

Crutcho Creek: I-40

By: Erica Emerson and Vy Lee

NW SE SW
Section 5-11N-2W
Oklahoma County
N 35.45152°
W 97.43491°

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The site on Crutcho Creek is located under Interstate 40 near the Del City library in Del City, a suburb six miles southeast of Oklahoma City, Oklahoma. Crutcho Creek flows north to the North Canadian River and drains an area of approximately six square miles which includes a portion of Tinker Air Force Base. The watershed is mostly urban with a lot of parking lots, businesses and housing developments. The creek area itself doesn't have a lot of natural land; it is highly developed and because of business development and parking lots, there is a lot of potential for water pollution. Crutcho Creek is located in the Central Great Plains ecoregion.

Habitat

The habitat in Crutcho Creek is better than the habitat expected in known high quality streams within the Central Great Plains ecoregion. The canopy cover from the trees and streamside vegetation on the creek bank is good and helps shade the water. Rocky runs and riffles are present but not common. Crutcho Creek has an extremely healthy variety of water depth with both deep and shallow pools. There is an excellent amount of in-stream cover (logs, rocks, aquatic vegetation) for food and shelter for the fish and macroinvertebrate communities. The creek has a few little islands (point bars) in the middle of the water that indicate some instability in the creek bottom. There is not a lot of water flowing in Crutcho Creek, perhaps because it drains such a small area. In this portion of the creek, the channel is fairly straight. Overall, the habitat in Crutcho creek is excellent.

Biological Community - Fish

On July 24, 2008, 538 fish were collected out 400 meters of Crutcho Creek by seining (pulling a net through the water). Twelve species of fish were collected from the creek; 86% of the individuals collected are tolerant of poor water quality or loss of habitat. The greatest number of fish of a single species collected was the Red shiner, they are a tolerant fish and they are omnivores (fish that eat anything). The least number of fish collected was the Golden shiner, they are tolerant and they are also omnivores. The Suckermouth minnow is the only intolerant species and the sand shiner is the only intermediate species of fish collected. When compared with reference conditions, Crutcho Creek is missing the sensitive fish that live on the bottom of the stream and has few insect eating minnows.

The number of sensitive benthic species (the fish that live on the bottom of the stream) drops with increasing siltation and increasing benthic oxygen demand. Many of these fish actually live within the cobble and gravel interstices and are very good indicators of conditions that make this environment inhospitable. These species are weak swimmers that do not readily travel up and down a stream, so their presence or absence at a site relates well to both past and present habitat and water quality conditions at the site.

The proportion of insect eating minnows decreases as the quality and quantity of the invertebrate food base decreases. These are the dominant minnows in North American streams but are replaced by either omnivorous or herbivorous minnows as the quality of the food base deteriorates. Often, as the density of aquatic invertebrates decreases, the standing crop of algae increases. This is because the aquatic invertebrates are the largest group of primary consumers. Fish that can switch their diet to algae or fish that eat only algae will replace fish that cannot adapt to the new conditions.

When compared with other high quality streams in the ecoregion, Crutch Creek gets a grade of a C. The fish collection tells us that there is possibly some sediment travelling down the creek (even though the habitat is excellent) and there may be an oxygen problem, possibly caused by increased amounts of algae and/or reduced numbers of benthic macroinvertebrates (bugs).

Biological Community – Benthic Macroinvertebrates (Bugs)

Benthic macroinvertebrates have been collected from rocky riffles in Crutch Creek in the winter and summer since 2007. These bug collections are compared seasonally: winter collections are compared with other winter collections, summer with summer.

Winter collections from 2007 and 2008 are missing the sensitive Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) species. These are often referred to as the EPT species. With few exceptions, these insects are more sensitive to pollution than any other groups. As a stream deteriorates in quality, members of this group will be the first to disappear.

