



Statewide Blue Thumb Water Pollution Education Program

Final Report: January 1, 2014 – December 31, 2014

FY 2013-2014 §319(h)

EPA Grant #C9-996100-17 – Project 8

Submitted by:

Oklahoma Conservation Commission ~ Water Quality Division

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Blue Thumb Volunteers at the “Twenty Years of Data Collection” Celebration
September 20, 2014
Edmond, Oklahoma

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Blue Thumb Water Quality Education Program 2014

When the moment arrives that the “Blue Thumb Final Report” winds down to the “big things” of the year, it is pretty exciting. Whether this should be referred to as a summary, as the items worthy of emphasis, or even as a place to put the things that do not neatly fit someplace else in the report, these are the activities and accomplishments that stand out for the Blue Thumb staff members now that 2014 is wrapped up.

1. Partnerships

Many events take place that bring Blue Thumb along. Sometimes groups, agencies, organizations, and others see Blue Thumb as more than an entity that can entertain a group for an hour. Blue Thumb also comes into contact with new organizations that share the goal of protecting the earth.

Twenty-fourteen brought Blue Thumb together with a number of organizations that became more than a partner for a single event. Blue Thumb AND these groups have seen fit to work together over time and for similar goals. The organizations that stand out as being more than a “one time” happening are:

- ◇ Wondertorium (Stillwater)
- ◇ Central Technical School (Drumright)
- ◇ OSU Environmental Sciences Program
- ◇ Camp McFadden
- ◇ Oklahoma Aquarium
- ◇ University of Central Oklahoma
- ◇ Wild Turkey Federation

- ◇ Girl Scouts of America
- ◇ STEM (science, technology, engineering and math) Summer Camp for Girls (Weatherford)
- ◇ Har-Ber Village and Museum (Grove)
- ◇ Choctaw Nation



STEM Summer Camp for 8th Grade Girls, Weatherford



World Ocean Day @ Oklahoma Aquarium



Camp McFadden, Kay County

2. Thumbs Up! For Blue Thumb Volunteers

Just as 2013 was the year to honor volunteers who started the Blue Thumb Program in the Tulsa area, 2014 was the year to honor western and central area Blue Thumb volunteers.

The “Thumbs Up” event was a conference for all volunteers and a celebration of the volunteers who have been at work a long time in the western and central part of Oklahoma. Not only was the conference special because of honoring volunteers, the agenda covered items such as:

- ◇ Kayaking and safety
- ◇ Rainfall Simulator (and benefit of no-till farming)
- ◇ The Historic Deep Fork River
- ◇ “Bob has a Blue Thumb”
- ◇ The Making of a Stream Steward”



Keynote Speaker
Cedric Bond



Exhibitor & soil artist
Carolyn Mathews



Sunfish at “Exhibits go Round



Medicine Creek's
Carol and Dennis Stayer



The Team—Happy the event came together.



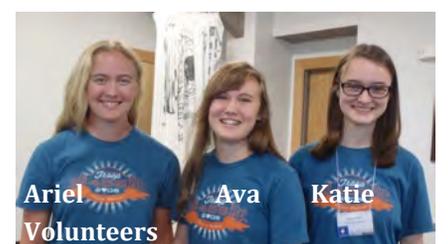
Volunteer John Harrington speaking
at “Exhibits go Round



Massive gathering



Soil Scientist
Greg Scott



Ariel
Volunteers

Ava

Katie



Water erosion demonstration



Center: Randy Fehr
Long time-volunteer



Les

Steve

Peter

3. Girl Scout Volunteers - Crutch Creek

Katie Prior, and Ariel and Ava McAffrey are homeschooled teenagers, Girl Scouts, Blue Thumb volunteers, and environmental enthusiasts.

The 2013 Blue Thumb final report provided information on this team, then in 2014, these young volunteers were recognized far beyond Blue Thumb. This trio won the “Keep Oklahoma Beautiful” Youth Initiative Award, and also raked in KOB’s “The Best of the Environmental Best” award.

These caring students have written two books (one of which is “Bob has a Blue Thumb”) and they spend their “spare” time setting up pollution prevention exhibits at their local library. All profits from their books are donated to the Oklahoma Blue Thumb Association.

These volunteers also investigate pollution sources and provide environmental presentations. Blue Thumb is THRILLED to have young volunteers of this caliber!



Katie, Ava, and Ariel with their KOB award



Ariel, Ava, and Katie with their exhibit at the Moore Public Library.

4. North Canadian River Traveling Educator Tour

The North Canadian River “Traveling Educator” Tour was held June 10—12, 2014. Twenty-one teachers, conservation district staff members, and other types of educators came along to learn about the North Canadian River watershed, ancient landforms, geologic processes, soil health, no-till farming, water quality, drought, groundwater, riparian areas, the Dust Bowl, and much more.

Blue Thumb was excited to have a role in demonstrating field techniques for collecting fish and fish identification, operating the groundwater model, and explaining runoff and watersheds. Like the tour in 2011, the participants got a very good feel for the land, water, wildlife, and history of the North Canadian River watershed.



Four participants gather around the stream trailer to learn about bank erosion and hydrology.

Tour participants prepare for a trek to the stream for a lesson in water quality!



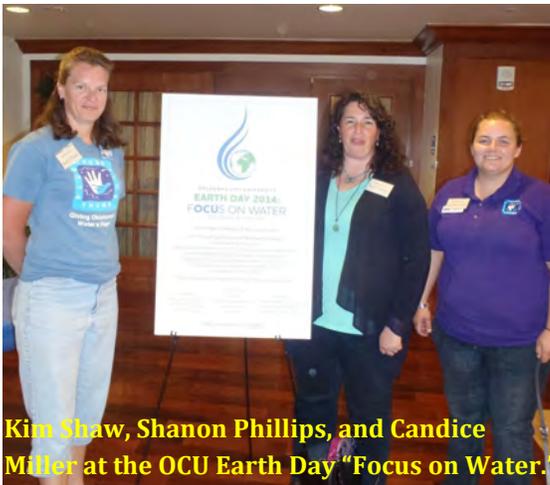
5. Earth Day 2014: Boeing and OCU

The Boeing Corporation, located in Midwest City, contacted Blue Thumb staff members in the fall of 2013 with an invitation to offer the staff of Boeing's headquarters' site a memorable Earth Day festival. Several planning meetings were held, and indeed, April 22 dawned sunny, yet cool.

Blue Thumb offered:

- ◇ EnviroScape Watershed demonstrations
- ◇ Live Macroinvertebrates
- ◇ Stream Trailer
- ◇ Fish Printing

In addition, Oklahoma City University, a longtime partner of Blue Thumb, invited staff to their Earth Day Celebration and Water Quality Panel the same late afternoon and evening. In fact, as is true each year, the month of April (also late March and early May) were filled with conservation education activities and presentations.



6. H2Ology Camp with Wondertorium

Blue Thumb jumped in with BOTH FEET to work with Stillwater's Science Museum, the Wondertorium, during the summer of 2014. June 23—27, Blue Thumb staff offered fourteen excited elementary age students the chance to learn all about water the Blue Thumb way.

Activities were many and varied, and included:

- ◇ Nature hikes
- ◇ Bird watching
- ◇ Water Olympics
- ◇ Building and painting watershed models
- ◇ Learning about macroinvertebrates
- ◇ Nature games and competitions

7. Leadership Training for Volunteers and Water Quality Specialists

Three separate workshops were held for volunteers and Oklahoma Conservation Commission Water Quality Specialists so they can be of more help to volunteers who are just getting started. In addition to helping new volunteers, the leadership tier of helpers/volunteers can perhaps;

- ◇ Be a part of educational events
- ◇ Ferry educational tools/reagents to various areas of the state
- ◇ Help volunteers with networking and spreading the word about pollution prevention
- ◇ Be of technical assistance for presentations and publications

Especially with the “targeted watersheds” concept for additional education going into effect, having the leadership volunteers/helpers ready to take action can add greatly to the chances of success in these watersheds.



Leadership training involved:

- ◇ Good communication skills
- ◇ Brushing up on water testing
- ◇ What's cool about nature



8. James “Jimbo” Jones Memorial Education Event, Broken Bow

The Oklahoma Blue Thumb Association was just barely approved for nonprofit status, when they were contacted by a Mr. Lonnie Davis. Mr. Davis had recently lost a good friend, Jim Jones, and he wanted to make a donation in Mr. Jones’ name.

Other friends of Jim Jones wanted to make a contribution as well. It turns out Mr. Jones was a lover of rivers and streams and a true conservationist from McCurtain County. The funding received made it possible to offer a children’s education day to members of the Broken Bow Boys and Girls Club on July 29. Most of the Boys and Girls Club members are affiliated with the Choctaw Tribe.

Additionally, funds are still being collected in Mr. Jones’ name and a bridge over the Mountain Fork River will be named after him once the new bridge is completed.

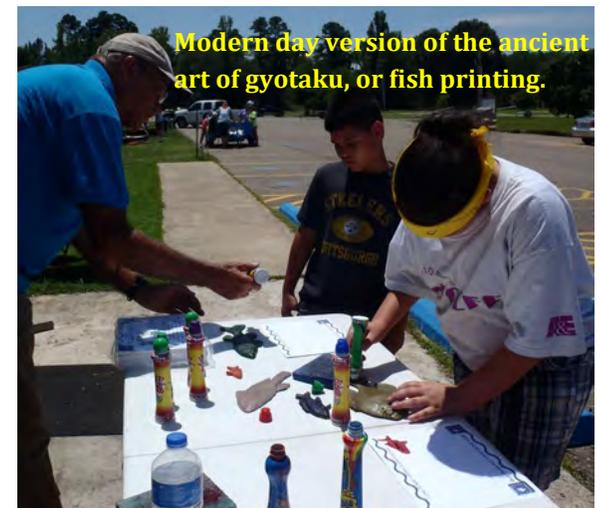
Photographs offer information of what activities took place. Approximately 70 children participated.



Stream Trailer: Hydrology and erosion lesson



Live benthic macroinvertebrates from a nearby stream.



Modern day version of the ancient art of gyotaku, or fish printing.



Grandchildren of Jim Jones



Large number of many of the Jim Jones Memorial Education Day Participants

Memorial Bandana—one was given to each child.



9. Oklahoma Blue Thumb Association

The Oklahoma Blue Thumb Association is about to enter their third year of existence. Twenty-fourteen has been a year of accomplishments for the organization. Among the successful efforts in 2014 are:

- ◇ Creation of articles of incorporation and registration as a non-profit corporation
- ◇ Development and revision of by-laws
- ◇ Funding of the Jim Jones Memorial Education Day
- ◇ All OBTA board members attended a Blue Thumb Leadership Training
- ◇ First annual meeting of OBTA members, held in conjunction with the “Thumbs UP!” volunteer conference
- ◇ Distribution of decals, membership cards, and annual report to all OBTA members



OBTA first annual membership meeting



OBTA silent auction fundraiser at OCLWA

10. Blue Thumb Publications

The Blue Thumb education coordinator, Candice, and the Blue Thumb communications coordinator, Jeri Fleming, have worked with additional Blue Thumb staff members and water quality specialists to complete several publications in 2014. Blue Thumb staff members come up with ideas for publications based on questions and comments from both volunteers and citizens at large. New publications can be found in Appendix F, but a few of the stellar new documents are alluded to here.

“Living on the Land” and “Living in Town” offer citizens an alternative to mowing, grazing, or farming right to the stream’s water.



