

Lariat Creek: E940 (American Horse Road)

County: Blaine

Legal: NW NW NE Sec36 T14N R12W

Lat/Long: N 35.65265, W -98.427367

WBID#: OK520620-01-0060T

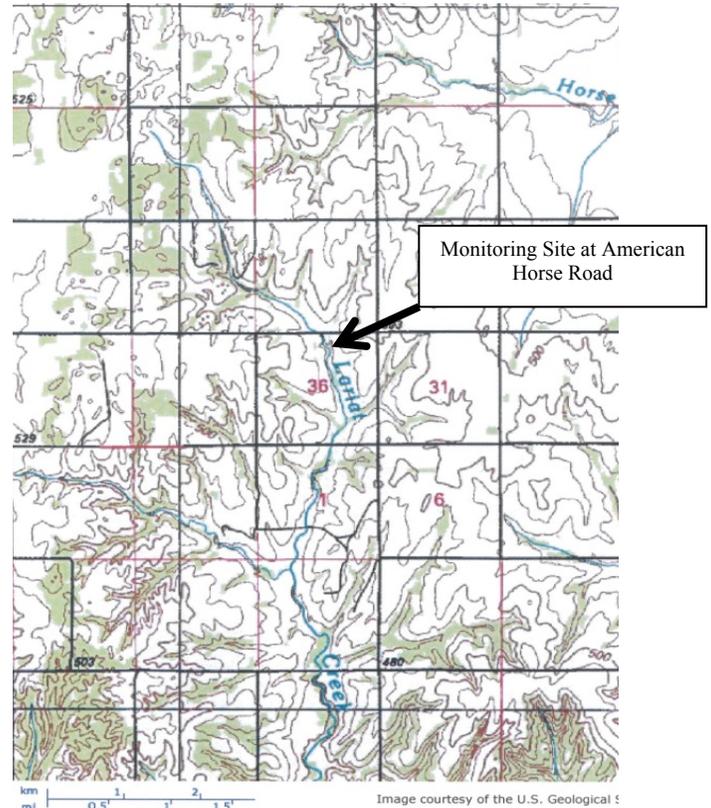
Blue Thumb Volunteer Monitoring Data Interpretation – July 2012

Written by Beth Landon

Description of Watershed and Monitoring Site

If one goes in search of Lariat Creek in Blaine County, Oklahoma, it is rather elusive. Traveling west by northwest from Geary, in the Central Great Plains to the west of State Highway 270, the headwaters rise from a natural spring. The creek itself returns to and reemerges from underground springs several times along its course until it joins with the North Canadian River approximately 8 miles from its beginning. Lariat Creek loses over 300 feet of elevation along its way, but it can be seen on this topographical map to move through fast elevation changes. The low mountains of this area create a narrow drainage area for Lariat Creek. It is obvious that downpours have become concentrated, cutting deeply into the bluffs through which the creek flows.

The Blue Thumb monitoring site is immediately south of American Horse Road (labeled on maps as E940) roughly halfway between two country roads (labeled on maps as N2560 Road and N2570 Road). Most of this area is grassland with some scattered homesteads and grazing cattle. The Lariat Creek Christian Camp occupies “eighteen rolling wooded acres” (from Lariat Creek Christian Camp Brochure) through which the creek flows. The camp’s cabins are constructed underneath the tree canopy to shade them from the harsh summer sun and an amphitheater used for church services has a pleasing view of the creek. On a different note, there is also an increasing presence of the oil and natural gas exploration and extraction companies up and down American Horse Road and on the side roads. The generally unpaved country roads show recent improvement, new signs warning of trucks turning dot the roadside, and new PVC- piped installations, highlighted with orange paint, emerge from the ground at the corner of each field section. Since the occurrence of these changes appears to be recent, it is unclear how Lariat Creek will be affected.



Stream Condition & Habitat Overview

Although a habitat assessment is performed every time a group goes to the creek, the most comprehensive assessment is taken in accordance with a fish collection. On June 18, 2009, the **fish collection/habitat assessment** was performed on Lariat Creek for 400 meters downstream from the monitoring site. The canopy and streamside covers were reported as being of high quality as is illustrated by this photo taken at the Lariat Creek Christian Camp on June 9, 2012. Instream cover and bank vegetation stability were only reported to be of medium quality. However, these variable points were not enough to overcome the poor quality of the rest of the parameters assessed.



Pool bottom substrate and flow are two parameters illuminated by this second photo. The creek channel is a mixture of sand and silt and clay making it very unstable for both macroinvertebrates and fish. As a spring-fed creek, the flow is chronically low year round with short bursts of water during precipitation events. Spring-fed creeks generally do not dry up during the long, hot summers in Oklahoma. A bit of established bank vegetation can be seen on this photo as well.



