

Tahlequah Town Branch: Spring Street

NE SE SW

Section 28-17N-22E

Cherokee County

Latitude N 35° 58' 4"

Longitude W 94° 58' 11.8"

WBID#: OK121700-03-0040P

Blue Thumb Volunteer Monitoring Data Review, December 6, 2006

Description of Watershed and Monitoring Site:

Tahlequah Town Branch is a beautiful, clear, spring-fed **second order** stream that is located primarily in a rapidly developing small city in northeast Oklahoma. It flows from north to south through both rural and urban areas in the city of Tahlequah and joins the Illinois River. It is in the Ozark Highlands ecoregion. The monitoring site is located near Northeastern State University where Spring Street crosses the creek.

Stream Condition & Habitat Overview

Though part of the stream has been stabilized by retaining walls where it runs through the NSU campus, most of the channel has not been altered. The water is clear and the bottom is rocky and stable for biological life in the creek. It is a low flow stream and is not very curvy. The banks are fairly stable with good vegetation and tree coverage which help shade the creek and keep the water temperature a little cooler. Most of the creek along a 400 meter stretch upstream from the monitoring site is ankle deep, with the deepest parts being around 0.5 meters (knee deep). Over half of the stream was pooled, 25% was classified as run and 25% as riffle. When compared to reference streams in the ecoregion known to be high quality, the habitat in Tahlequah Town Branch at Spring Street was ranked as very good.

Biological Conditions

Fish

The stream is not pristine. It is 43% of the quality of an average high quality Ozark Highland stream, a D - rating on a scale of A to E for fish sampling. The fish collection that was made on 9/13/2001 provided only 6 species of fish. (17 species was the average for the reference streams.) We found 2 intolerant species (southern redbelly dace and fantail darter) and 3 species of intermediate tolerance (central stoneroller, creek chub and orangethroat darter). By way of comparison, in reference conditions you would expect 11 intolerant species. Out of the total number of fish caught, 25% of the individuals were bluegill sunfish, a tolerant species. There were no insectivorous cyprinids, the dominant minnows in our streams that disappear 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.

Benthic Macroinvertebrates (bugs)

The quality of the macroinvertebrate collections has been declining over the last five years. The winter collections have dropped from 81% of reference in 2002 to 69% of reference in 2005. The summer collections have dropped from 93% of reference conditions in 2001 to 60% of reference in 2005. The average collection from each of the seasons scores a B on a scale from A to D. While there is good diversity with many different taxa, this site is missing taxa and corresponding numbers of individuals from the orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). 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.

Bacteria Testing

Water from Tahlequah Town Branch at Spring Street has been tested for *Escherichia coli* sporadically over the past few summers. The amount of *E. coli* in the water in Town Branch was higher than expected. The numbers below represent colonies of *E. coli* per 100 milliliters of water.

7/26/2001	460 CFUs/100 mL
7/18/2002	548 CFUs/100 mL
8/22/2002	196 CFUs/100 mL
9/19/2002	2419 CFUs/100 mL
6/24/2004	770 CFUs/100 mL

Inconsistent levels are shown over the last five years; however anything over 400 is unfavorable.

Chemical Testing

DO Dissolved oxygen saturation changes with the temperature of the water. By looking at the percent saturation, we can see when there are problems with the amount of oxygen available in the water for aquatic life. Too little oxygen can cause aquatic animals to die. Too much oxygen is an indicator that there are wide swings in the amount of oxygen available during a 24 hour period. This is often caused by algae in the water. The following data points fell outside the normal range of percent oxygen saturation.

10/11/2001	43%
8/7/2001	140%

8/28/2001	130%
3/25/2003	136%
8/28/2003	140%

pH pH in the State of Oklahoma is normal between 6.5 and 9. While the pH averages 7 in Tahlequah Town Branch, it dropped to 6.5 on 11/1/2001 and to 5.5 on 3/25/2003.

Nitrogen An estimate of soluble nitrogen was made by adding the amounts of ammonia-nitrogen and nitrate-nitrogen found in the water. Ideally, the level should remain below 0.8 mg/L nitrogen. It becomes a matter of concern when it is above 1.5 mg/L nitrogen. The soluble nitrogen in Town Branch was only below 0.8 mg/L nitrogen twice and was 1.5 mg/L nitrogen or more 75% of the times the creek was monitored between 2001 and 2006.

Phosphorus The amount of phosphorus allowed in Oklahoma's Scenic Rivers, including the Illinois River, is 0.037 mg/L. The amount of orthophosphate phosphorus found in Town Branch was only below that level four times between 2001 and 2006 and was greater than or equal to 0.1 mg/L four times.

9/24/2003	0.10 mg/L P
3/25/2004	0.15 mg/L P
4/29/2004	0.12 mg/L P
11/30/2004	0/14 mg/L P

Chloride Chloride levels in Town Branch average 14 mg/L.

Synopsis

Tahlequah Town Branch at Spring Street is a beautiful, clear stream with a fairly healthy physical habitat. Water chemistry shows increased levels of nutrients and high amounts of dissolved oxygen in the water, which indicate possible algal growth. The macroinvertebrate community, while still reasonable, has been showing signs of degradation over the past five years. The taxa that are missing are the sensitive mayflies, stoneflies and caddisflies. As the density of aquatic invertebrates decreases, the standing crop of algae increases. In 2001 limited numbers of individuals and fish species were collected and there were none of the insectivorous minnows that should dominate a healthy stream. *E. coli* levels in the stream are higher than expected.