

Walnut Creek Tributary: Rockwell Avenue

SE SE NE

Section 32-8N-4W

McClain County

35.12376°

-97.63537°

WBID#: OK520610-03-0115J

Blue Thumb Volunteer Monitoring Data Review - September 26, 2013

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Description of Watershed and Monitoring Site

Walnut Creek Tributary at Rockwell Avenue is located on the southeast side of Blanchard, OK which is about 28 miles south-southwest of Oklahoma City. The watershed area (area of land that drains into the tributary) is about 6-7 square miles on average from the headwaters of the tributary, which is on the north side of the main body of Walnut Creek. Walnut Creek eventually flows into the Canadian River. The tributary is located off Rockwell Avenue in a largely rural area with some housing nearby and downstream of some lagoon systems. Other land uses include farming and cattle. Walnut Creek Tributary lies in the Cross Timbers Ecoregion.

Stream Condition and Habitat Overview

The physical habitat at Walnut Creek Tributary was measured for 400 meters (about a quarter of a mile) downstream from the Rockwell Avenue bridge and had a total score of 74.1, just under the Cross Timbers Ecoregion high quality creeks reference average of 84.0. It scored high in terms of instream cover, pool variability, canopy cover shading, and streamside cover. Fallen trees were present in the water, helping to give cover for various insects and fish. There were areas of deep pools, which allowed for a possible variety of different species to live in. The riparian zone (the natural land area that extends out from the tributary water until it starts to be managed) was quite lush as it followed the course of the tributary. There were tall trees as well as patches of clearer area along the water's edge with grasses and shrubs growing, allowing for a mix of cool and non-cool temperatures throughout the riparian zone. Tree roots were sometimes a feature that held the banks in place where erosion was not as commonplace; however, shrubbery was the main form of botany. There was one section of the fished area that a big and deep pool was found, sadly the banks were eroding at a 90-degree angle. The tributary was generally straight in its course with not too much curvy variation. The tributary's bottom, being made

mostly of sand rather than rocks, is not stable thus sediment is constantly being washed with the course of the water in times of flow.

Biological Conditions

Fish

A fish collection was conducted in the summer of 2010, using the seining technique. While using the average high quality reference streams in this Cross Timbers Ecoregion as a benchmark, this unnamed tributary to Walnut Creek ranks quite low in terms of intolerant fish species. The total fish population was 100% tolerable to pollution (nutrients, sediment, low oxygen levels, etc.). The high quality reference streams averaged a tolerant fish population of 70%, which says that the remaining 30% was more sensitive to pollution. In this Walnut Tributary collection, there was a notable lack of benthic species, or, species of fish that live on the creek's bottom. The absence of benthic species could be due to the fact that the tributary has a sandy substrate as opposed to rocky, where benthic fish might lay their eggs.

Also a big difference was the amount of species collected; 9 for Walnut Tributary vs. 19 for the average of high quality reference streams. The most common fish species in the tributary sample was the Mosquitofish and Longear Sunfish, which are very tolerant to pollution. In total, 250 fish were collected in the sample. There was a low number of sunfish species (4 species from Walnut Tributary vs. 7 for the reference average) and an overall high percentage of insectivore/generalist feeders, which means that these species can survive on a varied diet, as opposed to more pollution-sensitive species with a more specialized diet. All this indicates, again, a lack of species diversity compared to a higher quality stream. The overall grade of the Walnut Tributary fish collection was a "D" for 2010.

Benthic Macroinvertebrates (Bugs)

Benthic macro invertebrates were collected in the summers of 2009 and 2010 and the winters of 2010 and 2011. The species found in the summer 2009 sample were largely tolerant to organic pollution as well as other pollution like nutrients, sediment, and low oxygen levels. The most common Order was Diptera, these turn in to flies and are all tolerant of pollution. The total bug population was more evenly distributed over the total number of bug species then compared to the reference conditions, so that was a good thing to see. There was only 1 sensitive species, a Mayfly, which was captured whereas the high quality reference streams averaged 7 sensitive bug species. This summer 2009 collection scored a "B" grade.

In summer 2010, the sample represented a fairly strong showing of species that were tolerant to organic pollution, though not quite as many as during the summer of 2009. The Order Diptera was by far the most common of the species represented. Just like in 2009, there was only 1 sensitive species, a Mayfly, which was captured whereas the high quality streams averaged 7 sensitive bug species. The population was not evenly distributed among the species, unlike summer 2009. This summer 2010 bug collection was quite poor, scoring a very low "C" grade.