There is also an overall lack of variability in such factors as: the presence of deep pools, very few rocky riffles which are instrumental in increasing the dissolved oxygen content of the water, or a marked sinuosity. Sinuosity (sand and silt shifting by means of erosion and deposition creating a snakelike pattern) is the customary form of streams especially over the Central Great Plains. Although some twisting and turning can be seen on the satellite photographs, Lariat Creek runs pretty straight to the North Canadian River.

Finally, **bank stability** is of obvious concern based on this third photograph. Although bank vegetation may be considered to be reasonably well established by grasses and small plants, trees

which form the canopy cover, are being undermined by massive erosion. Going forward these issues need to be actively addressed to improve these factors that immediately impact the stream.

Biological Conditions

Fish

After the habitat assessment was performed on the morning of March 4, 2009, the 400meter section was seined to count and identify the fish present at that time. Each creek that Blue Thumb monitors is compared to a Reference Average that is created for each ecoregion of the state. The Fish Assessment generated a grade for the creek, which in this case



was an “E.” In any school, this is a failing grade. Along the nearly quarter-mile stretch only 16 fish were counted. One was a Largemouth Bass which indicates that larger fish are possible; however, it was a very young fish. Twelve of the fish were mosquitofish (*Gambusia affinis*), a small fish which was introduced to eradicate mosquitoes and have found a niche worldwide. Beside the abundance of their preferred food, they also thrive in low oxygenated waters. The last three fish were green sunfish, a species that prefers to live in slow-moving waters, even those of poor quality. All of these fish are considered tolerant of poor water quality which is a mixed blessing; it is a positive factor that fish reside in the creek at all, but it is a negative factor that they are so few and of a species that can live nearly anywhere.

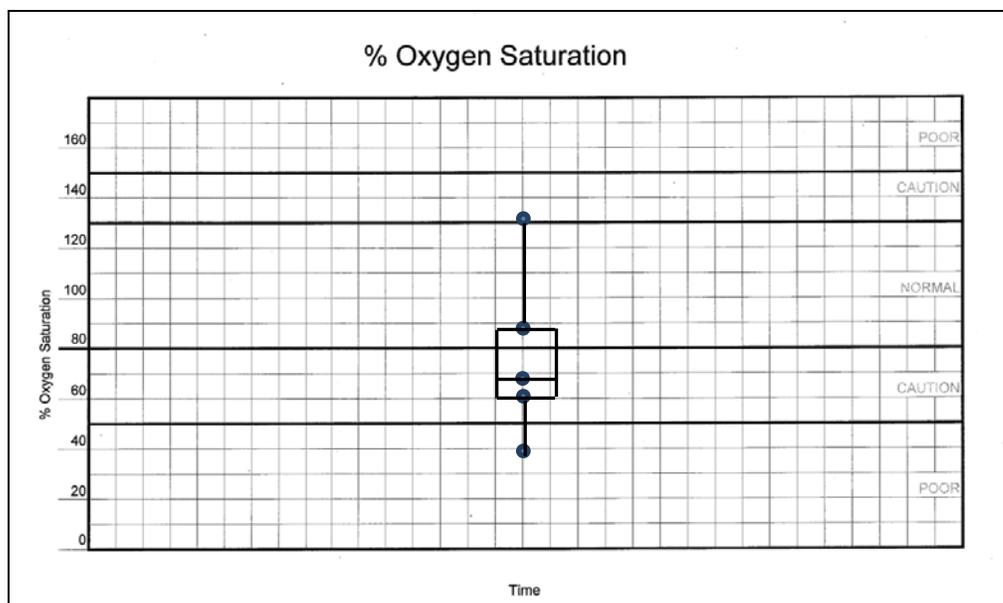
Benthic Macroinvertebrates (Creek Bugs)

The benthic macroinvertebrate, or bug, collections also generate letter grades for the creek. This is a quick and easy indicator of overall health of the creek. The fact that Lariat Creek earned a grade of “B” on March 4, 2009 in comparison to the Reference Average grade of “A” could indicate that its chemical and structural problems are not a big problem for the life of macroinvertebrates and fish. The results for the measures of diversity in insects, the Shannon-Weaver Diversity Index and the Hilsenhoff Biotic Index, indicated that Lariat Creek was at least as diverse as the Reference Average; however, it is interesting to note that of the 133 insects collected, 110 were representatives of only two species. Both of these species belong to the Chironomidae family (non-biting midges), which in the larval form resemble worms. They are known to thrive in conditions of low oxygen.