Right—Brand new Blue Thumb Field Guide to Stream Fish. Volunteers (and other citizens) are learning from and enjoying this publication greatly.



2015 Blue Thumb Calendar features families who monitor together.



11. Blue Thumb Training Sessions for New Volunteers and Mini-academies

Blue Thumb Training Sessions for New Volunteers mark the first step in the process of becoming a monitoring volunteer with the Blue Thumb Program. For teachers or even 4-H leaders who come to a training, the option exists to have students and club participants taught about monitoring at a later date.



Undercroft Montessori School Mini-academy



Langston University
Mini-academy



New Blue Thumb Volunteers—Stillwater



Southwestern OK State University
Mini-academy



New Blue Thumb Volunteers—Hugo



New Blue Thumb Volunteers—Tulsa

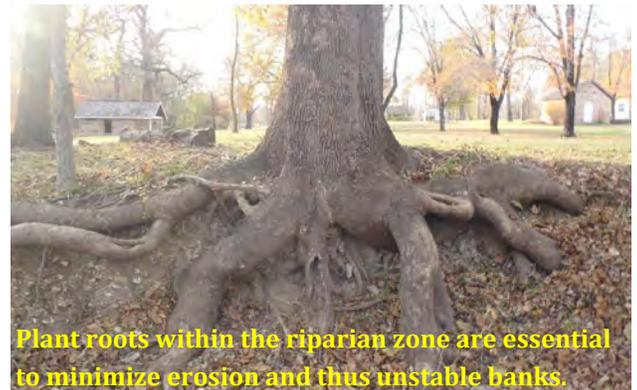
12. Introduction to Fluvial Geomorphology and Stream Restoration Course

Thirteen members of the Oklahoma Conservation Commission's Water Quality Division participated in a course that taught them the basics of stream morphology and restoration. Taught by Greg Jennings, the course was held in Tahlequah where OCC natural bank restoration projects have been ongoing for the past four years.

The primary value of the course for Blue Thumb staff was the greater understanding of how streams react to changes in the watershed. Every Blue Thumb training offers introductory information geared to help the new volunteers better understand watersheds and stream health. There are many examples of streams that are visibly degrading. Often questions come up about these. Blue Thumb staff is now better able to explain why streams "are like they are" and what can be done to improve them.



Students worked in teams to collect field data.



Plant roots within the riparian zone are essential to minimize erosion and thus unstable banks.



The "Introduction to Fluvial Geomorphology and Natural Stream Restoration" course included calculating "bankfull" stage and figuring out entrenchment ratios.

Blue Thumb Final Report - 2014

The Blue Thumb Water Quality Education Program offers this final report of activities to the US Environmental Protection Agency Region 6, as evidence of work completed in the calendar year of 2014. This final report relies upon the trust built between the Oklahoma Conservation Commission (particularly the Water Quality Division's Blue Thumb Program) and EPA Region 6 in complying with the approved Workplan. Following a format much like the one used in the previous two years, the author strives to document Blue Thumb activities while maintaining brevity. *The reader is particularly encouraged to note areas of text preceded by the blue arrow - ►. This arrow indicates extreme innovation, success, or perhaps simply something the writer feels is especially noteworthy.*

Exciting things happening within the Blue Thumb Program will be described in this report. As needed, the report will document work accomplished, and the reader is encouraged to let go and "enjoy the spirit" of progress that will be relayed as well!

Blue Thumb Program Description

Blue Thumb is a water quality education program that uses volunteers to monitor streams, screen groundwater, and educate the public about water pollution prevention. This is the only program in Oklahoma that supports volunteer stream monitoring. Blue Thumb is in its **twenty-third** year of existence.

Program Tasks

1. General Program Maintenance and Promotion
2. Groundwater Education and Screening for Western Oklahoma
3. Statewide Watershed Education Events
4. Support to Oklahoma's Conservation Districts

1. General Program Maintenance and Promotion

Blue Thumb staff members provide support to active, established volunteers while also pressing into new areas to offer Blue Thumb opportunities.

The counties with active monitoring in 2014 were:

Beaver	Mayes
Blaine	McClain
Caddo	McCurtain
Canadian	Murray
Cherokee	Oklahoma
Cleveland	Osage
Comanche	Ottawa
Creek	Payne
Custer	Pontotoc
Hughes	Pushmataha
Johnston	Roger Mills
Kay	Rogers
Latimer	Stephens
LeFlore	Tulsa
Logan	Woodward

Summary information for Blue Thumb Program, 2014:

Blue Thumb Volunteer Monitoring Program

Within the Blue Thumb Program, quality assurance is built into all aspects of volunteer monitoring. Basics of the Blue Thumb program for monitoring volunteers are:

- Volunteers attend a two-day training that covers pollutants, watersheds, stream ecology, field collections, and chemical monitoring
- Volunteers either form a team or are placed on existing teams to begin stream monitoring
- Data results are submitted to quality assurance officer Kim Shaw
- Volunteers participate in field collections overseen by staff members
- Volunteers attend quality assurance sessions

Additional opportunities for volunteers include educational activities where volunteers pass along the pollution prevention message to people within their watersheds and the community in general. Sometimes volunteer duties include:

- Making contacts with media
- Staffing exhibits
- Using watershed models to educate about water pollution prevention
- Data analysis and report writing
- Casual conversations and behavioral changes that lead to education through example

Quality assurance sessions are held for the various Blue Thumb groups four times each year. Volunteers' participation is mandatory. This said, obviously some volunteers miss these sessions, but Blue Thumb staff members work hard to plan in advance and make the sessions valuable experiences for the volunteers.

Quality Assurance Sessions for ensuring Credible Monitoring Results

Volunteers perform tests on known standards. This provides the opportunity to check:

- Volunteer skills
- Reagents
- Quality of de-ionized water
- Cleanliness of test kits

The Blue Thumb quality assurance plan was modified in 2012/2013 to allow additional OCC water quality staff members to have a role with volunteer field collections and stream site quality assurance sessions. During field work, individual volunteers now participate in QA sessions that allow staff members to document items such as:

- Do volunteers take their samples and test for dissolved oxygen at the appropriate location in the stream?
- Is rinse technique correct?
- Are all needed items being taken to the site?
- Is air temperature always measured before water temperature?

▶ Blue Thumb staff members are very happy to have help from water quality specialists from the Oklahoma Conservation Commission. Their addition has helped make it possible to continue program growth and offer "on site" quality assurance sessions.

Quality Assurance Sessions for additional Blue Thumb Activities

- Replenish reagents
- Hear important announcements
- Learn new activities and techniques
- Benefit from continuing education
- Sign up for educational events

Macroinvertebrate Collections

Blue Thumb volunteers participate with staff in Blue Thumb field experiences, particularly the collection of benthic macroinvertebrates. Collections of these larval insects, snails, mussels, worms and other spineless creatures from the stream take place primarily in January/February and July/August of each year. A change to the quality assurance plan is the removal of flow measurements taken during benthic macroinvertebrate collections. It was determined that this data was rarely used. Flow measurements continue to be taken during fish collections.

Blue Thumb volunteers learn early on that understanding stream health means gaining information on water chemistry, the life of the stream, and the stream's physical features. An important part of this effort is the re-occurring collection of macroinvertebrates. Normally these creatures are taken from a riffle with a kick net, according to Oklahoma Conservation Commission "standard operating procedures". Going outside with volunteers to make collections provides them with very important information, including:

- Field work takes place in all kinds of weather
- Macroinvertebrate collections are made with great attention to detail and according to standard operating procedure
- The life of a stream goes well beyond fish and land animals
- Aquatic insects frequently have very unique life histories that make it interesting to know more about your stream
- Aquatic insects are an important part of the stream's food web
- Macroinvertebrate collections, habitat information, and flow measurement results are used together; this demonstrates that "combinations" of information are important.

Macroinvertebrate collections made in 2014 include:

Winter Macroinvertebrate Collections 2014			
Name	M/F/H	Date	County
Pennington Creek: Turnaround	Macro	1/16/2014	Johnston
Pennington Creek: West Road Trail	Macro	1/16/2014	Johnston
Little Sandy Creek: Hwy 99	Macro	1/14/2014	Pontotoc
Rock Creek: Oklahoma Street	Macro	1/14/2014	Murray
Little Sandy Creek: Chamber Loop	Macro	1/14/2014	Pontotoc
Lake Creek: Wintersmith Bridge	Macro	1/14/2014	Pontotoc
Rock Creek: 40' Swimming Hole	Macro	1/14/2014	Murray
Chambers Creek	Macro	1/22/2014	Rogers
Double Spring Creek: W 730 Road	Macro	1/30/2014	Cherokee
Baron Fork River: Welling Road	Macro	1/30/2014	Cherokee
Cedar Hollow Creek: Nickel Preserve	Macro	1/29/2014	Cherokee

Winter Macroinvertebrate Collections 2014			
Name	M/F/H	Date	County
Park Hill Branch: Parkhill Rd.	Macro	1/20/2014	Cherokee
Park Hill Branch Creek: Murrell Home	Macro	1/28/2014	Cherokee
Tahlequah Ross Branch: Town Confluence	Macro	1/28/2014	Cherokee
Spring Creek: I-35	Macro	1/13/2014	Oklahoma
Tahlequah Town Branch: Basin Street	Macro	1/28/2014	Cherokee
Flint Creek: Fiddlers Bend, Above Illinois River	Macro	1/29/2014	Delaware
Spring Creek: Cavalier Road	Macro	1/28/2014	Mayes
Tenmile Creek: Davis	Macro	1/30/2014	Pushmataha
Clear Creek	Macro	1/30/2014	McCurtain
Mud Creek: E 2170 Road	Macro	1/30/2014	McCurtain
Yashoo Creek: Little River NWR	Macro	1/31/2014	McCurtain
Buffalo Creek: Ballard	Macro	1/31/2014	McCurtain
Bluff Creek: Battiest	Macro	1/31/2014	McCurtain
Crutcho Creek: I-40	Macro	1/13/2014	Oklahoma
Spring Creek: Martin Park	Macro	1/16/2014	Oklahoma
Chisholm Creek: 33rd & Western	Macro	1/21/2014	Oklahoma
Crutcho Creek: First Baptist Church	Macro	1/22/2014	Oklahoma
Bluff Creek: NW 150th	Macro	1/22/2014	Oklahoma
Bluff Creek: NW 150th	Macro-REP	1/22/2014	Oklahoma
Deer Creek: Meridian Avenue	Macro	1/30/2014	Oklahoma
Wolf Creek: McMahan Soccer Park	Macro	1/28/2014	Comanche
East Cache Creek: Big Green	Macro	1/28/2014	Comanche
East Cache Creek: Rodgers Lane	Macro	1/28/2014	Comanche
Jimmy Creek: Prose	Macro	1/28/2014	Comanche
Medicine Creek: Apache (Stayer)	Macro	1/28/2014	Comanche
Little River: SW 34th St.	Macro	1/13/2014	Cleveland
Bishop Creek: Constitution Street	Macro	1/30/2014	Cleveland
Bishop Creek: Eastwoods Park	Macro	1/18/2014	Cleveland
Merkle Creek: Brooks Street	Macro	2/1/2014	Cleveland
Spring Creek: Horinek	Macro	2/19/2014	Kay
Sand Creek: Osage Hills State Park	Macro	2/14/2014	Osage
Black Fork of Poteau River: CR D1513	Macro	2/19/2014	LeFlore
Sharp Creek: Smith Grove	Macro	2/1/2014	Beaver
Sharp Creek: Smith Silo	Macro	2/1/2014	Beaver
Little Deep Creek: Weatherford, Upstream of Treat	Macro	2/25/2014	Custer
Soldier Creek: Reno Avenue	Macro	2/24/2014	Oklahoma