The summer collection from 2008 also indicated reduced numbers of the EPT taxa. There were 2 taxa in Crutch Creek while in the high quality streams you would expect to find 6 different taxa. 8% of the individuals in Crutch Creek were from the EPT taxa while in the high quality streams 52% of the individuals were from the EPT taxa.

As a group, these benthic macroinvertebrate collections tell us that Crutch Creek is missing most of the sensitive bugs and that there must be some pollution in the water.

Water Chemistry

Water chemistry was tested monthly on Crutch Creek between November 10, 2007 and September 12, 2008.

Oxygen Saturation: Normal oxygen saturation is between 80% and 130%. The oxygen saturation at Crutch Creek is below the normal range 75% of the time with the median value at 70% saturation. This is well within the caution range (50% - 80%). August 7, 2008 the value was 37% saturation. Anything below 50% saturation is dangerous for aquatic life.

pH was consistently between 7.5 – 8 which is normal.

Soluble nitrogen is estimated by adding the ammonia nitrogen, nitrate nitrogen and nitrite nitrogen. Normal values should be below 0.08 mg/L N. Crutch has elevated levels of nitrogen more than half of the time with a median value of 0.1 mg/L. The highest values occurred in January 2008, April 2008, July 2008, September 2008, October 2008, December 2008 and May 2009. The January and December levels could be a result of deicing on the highway and streets and the spring and fall levels could be from lawn and garden fertilization.

Phosphorus: Orthophosphate phosphorus is in the caution range (greater than 0.05 mg/L P) more than half of the time. On July 12, 2008 the value was 0.1 mg/L and in the high range.

Chloride has remained consistent with values between 50 -60 mg/L Cl which is normal for this area. In December 2007 and December 2008 values were over 100 mg/L Cl, probably the result of deicing.

The water chemistry at Crutch Creek shows that the nutrients nitrogen and phosphorus are slightly higher than they should be. Excess nutrients cause algae to grow and algae often cause a drop in the oxygen saturation. Several times in the winter there were high values of nitrogen and chloride possibly indicating deicing of streets and highways.

Bacteria

Bacteria were tested during the summer months of May through September in 2008 and 2009. While *E. coli* was very low in 2009, it was higher in 2008. (Bacteria is reported in colony forming units per 100 mL of water. CFUs/100 mL)

10 May 2008	300 CFUs/100 mL
13 Jun 2008	380 CFUs/100 mL
12 Jul 2008	420 CFUs/100 mL
07 Aug 2008	25 CFUs/100 mL
12 Sep 2008	2340 CFUs/100 mL

Summary

A healthy stream requires good physical habitat, good water chemistry and the biological community that you would expect to find living there.

The habitat at Crutch Creek is better than that found in the average high quality stream in the Central Great Plains ecoregion. There is good variety in pool depth, good canopy and shading, and excellent in-stream cover for aquatic life. While this reach of the

stream is straight and there is low flow, the banks are quite stable and there is good vegetation along the banks. There appears to be some excess sediment within the creek. The habitat at Crutch Creek is superior to the average high quality stream in this ecoregion.

The water chemistry indicates that Crutch Creek has elevated levels of the nutrients, nitrogen and phosphorus. These can cause algae growth. The oxygen saturation level is lower than it should be. Algae can cause this problem as well. Winter months indicate an occasional influx of chloride (salt) which is most probably caused by deicing of streets and highways.

The biological collections are missing the most sensitive species of both fish and benthic macroinvertebrates. The fish collections tells us that there is possibly some sediment travelling down the creek and there may be an oxygen problem, possibly caused by increased amounts of algae and/or reduced numbers of benthic macroinvertebrates (bugs). The bug collections indicate there must be some pollution in the water.

Though it is showing the effects of urban development, Crutch Creek is still reasonably healthy. If people don't stop polluting the creek soon all creatures living in it will die, but if people work together to clean up and stop pollution the creek will be a better place for the fish to live. Continued monitoring will show how urban development will affect the creek. Community education to homeowners, businesses and construction companies about the value of Crutch Creek could help stop its degradation.