It is also to be noted that the two measures in which Lariat Creek falls behind the Reference Average are the variety and number of sensitive species. These are the “canary-in-the-coalmine” species of Mayfly, Stonefly, and Caddisfly that require higher oxygenation and lower pollution levels to thrive. From the results of the March 4, 2009 collection one species of Mayfly and one species of Caddisfly were represented by only 8 (of 133) individual insects. The fact that these macroinvertebrates were present suggests that there is hope to improve the health of Lariat Creek.

Chemical Condition

All of the chemical testing on Lariat Creek, performed by Blue Thumb volunteers, was reported from July 2008 through December 2009. Generally speaking, even on the dog days of summer, the water temperature never tested above 25°C (77°F) and frequently was recorded at 23°C (73.4°F). The tree canopy cover is doing a good job in keeping the water temperature moderated. Although this is a very positive component of a healthy stream, a low flow of water, being the normal state of this creek, can affect its physical condition negatively. As a rule cold water holds more oxygen than warm water, so the summer months in Oklahoma can be more stressful for fish especially during the years immediately following 2007, a year when the rainfall was nearly double the average.



The Dissolve Oxygen test was reported as 12 mg/L (the topmost dot on the grid) and 11 mg/L three times, eight times it was reported between 8 mg/L and 4 mg/L. A reading of 5 mg/L or below, especially during a summertime monitoring, can indicate severe stress on fish. For example, on October 25, 2008 a result of 5 mg/L was reported at a time when the water temperature reading showed 13°C (55.4°F). Since water temperatures lag behind air temperatures over time, it is likely that this low dissolved oxygen reading was the result of low flow. These figures generated an oxygen saturation level of 50%. By contrast the best monitoring result occurred on March 14, 2009, while the water temperature was read at 20°C (68°F) and the dissolved oxygen was reported as 12 mg/L, the oxygen saturation level reached 137%. As is shown by the %Oxygen Saturation grid, the creek spends nearly 40% of its time in the low cautionary zone.

Two other indicators are important in this rural region: the amounts of available nitrogen and phosphorous suspended in the creek water. These are nutrients which in high amounts can stimulate algae growth, choking the creek and robbing it of oxygen. On that same October day mentioned above, although the available nitrogen was reported as “below detection level,” the orthophosphate phosphorous reading was reported as 0.127 mg/L, the highest level of any monitoring on the creek. This amount may seem negligible; however, the upper legal limit for orthophosphate phosphorous according to the Oklahoma Scenic Rivers Act is 0.037 mg/L. Lariat Creek is not a scenic river. On the other hand it should be noted that on September 8, 2009 and November 7, 2009, the reported orthophosphate phosphorous results were the lowest on record. One explanation might be that there had been no rain in the six weeks prior to the October

monitoring event causing the orthophosphate to become concentrated in the creek, followed by a significant shower in the two weeks afterward, flushing the creek so that the November monitoring event reported results that were “below detection level.”

During that same monitoring event in October 2009 the amount of soluble nitrogen was reported as “below detection level.” Through 2008 and 2009 nitrogen levels rarely were reported in the cautionary zone. According to the data, overabundant amounts of nitrogen are not a big problem on Lariat Creek.

One substance that may become a problem in the future is chloride. From July 2008 through December 2009, reported amounts of chloride ranged evenly between 20 mg/L and 60 mg/L. This is a normal range for Central Oklahoma; however, this parameter bears scrutiny in the future considering the heightened activity of energy companies in the area.

Generally speaking the bacteria level in the creek is tested once a month from May through September. The bacteria level in Lariat Creek was tested twice in 2009. On June 5, 2009, the Coliscan EasyGel plates yielded readings of 486 for *E. coli* and 680 for Total Coliforms, as opposed to readings of 6000 for *E. coli* and 6000 for Total Coliforms on September 6, 2009. A reading of 6000, especially for both *E. coli* and Total Coliforms, indicated that the number of bacterial colonies was “too numerous to count” (TNTC). It is interesting to note that on that same September date, the %Oxygen Saturation was the lowest reading of all at 50% with almost the lowest readings for all of the chemical tests. On June 5, 2009 the %Oxygen Saturation reading was one of the highest at 134% along with higher chemical test readings. Cattle do have free access to Lariat Creek around the monitoring site and further downstream.

Synopsis

Because Lariat Creek is spring-fed it will most likely endure; however, there are some actions that can be taken to improve its condition. An enhancement of bank stability would go a long way to stimulate a recovery in many of the other issues. Fencing out the cattle would help the physical habitat a great deal as well as the water quality.