Winter Macroinvertebrate Collections 2014			
Name	M/F/H	Date	County
North Fork Creek: Estates Park bridge	Macro	2/28/2014	Cleveland
Middle Creek: Buzzard Roost Ranch	Macro	2/28/2014	Hughes
Fourche Maline Creek: Black Loop	Macro	2/27/2014	Latimer
Rock Creek: Hwy 33	Macro	3/6/2014	Creek
Rock Creek: Hwy 33	Macro	3/6/2014	Creek
Spunky Creek: Hwy 412	Macro	3/6/2014	Rogers
Nickel Creek: 91st Street	Macro	3/5/2014	Tulsa
Fred Creek: Evanston	Macro	3/5/2014	Tulsa
Crow Creek: Zink Park	Macro	3/5/2014	Tulsa
Adams Creek: Broken Arrow High School	Macro	3/5/2014	Tulsa
Flat Rock Creek: Hwy 75	Macro	3/6/2014	Tulsa
Polecat Creek: 33rd West	Macro	3/6/2014	Tulsa
Fourmile Creek: Adams Park	Macro	2/28/2014	Canadian
Sixmile Creek: Kouba	Macro	2/27/2014	Canadian
Guy James Creek: NW Eubanks St.	Macro	3/11/2014	Oklahoma
Feather Creek: Old Hwy 51	Macro	2/25/2014	Payne
Boomer Creek: S. Perkins	Macro	2/27/2014	Payne
Boomer Creek: 3rd Ave	Macro	2/27/2014	Payne
Stillwater Creek: Babcock Park	Macro	2/27/2014	Payne
Sanborn-Hazen Lake Creek: Strickland Park	Macro	3/5/2014	Payne

Summer Macroinvertebrate Collections 2014			
Creek	M/F/H	Date	County
Fred Creek: Evanston	Macro	7/25/2014	Tulsa
Flat Rock Creek: Hwy 75	Macro	7/25/2014	Tulsa
Yashoo Creek: Little River NWR	Macro	7/29/2014	McCurtain
Mud Creek: E 2170 Road	Macro	7/30/2014	McCurtain
Clear Creek	Macro	7/30/2014	McCurtain
Pennington Creek: Turnaround	Macro	8/6/2014	Johnston
Pennington Creek: West Road Trail	Macro	8/6/2014	Johnston
Tahlequah Town Branch: Basin Street	Macro	8/5/2014	Cherokee
Park Hill Branch Creek: Murrell Home	Macro	8/6/2014	Cherokee
Cedar Hollow Creek: Nickel Preserve	Macro	8/6/2014	Cherokee
Spring Creek: Cavalier Road	Macro	8/5/2014	Mayes
Tahlequah Ross Branch: Town Confluence	Macro	8/5/2014	Cherokee
Baron Fork River: Welling Road	Macro	8/5/2014	Cherokee

Sanborn-Hazen Lake Creek: Strickland Park	Macro	8/20/2014	Payne
Tenmile Creek: Davis	Macro	7/8/2014	Pushmataha
Joe Creek: Metro Christian	Macro	8/19/2014	Tulsa
Mingo Creek: 46th Street North	Macro	8/19/2014	Tulsa
Mooser Creek: Pepsi	Macro	8/19/2014	Tulsa
Nickel Creek: 91st Street	Macro	8/18/2014	Tulsa
Polecat Creek: 33rd West	Macro	8/18/2014	Tulsa
Crow Creek: Zink Park	Macro	8/18/2014	Tulsa
Fourche Maline Creek: Robbers Cave State Park	Macro	8/28/2014	Latimer
Fourche Maline Creek: Black Loop	Macro	8/28/2014	Latimer
Spunky Creek: Hwy 412	Macro	8/26/2014	Rogers
Little Sandy Creek: Hwy 99	Macro	8/21/2014	Pontotoc
Black Fork of Poteau River: CR D1513	Macro	8/25/2014	LeFlore
Sharp Creek: Smith Grove	Macro	8/16/2014	Beaver
Sharp Creek: Smith Silo	Macro	8/16/2014	Beaver
Little River: SW 34th St.	Macro	7/7/2014	Cleveland
Merkle Creek: Brooks Street	Macro	7/11/2014	Cleveland
North Fork Creek: Estates Park bridge	Macro	8/25/2014	Cleveland
Bishop Creek: Eastwoods Park	Macro	8/21/2014	Cleveland
West Elm Creek: S. Douglas	Macro	8/25/2014	Cleveland
Jimmy Creek: Prose	Macro	5/27/2014	Comanche
East Cache Creek: Big Green	Macro	8/28/2014	Comanche
East Cache Creek: Rodgers Lane	Macro	8/28/2014	Comanche
Little Deep Creek: Weatherford, Upstream of Treat	Macro	8/7/2014	Custer
Middle Creek: Buzzard Roost Ranch	Macro	8/19/2014	Hughes
Spring Creek: Horinek	Macro	9/10/2014	Kay
Crutcho Creek: First Baptist Church	Macro	7/8/2014	Oklahoma
Spring Creek: Martin Park	Macro	8/8/2014	Oklahoma
Spring Creek: I-35	Macro	8/11/2014	Oklahoma
Chisholm Creek: 33rd & Western	Macro	8/14/2014	Oklahoma
Deer Creek: Meridian Avenue	Macro	8/20/2014	Oklahoma
Crutcho Creek: I-40	Macro	8/27/2014	Oklahoma
Guy James Creek: NW Eubanks St.	Macro	8/29/2014	Oklahoma
Rock Creek: Hwy 33	Macro	9/19/2014	Creek
Tar Creek: H Street N.E.	Macro	9/11/2014	Ottawa
Coal Creek: Hwy 11	Macro	9/12/2014	Tulsa
Polecat Creek: Elm	Macro	9/11/2014	Tulsa

Twenty-fourteen is hailed as a year that most streams had flow, and therefore macroinvertebrate collections could be made. Southwest Oklahoma is still in the driest condition, and not all collections could be made there. As the author prepares this report, the general feeling is that much of Oklahoma is doing better concerning rainfall than it has the previous three years. Meteorological information supports this. As was included in the final report last year, the writer holds concern that in some cases, where collections have been made the collections might not be truly representative of the stream, although the data is likely to be in character with consideration of two to three previously very dry years. All of this has been excellent conversation fodder to build stream understanding with the Blue Thumb volunteers.

The Seasons are Meaningful

The quality assurance sessions of winter and summer are associated with macroinvertebrate collections. Quality assurance sessions during these times are held at the stream, which is a triumph for Blue Thumb, and has been discussed previously.

The spring and autumn quality assurance sessions are held in conjunction with macroinvertebrate sub-sampling. In these sessions, a portion of the “bugs” and other spineless creatures from the previous collection are removed from the algae, rocks, sticks, leaves, etc. Volunteers do the work of bug removal, but they are watched over by staff members who:

- Check to see that the items removed really were once alive
- Check “picked” squares to see that all bugs have been found and
- Transfer the chosen 100 to 150 creatures to a vial in preparation of a journey to the Oklahoma Conservation Commission contract taxonomist.

While it is the role of the taxonomist to identify the creatures submitted, information on the various bugs of the sample is shared with volunteers during subsampling. Reference information on larval insect species, worms, snails, etc. is available, and many volunteers have become familiar with the creatures of their stream. Even a budding stream ecologist can grasp the importance of finding a diversity of creatures in their sample.

Of additional benefit to the volunteers are the books about aquatic insects that are available at all subsampling events. Often the bug pickers want to know what a certain bug will look like once it exits the watery world to become an adult. On more than one occasion, “gift” books that tell about macroinvertebrates have been made available to volunteers. ▶It is one of the biggest benefits of the Blue Thumb Program that volunteers are involved in a “full circle” approach. Those who do the actual subsampling have a better grasp of the “ecology” component than those who have NOT been on site during a macroinvertebrate collection.

Fish Collections

Blue Thumb fish collections are performed on the individual streams approximately once every five years. Fish collections are held in conjunction with habitat assessments. Volunteers probably get their best introduction to streams when they participate in these activities. For the time frame of this report, fish were collected from:

Fish Collections 2014			
Name	M/F/H	Date	County
Jimmy Creek: Prose	Fish	5/27/2014	Comanche
Fourmile Creek: Adams Park	Fish	6/2/2014	Canadian

Fish Collections 2014			
Name	M/F/H	Date	County
Sixmile Creek: Kouba	Fish	6/3/2014	Canadian
Spring Creek: Horinek	Fish	6/5/2014	Kay
Rock Creek: Hwy 33	Fish	6/24/2014	Creek
Little Deep Creek: Weatherford, Upstream of Treat	Fish	6/27/2014	Custer
Tar Creek: H Street N.E.	Fish	6/30/2014	Ottawa
Sand Creek: Osage Hills State Park	Fish	7/1/2014	Osage
Little River: SW 34th St.	Fish	7/7/2014	Cleveland
Crutcho Creek: First Baptist Church	Fish	7/8/2014	Oklahoma
Boomer Creek: S. Perkins	Fish	7/15/2014	Payne
Feather Creek: Old Hwy 51	Fish	7/21/2014	Payne
Sanborn-Hazen Lake Creek: Strickland Park	Fish	7/22/2014	Payne
Medicine Creek: Apache (Stayer)	Fish	8/6/2014	Comanche
Wolf Creek: McMahan Soccer Park	Fish	8/7/2014	Comanche
Spring Creek: Martin Park	Fish	8/8/2014	Oklahoma
Spring Creek: I-35	Fish	8/11/2014	Oklahoma
Chisholm Creek: 33rd & Western	Fish	8/14/2014	Oklahoma
Deer Creek: Meridian Avenue	Fish	8/20/2014	Oklahoma
Stillwater Creek: Babcock Park	Fish	8/26/2014	Payne
Crutcho Creek: I-40	Fish	8/27/2014	Oklahoma
Guy James Creek: NW Eubanks St.	Fish	8/29/2014	Oklahoma
Bluff Creek: NW 150th	Fish	9/8/2014	Oklahoma
Bishop Creek: Constitution Street	Fish	9/9/2014	Cleveland

Volunteers work with Blue Thumb staff to seine a 400 meter reach of stream. The staff member is the “lead collector”. This person is responsible for fish identification, deciding what fish will be kept as representative specimens, and photographing larger fish that will be released. The fish collection allows volunteers to experience:

- The variety of fish living in the stream
- Different fish occupying different stream habitats
- The individual sizes, builds, and colorations of fish
- The effort that must go into a fish collection to achieve reliable results and
- The importance of labeling, record-keeping, and documenting the collection.

Assessing the stream habitat, done just before the fish collection, is also an “eye opening” experience for volunteers. This on-site effort is essentially a look at the stream from the viewpoint of a fish, and in some cases the viewpoint of a macroinvertebrate. As people, we tend to always view things from a people perspective. It is interesting to seek out the undercut banks, make note of the woody debris, and contemplate the size of the rocks in the runs so that we can understand what kind of “home” the stream really is.

Volunteer Training Sessions

The Blue Thumb Program recruits volunteers in new areas, and also recruits new volunteers to enter existing program areas. This is another important aspect of the maintenance and promotion task.

