphorus level for this period was 0.040 mg/L. We note that increases in orthophosphate phosphorus usually follow periods of increased rainfall. *Chloride* levels ranged from 15 mg/L (June 30, 2006) to 45 mg/L (July 17, 2004). The mean chloride level during this monitoring period was 27 mg/L.

With the exception of high values of nitrate nitrogen, the water chemistry is within normal expected values.

F. Microbiological Testing

Coliform testing was performed July 2006, August 2006, September 2006, and June 2007. Except for 16,500 CFU/100 mL in September 2006, fecal coliform levels were too numerous to count. *E. coli* counts were 100, 600, 800, and 160 CFU/100 mL for July 2006, August 2006, September 2006, and June 2007, respectively.

G. Summary

The habitat quality of Little Deep Creek from 2004 to 2007 was relatively good, although there is some sedimentation in the pools and flow is very low during the drought. The channel

sinuosity is low because the creek is straight along the bluff. Analysis of macroinvertebrate collections resulted in average condition grades of "B", reflecting few species of mayflies, stoneflies and caddisflies when compared with high quality streams in the Central Great Plains ecoregion. However, based on counts and the degree of diversity identified in macroinvertebrate and fish collections, it appears that the habitat and water quality of Little Deep Creek is sufficient to support a range of species. Nitrate nitrogen levels have been consistently high in Little Deep Creek samples, which may be largely attributed to the close proximity of farm land and grazing pastures, as well as the moderate to poor bank stability and bank vegetation stability. These same factors are also likely to be the basis for the high fecal coliform counts recorded in 2006 and 2007.