In winter 2010 there were 2 species of sensitive bugs, half as many as the reference conditions. The bugs showed some tolerance to organic pollution but still very close to reference conditions. The total bug population was more evenly distributed amongst the bug species than the reference conditions. Order Diptera still made up the majority of the collection. This collection scored the highest of a high "B" score.

In winter 2011, the same was true for the Diptera being the dominant species, once again, which seems to be the pattern for this stream. One sensitive Mayfly species was collected which is below the reference average of 5 sensitive species. The overall population is showing signs of organic pollution and is not as evenly distributed as it should be. This collection scored a middle "C" grade.

Overall, the bugs sensitive to pollution made up only about 3% of the diversity when ideally there would have been at least 15%. The measure of balance in this case is geared toward the species that can resist pollution.

Chemical Condition

Water chemistry was tested monthly from 4/27/2009 to 12/31/2011 using Hach test kits for the following parameters.

Dissolved Oxygen. In looking at the percent saturation of dissolved oxygen, we can get a picture of when there might be problems with the amount of oxygen available to aquatic life. The Walnut Creek Tributary's mean value for dissolved oxygen was 77.5%, which is a little on the caution side of things. Normal levels would be between 80-130%. The readings show that oxygen levels were at their lowest on 9/26/2010 at only 21% saturation, a time when overpass construction debris altered flow of the stream. The highest reading was taken on 1/18/2010 with 114% saturation. The readings were normal toward the end of 2009 and early 2010, but began to waver between the normal and caution range heavily through to 2011.

Habitat alteration is one possible contributor to this rise and fall in oxygen saturation levels as well as lagoon discharge.

Nitrogen. An estimate of soluble nitrogen was made by adding nitrate nitrogen, nitrite nitrogen, and ammonia nitrogen. The median value was 0.7mg/L N which is just in the normal zone under 0.8mg/L N. About 20% of the data was in the caution zone between 0.8-1.5mg/L N and about 30% was above in the poor zone above 1.5mg/L N. There was one very high point at 16.5mg/L N on 8/18/2009, well into the poor conditions range.

Phosphorus. The amount of phosphorus allowed in Oklahoma's Scenic Rivers is 0.037 mg/L P. The Walnut Creek Tributary (not a scenic river) median reading was in the poor range with 0.01865 mg/L P. At no time during the monitoring were the readings in the normal range (below 0.05 mg/L P). The readings were particularly high (above 1.0 mg/L P) on 6/8/2009, 8/18/2009, and 5/24/2010. Most of these dates were in the summer season. Phosphorus is used in fertilizers, so, perhaps the readings coincided with the growing season. However, soaps from lagoon runoff are also a likely contributor to abnormally high readings.

pH. pH was steady between 7.5 and 8.0, which is normal for surface waters.

Chloride. Chloride ranged from 20-85mg/L Cl with a median value of 65mg/L Cl. These values are normal for this area.

Bacteria. E. Coli and Total Coliforms were screened 5 times by using Coliscan Easygel. These 5 samples had an average E. Coli of 1,293CFUs/100ml. This is quite high. Walnut Tributary was above the State of Oklahoma E. Coli Requirements of 400CFUs/100ml four of the five times it was screened. The tributary was downstream of three lagoon systems that might have caused a peak in E. Coli readings. The readings indicate a spike during the summer months, when possibly lagoon runoff was at its height. There is also cattle activity in the watershed that could be a contributor to the higher E. Coli readings.

Synopsis. This unnamed tributary to Walnut Creek runs southeast of Blanchard, OK in to its main body Walnut Creek. The tributary's flow was disrupted especially in August 2010 due to manmade obstacles. A nearby overpass was being repaired and debris from this construction (concrete, wood, and trash) fell into the creek and remained long enough for the flow to be severely disrupted. Stagnant water was a result of this habitat alteration. The physical habitat of the Walnut Creek Tributary is a little below the average high quality stream in the Cross Timbers Ecoregion with plentiful canopy cover shading and pool variability, however, its flow rate is generally poor and its bank stability is low due to erosion caused largely by cattle use. The biodiversity is also below average as the fish and bug collections yielded

poor results in terms of intolerant species. This would not be too surprising due to the sandy creek bottom, but also the below average dissolved oxygen rate and high nutrient findings. As the surrounding land is used for agriculture, some possible fertilizer run off could be an indicator for some pollutants in the readings. Also, the presence of three lagoons in the watershed likely contributed to high yields of E. Coli in the cultures.