Blue Thumb training sessions held during 2014 include

- January 24 & 25 – Blue Thumb Training for New Volunteers, Norman
- March 29 & 30 – Blue Thumb Training for New Volunteers, Stillwater
- June 16 & 17 – Blue Thumb Training for New Volunteers, Hugo
- August 23 & 24 – Blue Thumb Training for New Volunteers, Freedom
- October 10 & 11 – Blue Thumb Training for New Volunteers, Tulsa

Blue Thumb training sessions introduce and educate participants in the subject areas of:

- Stream monitoring
- Stream ecology
- Watersheds
- Common pollutants
- Communications
- Stewardship and
- Field collections.

Blue Thumb volunteers graduate from training ready to join a team and begin monthly monitoring on a site. They spend much of their volunteer time in chemical monitoring. Chemical tests performed are:

- Temperature
- Secchi depth
- Dissolved oxygen
- pH
- Nitrate /Nitrite
- Ammonia nitrogen
- Orthophosphate phosphorus
- Chloride

Mini-academies for Middle School, High School, and College Students

Blue Thumb mini-academies are offered to the students of teachers who have completed a Blue Thumb training. Sometimes teachers like the opportunity to have the students taught by Blue Thumb staff and it serves as a refresher for them as well. The time frame of this grant was the fifth year to offer mini-academies, and these events have been an excellent way to increase student interest and improve the quality of data received. Each mini-academy has a personality of its own, but essentially the students learn the testing procedures. Where more time is scheduled, students also go to the stream to gather sample water and make observations. Blue Thumb staff members view the mini-academies as very valuable experiences.

▶ Blue Thumb mini-academies are not new events, but Blue Thumb staff members are promoting these, and *the number offered has been increasing each year*. These events allow Blue Thumb staff the chance to get into the school to work with students, and often there is even a stream component. Mini-academies held in 2014:

- January 10 – Southwestern Oklahoma State University (Weatherford)
- January 31 – Langston University
- February 14 – Spiro Middle School

- March 11 – Jenks West Intermediate
- June 23 – Tulsa University
- August 25 – Hodgens Middle School
- August 26 – Sapulpa Middle School
- August 29 – Southwestern Oklahoma State University
- September 12 – Undercroft Montessori, Tulsa
- September 16 – Cameron University, Lawton
- November 6 & 7 – Street School, Tulsa
- November 19 – Hodgens Middle School

Quality Assurance is built into the Blue Thumb water quality education program. Descriptions and information below are included so the scrutinizing eye of the EPA officer can see how the volunteer monitoring takes place, and how quality assurance is the foundation of the program. Volunteers run each test twice for accuracy purposes. It is important for volunteers to be able to duplicate results so that they have confidence in their ability to properly test water. All tests except for pH, dissolved oxygen, and nitrate strips require that a “blank” be run. The blank is simply the testing of deionized water. Deionized water that yields a result other than “0” alerts volunteers to possibilities of problems – chemicals could be bad, glassware could be dirty, or technique could be questionable. And perhaps the most dreaded of all, the DI water is contaminated, which rarely happens.

Volunteers visit their site, collect their water sample, perform the dissolved oxygen test to the point where it is “fixed” and then complete site information on the data sheet. In addition to recording the chemical testing results, the data sheet has spaces, symbols, and choices for the recording of information about weather, stream stage, water clarity, human impacts, signs of animal activity, etc. Volunteers are required to perform the additional water tests in a controlled environment. Blue Thumb staff has found that test results are more likely to be accurate if tests are run indoors. The volunteers then have the responsibility of sending in the data sheet. Volunteers enter data on an Adobe document emailed to them from the quality assurance officer. Volunteers then submit this data back to the QA officer.

Volunteers have the option of monitoring bacteria May through September. Blue Thumb provides the necessary supplies. Blue Thumb is now in the seventh year of bacterial monitoring with the Coliscan Easygel method.

Volunteers add stream water to the medium, and then pour it into the Petri dishes, incubate the samples, and they then count the colonies. The Coliscan Easygel method of colony growth has been adopted by Blue Thumb, and details are in the Quality Assurance Plan. Blue Thumb staff has noticed that the volunteers’ comfort level in performing the bacterial testing continues to increase.

As an educational boost to the volunteers, Blue Thumb staff provided the teams with example cards that use color photography and text to identify *Escherichia coli*. These cards have given the volunteers more confidence in their colony counting.

Blue Thumb staff members work hard to communicate with volunteers. We strive to get volunteers to QA sessions, where announcements are made, and where they can hone their monitoring skills. Sometimes handouts are provided at QA sessions, and important announcements are always made. Blue Thumb staff members call, email, and send notes to volunteers about important activities, news, and announcements. In 2014 Blue Thumb volunteers accounted for 7,000 hours toward matching funds.

► Leadership Training Event for Blue Thumb volunteers

In 2013, Oklahoma Conservation Commission water quality specialists began taking part in helping Blue Thumb staff with summer and winter benthic macroinvertebrate collections and stream site quality assurance sessions. This has been a major boon to the Blue Thumb Program! Similarly in 2014, Leadership workshops were held for Blue Thumb volunteers who were willing to take on additional activities. Workshops were held:

- February 25 – Oklahoma City (8 volunteers)
- February 27 – Tulsa (10 volunteers)
- March 1 – Lawton (10 volunteers)

The four hour workshops covered test tips, instilling confidence in new volunteers, mentoring, and much more. An agenda for the workshop is included in an appendix.

2. Groundwater Education and Screening for Western Oklahoma

Blue Thumb Groundwater Screenings

March 12 – Creek County

September 6 – Oklahoma County

October 21 – Custer County

Blue Thumb responds to conservation districts who ask for a groundwater screening. Screenings are positive activities, as they help landowners to: 1) gain valuable wellhead protection information, 2) learn about a variety of parameters that are tested for, 3) bring in citizens for a one-time event as a volunteer, and 4) remember to turn to their conservation district for conservation information.

The Creek County groundwater screening in March resulted in forty-two samples screened. Alkalinity averaged 229mg/L with two samples greater than 400mg/L. Chloride averaged 49mg/L with two samples above 400mg/L. Nitrate averaged 2mg/L with the highest reading of 5mg/L in two samples. pH average was neutral at 7.1. Sulfate averaged 72mg/L with four samples above 200mg/L.

The Oklahoma County groundwater screening in September resulted in fifty samples screened. Alkalinity averaged 215mg/L with four samples greater than 400mg/L. Chloride averaged 34mg/L. Nitrate averaged 4mg/L with the highest reading of 10mg/L in one sample and the rest at 6mg/l or below. pH average was neutral at 6.9. Sulfate averaged 73mg/L with one sample above 200mg/L.

The Deer Creek Conservation District (Blaine, Caddo, Custer and Washita Counties) groundwater screening in October resulted in forty-two samples screened. Alkalinity averaged 250mg/L with two samples greater than 400mg/L. Chloride averaged 24mg/L. Nitrate averaged 7.9mg/L with eight samples above 10mg/L and the highest reading was 37mg/L. pH average was neutral at 7.0. Sulfate averaged 102mg/L with scattered results.

When high readings are found, participants are directed to the Oklahoma Department of Environmental Quality.

3. Blue Thumb Watershed Education Events

Blue Thumb education events that fall under this section can be found in Appendix D. Monthly reports are kept and all Blue Thumb activities can be found highlighted each month. A few major events are recorded here.

Oklahoma Association of Conservation Districts Area Meetings

Because Blue Thumb operates from the Oklahoma Conservation Commission's Water Quality Division, working with Oklahoma's 86 conservation districts is a priority. Reasons why the conservation districts are key to the success of Blue Thumb include:

- They exist all over the state
- Conservation Districts have an interest in resource protection
- Conservation Districts like to offer their citizens a chance to be involved
- Conservation Districts offer a location for events and meetings
- Conservation Districts can use volunteer help

Area meetings for 2014 were held:

- October 29 – Area III, Afton
- November 6 – Area IV, Quartz Mountain
- November 13 – Area I, Enid
- November 18 – Area II, Stillwater
- November 20 – Area V, Poteau

During the 2014 OACD Area Meetings, Blue Thumb set up an exhibit, distributed 2015 Blue Thumb calendars, and staff members announced their interest in working with local districts. Additionally, staff members reminded districts that groundwater screening events are available with help from Blue Thumb.

Statewide Watershed Education Events

The year 2014 saw much personal attention paid by this report's author to the concept of "watershed education". There is the education by staff members and volunteers that helps citizens realize that their actions can have an impact on a local stream, river, lake or wetland. The Blue Thumb Program has always viewed the program as having a formula similar to this:

Concerned citizens X appropriate training X stream data collection X stringent quality assurance X data interpretation = volunteers well prepared for specific watershed education.

The reader is urged to keep the above equation in mind and now consider this formula:

Committed volunteer X real data/data report X educational efforts within the watershed = stream that is protected from degradation or even stream that is improved.

The Blue Thumb volunteer program has in the past lead volunteers to do watershed education using tools such as: Enviroscope watershed model, storm sewer in a suitcase, and fish printing. Volunteers have been encouraged to take their data reports and provide them to local media, science teachers, and conservation districts. The Blue Thumb staff has had an epiphany. ► **Volunteers need more guidance concerning watershed education efforts and Blue Thumb staff is working to set up volunteers for success in watershed education as it has never been done before!**

► Blue Thumb staff members put pen to paper during 2014 and came up with a workplan adjustment (for 2015) that will educate and empower Blue Thumb volunteers to accomplish watershed education in three targeted watersheds. These watersheds are: Crow Creek (Tulsa County), Medicine Creek (Comanche County) and Pennington Creek (Johnston County).

The planning for these three watersheds has begun in 2014, but reporting should wait until 2015. This author is very happy about how early efforts in these watersheds is going!

The reader is urged to pay attention to the portion of this report titled "Monthly Reports." Everything that we did is listed. So far as Blue Thumb Volunteer efforts go, nearly 7,000 volunteer hours were

logged. The author guesses that probably at least 1,500 more hours somehow slipped through the cracks.

Improved Blue Thumb website and Facebook Page

► The Blue Thumb website <http://www.bluethumbok.com> is now truly a useful tool for staff, volunteers, and the public at large. Probably one of the best features of the website is the ability to easily find the volunteer written data interpretations. Of additional benefit are:

- All forms, instructions and procedures can be found
- Blue Thumb educational presentations are available for download
- Video instructions for some of the tests can be accessed
- **Videos of volunteers sharing why they love Blue Thumb are easily added to the site**
- Basic information on stream protection is provided
- It is easy to find the volunteer written data reports on the webpage
- **Easily updated calendar of events**

The Blue Thumb Facebook page is very active, with over 450 followers! Staff and volunteers are keeping posts updated and lots of volunteer involvement through comments and shares expand our reach everyday. This page can be accessed at <http://www.facebook.com/bluethumbok>.

4. Support to Oklahoma's Conservation Districts

Blue Thumb has maintained an attitude of service to conservation districts. There are many advantages to working with districts, including:

- ✓ Districts are spread over the state
- ✓ Districts disseminate a message of local resource conservation
- ✓ Districts provide a framework in which volunteers can work and have their hours credited
- ✓ Districts often have activities beyond Blue Thumb that require a volunteer workforce.

Keeping the above and in mind, and recognizing there are dwindling funds, administrators in the Blue Thumb Program are seeing more than ever the value that can come from working with a willing conservation district.

Oklahoma Blue Thumb Association

The Oklahoma Blue Thumb Association is now formed, and board members are governing the new association and are partnering with the Blue Thumb Program to build a stronger volunteer network and to ultimately better protect streams and rivers. To quote from an Oklahoma Blue Thumb Association membership brochure, "The Oklahoma Blue Thumb Association is organized exclusively for charitable and educational purposes, more specifically to promote clean and healthy water ecosystems in Oklahoma, with an emphasis on fishable and wadeable streams and rivers, through education, stewardship, and public outreach."

The Oklahoma Blue Thumb Association worked to increase involvement of Conservation Districts through a promotional effort by offering lifetime memberships to conservation districts for \$75, instead of the current \$150. Forty-six districts came aboard at this price. The idea was to gain conservation district "buy in."

The OBTA had an excellent first year of activity, with some of the achievements being...

- Contributing to the planning and financing of the 2014 Blue Thumb “Thumb’s UP” Volunteer Conference and Western and Central Oklahoma Volunteer Recognition
- OBTA retreat to begin the planning process for the association, and to allow board members to get to know each other better
- First OBTA membership meeting
- Support to the “Jimbo Jones “ Memorial Education Event in Broken Bow. Friends of Jim Jones, recently deceased, funded OBTA to offer an educational event in their friend’s name after his death. In addition, funding will be used to name a bridge after the locally beloved conservationist

Currently the Oklahoma Blue Thumb Association is putting together a plan for how funds that come to the association can be best used, which will lead the board to better know to whom they might turn for charitable gifts.

Blue Thumb Measures of Success

1. Continuation of at least 75% of existing Blue Thumb Programs

Blue Thumb has met this Measure of Success. Currently, monitoring takes place in these counties:

Beaver	Mayes
Blaine	McClain
Caddo	McCurtain
Canadian	Murray
Cherokee	Oklahoma
Cleveland	Osage
Comanche	Ottawa
Creek	Payne
Custer	Pontotoc
Hughes	Pushmataha
Johnston	Roger Mills
Kay	Rogers
Latimer	Stephens
LeFlore	Tulsa
Logan	Woodward

Additional Blue Thumb activities take place in additional counties. Such activities might include: groundwater screening, natural resource day, high school or college creek walks, presentations and/or exhibits at events. The ardent report reader is encouraged to review information in the monthly reports appendix to get a feel for the activity level of staff members and volunteers.

2. Measures of Success – Blue Thumb data reports will be completed for streams receiving fish collections in the previous year.

Data reports completed and still under review include:

- Bishop Creek, Cleveland County
- Coal Creek, Hughes County
- Doe Creek, Noble County
- Fourche Maline Creek, Latimer County
- Lake Creek, Pontotoc County
- Sharps Creek, Beaver County

- o Sixmile Creek, Canadian County
- o Soldier Creek, Oklahoma County
- o Spring Creek, Kay County

The data reports are in Appendix C. While this number of data reports is smaller than the number submitted last year, it is an interesting dive into the river of volunteerism and science to learn why. Blue Thumb fish collections are completed annually based on ecosystems. In some ecosystems we have more streams that are monitored. Sometimes the volunteers doing the report writing are slow at it, so they just do not get them completed in time to submit to the EPA. A couple of reports will needed to be included next year.

At this place in the report, allow the author to express appreciation to how well the gears move among Oklahoma Conservation Commission staff members. The 2013 Blue Thumb final report applauded the coming aboard of new staff members in the main Water Quality Office that work with data. Requests to the main office by Blue Thumb staff members are treated as a priority. This makes for smooth running of business, and quick entry of data, and quick output when results are needed. It takes a village to care for volunteers as they need to be cared for.

The reports listed above will be placed on the Blue Thumb website by April 30, 2015.

Finally, the Blue Thumb Quality Assurance Officer has settled into her job, and she pulled together all of the essential data, met with the volunteers, and got them started on the reports. Blue Thumb data reports are written by the volunteers and are based on the data collected. Volunteers turn the reports in, they are reviewed by the QA officer, and then they are ready to be published.

3. Measures of Success - Volunteers will Provide Blue Thumb Presentations – Two Annually

Blue Thumb volunteers provided presentations at the 2014 (April 2 & 3) Oklahoma Clean Lakes and Watersheds Association Annual Conference:

- Jahna Hill – Poster Presentation on Blue Thumb as a Great Way to gather Stream Data
- Ariel and Ava McCaffrey, and Katie Pryor – BOB and Stormwater, oral presentation

Jahna Hill continues in her efforts to gain a Master’s degree in Wildlife Conservation, fisheries option. Jahna has been inspired by the Blue Thumb Program, and boosts the program by often referring to it as her inspiration to go into science.

Ariel, Ava, and Katie are homeschooled teenagers who put their own powerpoint program together and gave the oral presentation. They are also the authors of a book, “Bob has a Blue Thumb” about a hedgehog that becomes frustrated when the stream near his home in the woods gets polluted. Bob works to educate the town people on reducing pollution! All proceeds from the Bob book goes to the Oklahoma Blue Thumb Association!

4. Measures of Success – Volunteers using their monitoring experiences and data reports for watershed education.

The reader is urged to look to the monthly reports concerning the individual education activities held by both volunteers and staff members.

Blue Thumb volunteers get the word out about protecting streams and rivers. Volunteers are notoriously BAD at logging the hours they spend in education. Early conversations about what would make for a successful Blue Thumb Program included language like: “seeing a cultural change in

people to live more sustainably on their land which means reducing actions that can leave streams eroding and polluted.”

Volunteers come aboard with Blue Thumb, and frequently these are very “green” people who live lives that are good examples for those around them. Blue Thumb volunteers frequently:

Recycle not only their own products, but serve as neighborhood recyclers!

Keep lawns that include native plantings for local wildlife and water conservation

Reduce chemical use or apply NO CHEMICALS to lawns

Leave riparian areas along streams

Talk to county commissioners and city council members about zoning and land management that is sustainable

Check out educational tools for use at home, at schools, with scout troops, neighborhood associations, libraries, and more

Write newspaper columns and letters to the editor

Post information on social media about environmental protection

Wear Blue Thumb shirts and proudly answer the question “what the heck is Blue Thumb?”

► **The Blue Thumb staff cannot gather and report on all of the ways that volunteers are making exciting things happen for the good of streams and rivers in Oklahoma!** Hopefully the scrutinizing eye of the EPA officer will “read between the lines” to see that this statement is true.

With input from the Oklahoma Blue Thumb Association, a second tier of volunteers is being built for the purpose of 1) helping new volunteers settle into monitoring and 2) contributing to more stream protection education, by themselves and other volunteers.

However, volunteers do accomplish education, and some ways that this happens is listed not only in the monthly reports, but also in the “Big Things of the Year” section.

Lessons Learned/Obstacles Overcome

It is interesting to read the “lessons learned and obstacles overcome” from last year. This is the part of the Blue Thumb final report that leads to soul searching. Jumping in...

There is never enough time. This is because the Blue Thumb staff “marches forward.” There is a philosophy of saying “yes” to groups who want a pollution prevention demonstration. There is a commitment to offering Blue Thumb training sessions and mini-academies throughout the state. There is great joy in every request that comes in for a “Creek Walk” because this is where the rubber meets the road...this is where stream biology becomes real for someone who perhaps has never considered it before. This is where somebody who has never pulled a seine gets that first chance. And this is why the Blue Thumb staff will never have “slow” times.

Throughout the state of Oklahoma, “here say” has been good to the Blue Thumb Program. We receive many invitations to be out there among the masses. Blue Thumb staff members want volunteers to be in a role to assist us, or in a role to borrow educational tools and find venues. Of course volunteers have their “duties,” but staff is working to move volunteers into creating their own educational activities in their own communities, in their own watersheds. This is a concept that is not new, but staff members continue to push volunteers in this direction.

Blue Thumb staff members have perhaps underutilized leadership volunteers and OCC water quality specialists who work with us. Report author looks forward to finding solutions to this, hopefully in 2015. This is very likely an important key to Blue Thumb Program expansion. Volunteers need care, and more people in a leadership role to offer this care simply means MORE opportunity!

Appendix A – Staff Voices

Blue Thumb staff members were provided with the opportunity to tell a little about themselves and describe their job duties for the 2014 Blue Thumb Final Report.

KIM SHAW

What is your title, and in this role, what is your primary function? *Blue Thumb Quality Assurance Officer.* Create what we need for our quarterly QA sessions with our active creek monitoring Blue Thumb volunteers: make up the standard solutions, create the QA memo that goes to the staff members leading the sessions, graph the results, problem solve any outstanding results/outliers or troubles with any of the tests. Update the QAPP annually. Keep staff and volunteers on track with all of the QA parts to the Blue Thumb program. Lead fish collector.

What is your favorite “on the job” duty? Any and all of the field work; even the 100+F degree summer days and negative degree wind chill winter days. I LOVE getting people (of all ages) out into a creek to explore what bugs/fish are there, what the physical habitat is like, conduct some or all of the Blue Thumb chemical tests, look at the land use, riparian area, talk about non-point source pollution while standing in a creek or by a storm drain.

Describe an event or two that took place in 2014 that made you especially proud or happy. I am ecstatic to have finally gotten in touch with and worked with several Girl Scout Troops in central Oklahoma in 2014. I was a Girl Scout from 1st grade-12th grade (in the USA, Germany and England) and I have always wanted to give back to the Girl Scout Organization through my skills and knowledge about water quality. Girl Scouts are currently big into empowering girls in the fields of science, engineering, technology and math so I fit right in to that. I have been on two interview panels for younger girls 3rd-6th grades, taught others about what water pollution is via our interactive EnviroScape watershed model, taken some out to a creek where we kicked up some creek bugs and seined fish and had them conduct some of the chemical tests on the creek’s water. A few troop leaders want creek experiences this spring/summer and I’ve been asked to be on two other interview panels later on this year. I even had a meeting at the corporate Girl Scout office in Oklahoma City with the staff member in charge of organizing the summer camps and I am scheduled, along with Cheryl Cheadle, to go out to the main summer camp to teach some their counselors about environmental education. I am also going to teach a full day session to the girls at this camp about water quality.

What are you looking forward to in 2015, or even 2016? The continuous growing/re-building of the Blue Thumb program. In 2012 we had several hits to the program and it (the program) and the volunteers suffered. We have been a full staff now since 2013 and have really seen the program growing again with leaps and bounds. So much more education is going on by our staff and we have ventured in to new and different venues and have gained many new contacts.

CANDICE MILLER

What is your title, and in this role, what is your primary function?

My title is *education coordinator or educator*. In this role, I produce educational materials such as our annual calendar and our new “Volunteer’s Field Guide to the Stream Fish of Oklahoma”, along with updating regular publications such as our informational brochure. I also participate in many outreach and educational events including natural resource days, mini-academies, an educator’s watershed tour,

and a school open house, as well as expanding my education with the Commission's educator workshop (trees) and fluvial geomorphology workshop.

What is your favorite "on the job" duty?

My favorite on the job duty is simply getting to work with volunteers; seeing their dedication and passion for the program is amazing. I know we work with volunteers in many different capacities, but each of them shares the belief that water is a precious resource that needs to be protected and that is a special thing.

Describe an event or two that took place in 2014 that made you especially proud or happy.

Participating in our Jim "Jimbo" Jones Memorial Education Event in Broken Bow was a great part of 2014. Providing hands on education for children of an under-served population was a rewarding experience. The children who participated had a fun-filled day with lessons and activities about conservation, water, and biological diversity.

What are you looking forward to in 2015, or even 2016?

For 2015, and into 2016, I am looking forward to working with our new targeted watershed project in Pennington Creek. I think we have a great group of volunteers in the area and I am excited knowing the potential they have to achieve success within this watershed.

JERI FLEMING

What is your title, and in this role, what is your primary function?

Blue Thumb Communications Coordinator, My primary functions are to maintain the website and facebook page, develop, edit and coordinate printing of Blue Thumb publications, t-shirts and other items as needed, disseminate press releases and build relationships with media, and work with volunteers in the Stillwater area.

What is your favorite "on the job" duty?

It is hard to narrow it down to just one! But I think my most favorite is when we take kids or adults to a stream and they discover for the first time what is living there – which I guess boils down to education. No matter how stressful a day has been, being able to get in a creek and share what I have learned with others makes the stress just flow right on downstream with the water!

Describe an event or two that took place in 2014 that made you especially proud or happy.

I was particularly pleased to help develop and teach the first ever Blue Thumb summer camp – H2Ology. Getting to spend three days with 14 kids who are excited about learning something new was very rewarding. And the selfish part of me was excited that four of my grandkids got to experience the summer camp as well and reaffirmed their excitement of learning about all things water. Our 2014 Celebration and Volunteer Conference was fun to help organize and introduced several volunteers to some new concepts at the conference. The exhibit go-round was especially fun for the volunteers, both the ones with the exhibits and the ones that were learning from other volunteers.

What are you looking forward to in 2015, or even 2016?

For 2015 I am looking forward to helping our legislators gain a better understanding of the importance of Oklahoma's streams and rivers and how voluntary programs are improving and protecting Oklahoma's waters through legislative field days. We have also been contacted by the Grand River Dam Authority, which manages Grand Lake in northeast Oklahoma about helping them develop a weeklong summer camp on the lake. Blue Thumb is always investigating ways to develop partnerships to help

meet our goal of stream protection through education and I look forward to forging new partnerships in 2015.

CHERYL CHEADLE

What is your title, and in this role, what is your primary function?

I am *Blue Thumb Coordinator*. I manage the Blue Thumb water quality education program, supervise staff, and coordinate volunteer activities and education. Like the other three Blue Thumb staff members, much of what I do is on site with our volunteers. All staff members have an area that is theirs to work, and we set up events and oversee volunteer activities in these areas.

What is your favorite “on the job” duty?

I very much enjoy being in the role of teaching. If I can be in this role in a creek on a nice day, with an interested audience, it doesn't get much better. We have only one earth, and we are called to care for it, to share it with other creatures, and to protect it. Of course in my field of interest, this is often going to apply to streams and rivers. I take the challenge of communicating about stewardship very seriously. When I am outdoors with people, it takes the pressure off of me to say the right thing. Getting people outdoors is the hard part. Once out and wading in the creek, people tend to only need an introduction to the very interesting life that resides there.

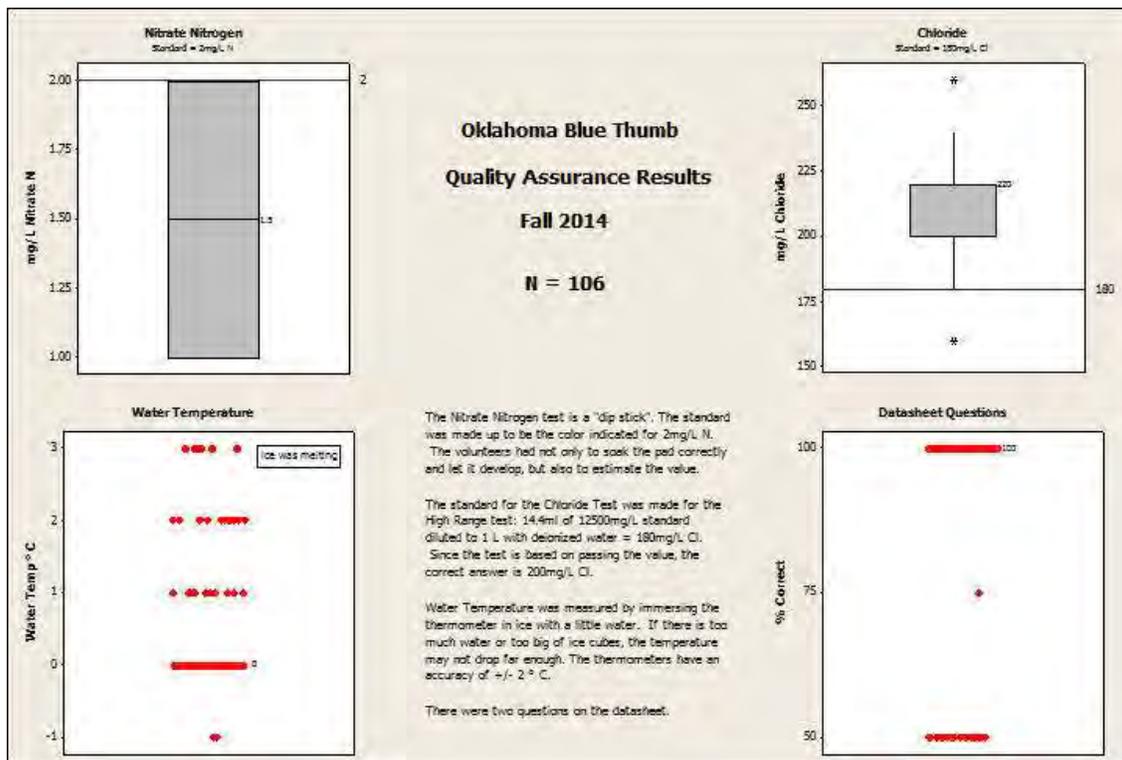
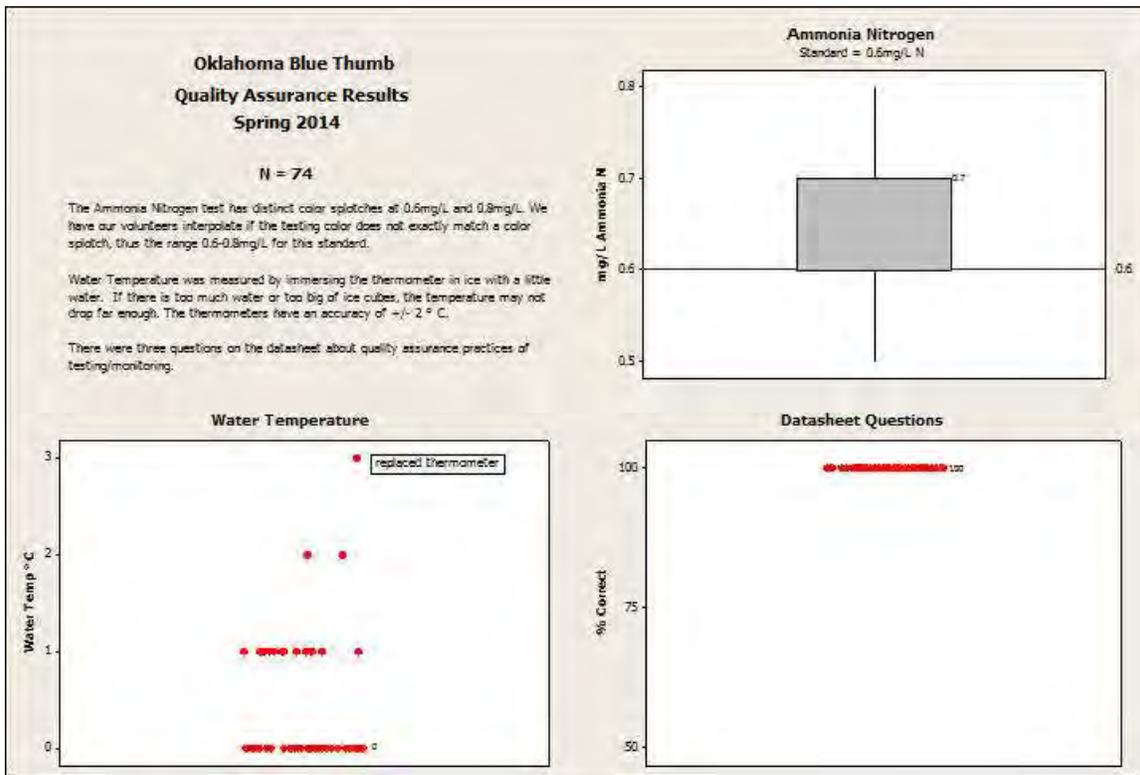
Describe an event or two that took place in 2014 that made you especially proud or happy.

The first events that come to mind were two particular days out in streams with middle school students. One was in Tulsa on Coal Creek. There were about 15 students from Undercroft Montessori School and they all put on waders and we went into the stream. We kicked for bugs and we seined for fish. Nobody was in a big hurry. A similar event was a few weeks later on Holi-Tuska Creek in LeFlore County, again with middle school students, probably 12 children. Everyone was quiet when quiet was needed, and the children learned that a nice stream will be a home. They loved looking at the fish and the bugs, and they loved pulling the seine. I wish I could say I was really “on” these two days, but what really happened was the coming together of children and nature. All that was needed was a little leadership, and the children were wonderful, respectful explorers!

What are you looking forward to in 2015, or even 2016?

I want 2015 to be the year of targeted watershed education for Crow Creek, Pennington Creek, and Medicine Creek. We are up and running to support volunteers as good things happen. I look forward to beginning the planning of a wonderful Blue Thumb Volunteer Conference that will draw all types of environmental volunteers. This will happen in 2016, but the planning will begin this summer. I look forward to engaging the leadership volunteers and the WQ Blue Thumb helpers in a way that lets them be involved where they have strengths, and so that they can be truly a part of the success of Blue Thumb. I look forward to taking a dive into a stream with an interested group of citizens who are eager to be a part of environmental stewardship.

Appendix B – Quality Assurance



Appendix C – Data Interpretations

Data interpretations written during 2014 are included on the following pages. The streams are:

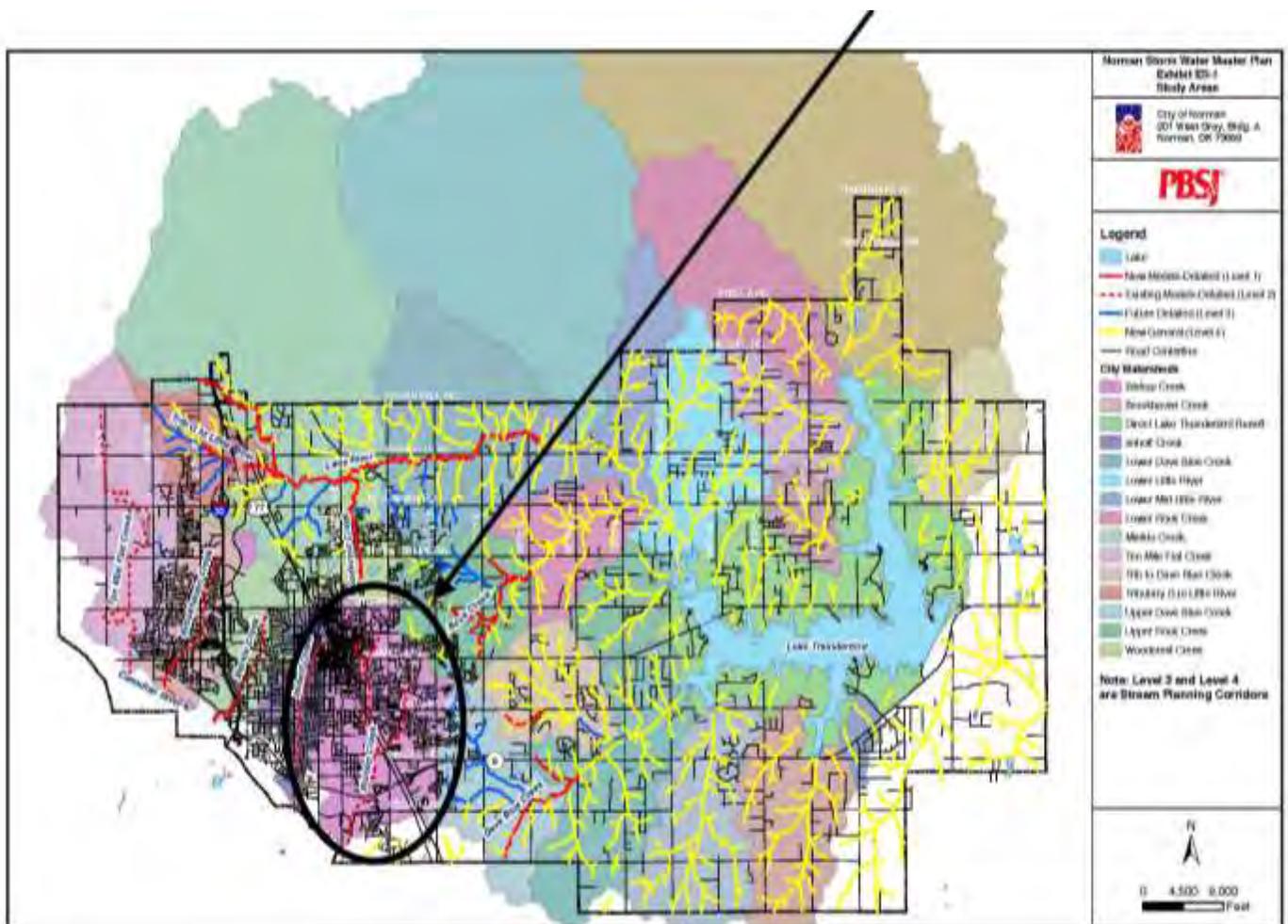
Bishop Creek – Lindsey	Page 34
Coal Creek – EW 137 Rd.	Page 42
Doe Creek	Page 45
Fourche-Maline – Black Loop	Page 48
Lake Creek	Page 52
Sharps Creek	Page 55
Sixmile Creek	Page 73
Soldier Creek – CR75	Page 76
Spring Creek – Horinek	Page 80

**Bishop Creek Tributary – Lindsey St.
NW NE NW
Section 5-8N-2W
Cleveland County
N 35.203752 W -97.435824
WBID#: OK520610-01-0180R**

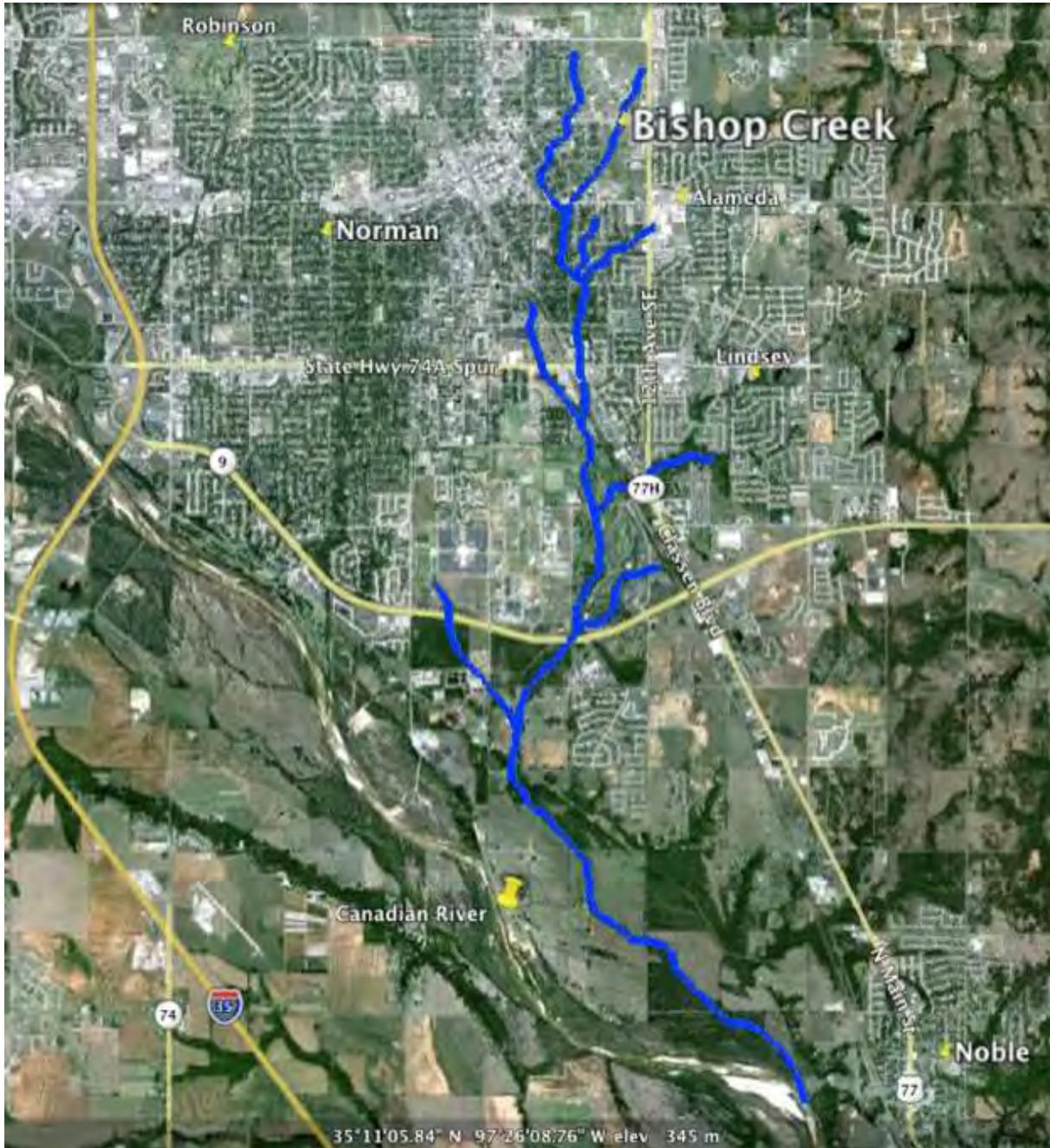
Blue Thumb Monitoring Data Review, December 2014

Written by: Karen Chapman

Bishop Creek is an urban stream that starts in north Norman and flows south into the South Canadian River on the west side of Noble. The Bishop Creek watershed drains an area of slightly less than 10 square miles in western Cleveland County in central Oklahoma.



Although part of the southernmost section is comprised of farmland, grassland, and wooded areas, most of this watershed is heavily urbanized with a significant degree of impervious surface cover: streets, parking lots, stand-alone businesses, restaurants, strip malls, a Walmart Supercenter (a Walmart Neighborhood Market is currently under construction as well), Norman Regional Hospital, and various types of housing (single-family homes, condominiums, duplexes, apartment complexes). The University of Oklahoma campus and the Jimmie Austin O.U. Golf Course are also located in this watershed.



This report will be covering data collected at the monitoring site on Lindsey Street which is located on a tributary of Bishop Creek and falls on O.U. property. This site is directly south of the O.U. duck pond. The source of this tributary is only ¼ mile north of the monitoring site between a housing area and railroad tracks.



HABITAT ASSESSMENT

**Bishop Creek Tributary
Total Points: 84.3**

**Central Great Plains Reference
Total Points: 77.6**

A habitat assessment was performed on July 26, 2011 in conjunction with the fish collection and summer macroinvertebrate collection. Bishop Creek Tributary ranked high in canopy cover, streamside cover, and instream cover. All three provide a habitat for aquatic and terrestrial life. Shade from the vegetation cools the water and the organic material dropped from the vegetation is a valuable nutrient source (e.g. leaves, twigs, needles).

Bank vegetation stability received a medium ranking, meaning there were places along the bank that had very little vegetation and there were signs of active erosion. Also receiving a medium ranking was pool variability (various shallow and deep places) as well as the presence of rocky runs and riffles. These characteristics are important in that they tend to encourage a diversity of aquatic life.

Unfortunately the lack of appreciable channel sinuosity (curves in the assessed 400 meters) and channel alteration (many newly formed point bars in the creek means it's unstable), combined with a pool bottom substrate composed mainly of mud, sand, and clay discourage a diversity of aquatic life. Bank stability also received a low ranking, possibly due to the effects of high-velocity runoff during storm events and bank vegetation that, although apparently in reasonable supply, was insufficient to stabilize the bank. Yet the overall score for Bishop Creek Tributary habitat assessment is better than the Central Great Plains Reference Conditions average score.

BACTERIA TESTING

No E. coli testing was conducted.

BIOLOGICAL COMMUNITY - FISH

Fish Collection: July 26, 2011
Condition: 42%, "E" grade

Central Great Plains Reference
Condition: 100%, "A" grade

One fish collection was performed using a seine beginning at the monitoring site and ending 400 meters downstream. A total of 1292 fish were identified representing 7 species, compared to 13 species from the Central Great Plains Reference data. There were 1045 mosquitofish (*Gambusia affinis*) identified, which constituted the largest group in this collection.

Out of the seven species represented, 1 species had intermediate tolerance to pollution: sand shiner (*Notropis stramineus*). Only 1 fish from this species was captured. No fish were found that were sensitive to pollution (intolerant species).

Among the 7 species captured:



Green Sunfish



Longear Sunfish



Mosquitofish

There was a low degree of diversity represented in this collection; 81% of the total fish collection was mosquitofish. This low diversity could possibly be the result of chemical pollution from the highly urbanized landuse. Another possible cause could be high-velocity flows when it rains due to all the impervious surfaces and not much natural grassy land. Or perhaps very high water temperatures, which lower dissolved oxygen levels. According to weather history records, Norman, Oklahoma experienced 28 days of triple-digit temperatures in July of 2011. Please note that this fish collection was performed the same day as the summer macroinvertebrate collection which also received in a low score.

BIOLOGICAL COMMUNITY - BENTHIC MACROINVERTEBRATES

A *benthic macroinvertebrate* is a spineless creature large enough so that it can be seen with the naked eye. Benthic means the creature is living underneath debris and rocks on the bottom of the creek. This includes the larval form of many insects that fly once they are mature. The condition of a stream is reflected, in part, by the number and diversity of macroinvertebrates present. Macroinvertebrates play an important role in the ecosystem by being a primary food source for aquatic life. Macroinvertebrate diversity is negatively impacted by sedimentation, chemical pollution, and loss of habitat. Because of this, macroinvertebrates are valuable bio-indicators that can be used to determine the health of a stream.

A benthic macroinvertebrate collection was performed on this site in the winter and summer of 2011. The EPT index was used in both collections to assist in determining water quality. *EPT* stands for *Ephemeroptera*, *Plecoptera*, and *Trichoptera* or *Mayfly*, *Stonefly*, and *Caddisfly*, respectively. These organisms are pollution intolerant. The higher the EPT index, the lower the pollution content of the creek.

Winter Collection -January 23, 2011
Condition: 100%, "A" grade

Central Great Plains Reference
Condition: 100%, "A" grade

There were 14 species represented in this collection which is better than the Central Great Plains Reference that averaged 12.6 species. The three most abundant species were comprised of two different midge fly larvae species (*Diptera Chironomini*) and *Diptera Orthoclaadiinae*) and a species of earthworm (*Haplotaxida Limnodrilus*). There were 80 organisms collected in these three taxa out of a total of 115 organisms. All three species are pollution tolerant, as were most of the taxa collected. There was only 1 individual from each of the EPT species mayfly, stonefly, and caddisfly; 2 % of the total population from the collection. Due to the greater number of species in this collection than reference conditions averaged really helped to score well in population distribution and diversity resulting in a final total score of 100%.

Summer Collection -July 26, 2011
Condition: 13%, "D" grade

Central Great Plains Reference
Condition: 100%, "A" grade

There were 6 species represented in this collection, compared to an average of 16 species for the Central Great Plains Reference. Just over ¼ of the total population came from 1 species of midge fly larvae (*Diptera Chironomini*), which is tolerant to pollution. This resulted in an extremely poor score for species distribution and diversity. No EPT species were found in this collection, although there were 2 pollution-sensitive species represented: 1 damselfly (*Odonata Argia*) and 2 fingernail clams (*Veneroida Sphaerium*).

There was an impressive amount of diversity and distribution in the winter collection (albeit mostly pollution-tolerant species), which contributed to the high score. The EPT index from the winter collection suggested this creek had potential. It is unknown what created the circumstances that resulted in the low score for the summer collection. Given the fact that this is an urban creek, it is possible that chemical pollution played a role. Warmer water temperatures and low flow can lower the dissolved oxygen level, which can also stress aquatic life. July of 2011 was a particularly hot month, as already stated.

CHEMICAL TESTING

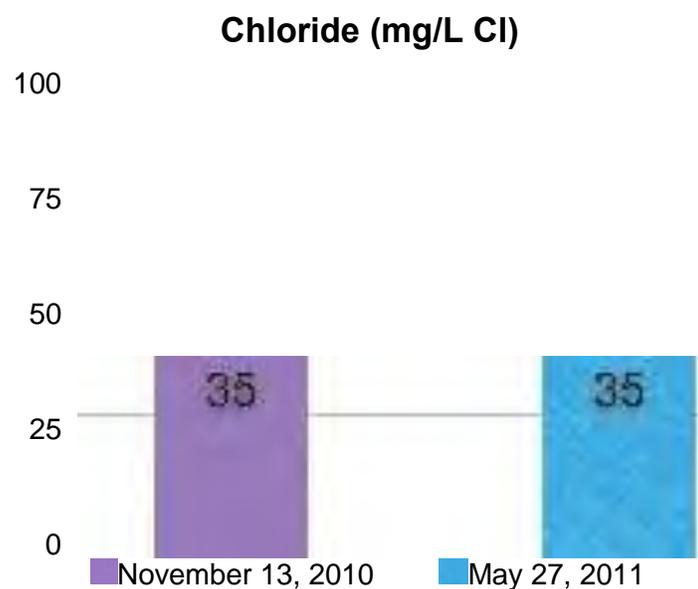
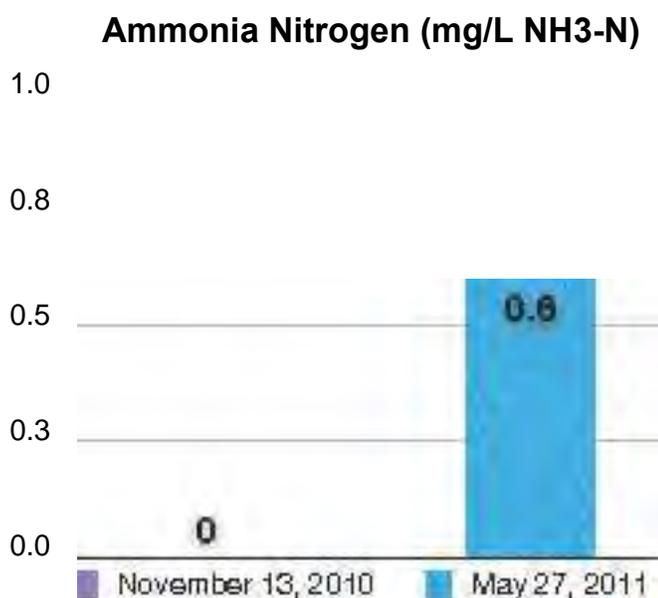
Water chemistry was tested at this site on only two occasions: November 13, 2010 and May 27, 2011. This particular monitoring site is directly south of the O.U. Duck Pond. It's feasible that the increased level of waterfowl droppings could impact the water chemistry, especially during the warmer months when more waterfowl are present. The amount of ammonia nitrogen, nitrate, nitrite, and orthophosphate might increase when the amount of fecal matter in the creek is higher than normal. In addition, chemical fertilizer contains both nitrogen and phosphorus, which can result in higher levels of ammonia nitrogen and orthophosphate levels, especially when lawns are over fertilized.

Given the above information it isn't surprising that, with the exception of nitrate, the levels of ammonia nitrogen, nitrite, and orthophosphate were higher in May. Why the nitrate level remained the same for both months is unknown. The total nitrogen levels for both monitoring events were in the poor range, above 1.5mg/L N. Orthophosphate in November was below 0.05 mg/L P so was in the normal range. The Orthophosphate reading in May however was in the poor range as it was above 0.1mg/L P.

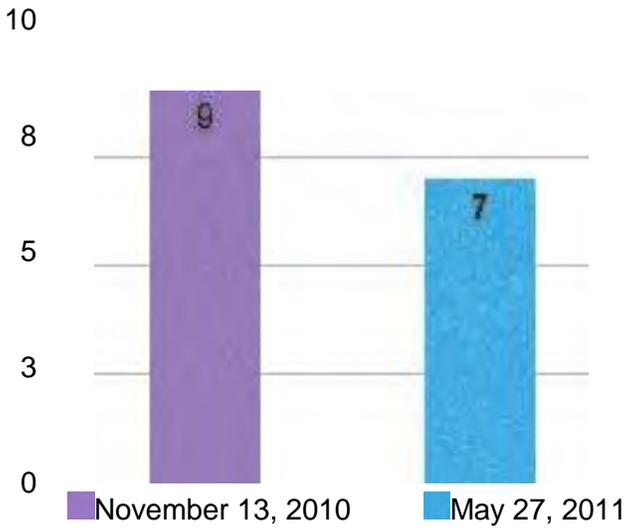
The percent oxygen saturation for both months fell within normal parameters, although the dissolved oxygen level was slightly lower in May. This could be the result of warmer water temperatures. As water becomes warmer it holds less dissolved oxygen. Another possibility could be the higher levels of nitrogen and orthophosphate that increase algal growth. These algae will eventually decompose and the bacteria that feed on decaying algae further deplete dissolved oxygen levels.

Chloride levels were the same for both November and May. According to weather history records, November of 2010 was warmer than average. It's possible to have much higher chloride levels during the cold-weather months if streets have been salted due to sleet or freezing rain.

The pH level for both months was within normal parameters.

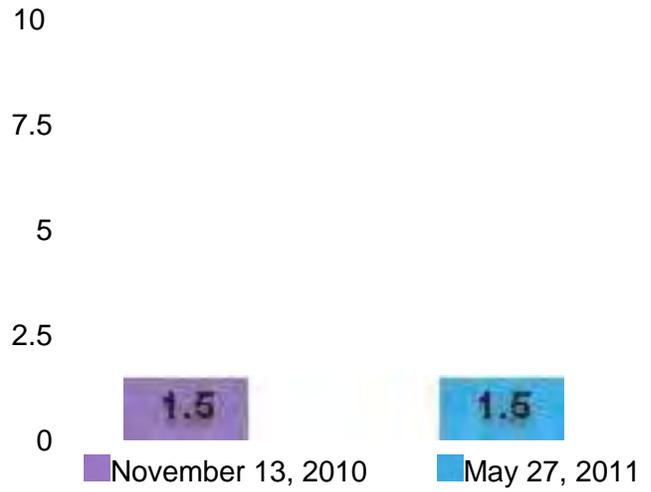


Dissolved Oxygen (mg/L O₂)



% Oxygen Saturation for 11/13/10: 89
% Oxygen Saturation for 05/27/11: 87

Nitrate (mg/L N)



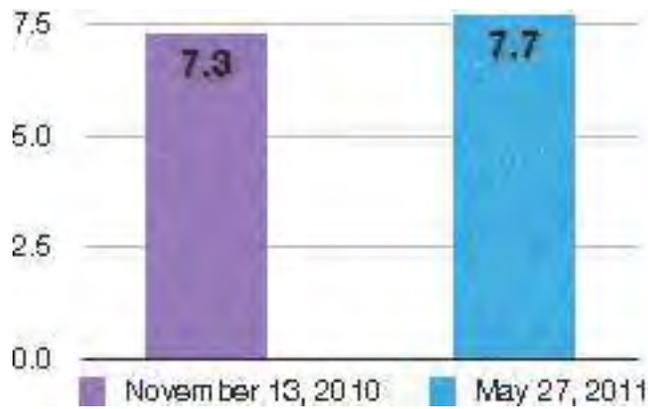
Nitrite (mg/L N)



Orthophosphate (mg/L P)



pH



SUMMARY

There has been no Blue Thumb activity on this site since July 26, 2011. There is no photo of this tributary available from that time. The picture below, taken in October 2014, shows a tributary that appears quite different from the image presented by the data gathered during the habitat assessment. What caused this change? Two possibilities: Since the habitat assessment in 2011, Lindsey Street has been widened and a new bridge has been built at this location. The drought condition experienced in this area for the last several years has no doubt played a part as well.

Bishop Creek is an urban stream. Because of this, the creek and its tributaries are negatively impacted, in part, by the following factors:

- Large areas of impervious surface that quickly convert rainfall into rapid runoff which increases creek bank erosion as it flows downstream.
- Trash in the runoff, mainly composed of Styrofoam and plastic containers as well as plastic bags.
- Large objects dumped into the creek.
- Chemical pollution from the surrounding area that drains into the creek during rain events.
- Other human activities resulting in flow and habitat alteration.

All of the above factors alter stream chemistry and creek flow, and adversely affect aquatic life (whether through pollution or habitat loss). Unfortunately, at this point in time the city of Norman is an area of rapid growth which will only exacerbate the problem, unless strict adherence to BMPs regulating construction and development takes place, and an educational effort places citizens in the role of stream stewards. This tributary to Bishop Creek would benefit from consistent monitoring and an education effort within the watershed. With only 2 chemical monitoring episodes to draw from, it is difficult to know just what the message from the data actually is. Results seem inconsistent, and this is sometimes the case when volunteers are new and they do not have experience behind them.



Coal Creek: EW137 Rd. (Mail Route Rd.)

NE SW SE

Section 32, Township 7 North, Range 11 East

Hughes County, Oklahoma

Latitude N 35.03370°

Longitude W -96.16512°

WBID# OK220600-01-0200K

Blue Thumb Volunteer Monitoring Data Review – October 15, 2014

Written by: Andrea Jones

Description of Watershed and Monitoring Site

Coal Creek at EW 137 Road is located SSW of the small town of Lamar, about 15 miles east of Holdenville, in Hughes County. This monitoring site is located just downstream of a junction where a tributary enters Coal Creek in the Horntown/Lamar area. The main channel of Coal Creek begins about 3.5 miles north at the base of the Lamar Mountains in Section 16, Township 7 North, and Range 11 East at approximately 1,030' elevation. The tributary begins about 2.75 miles to the northwest in the Horntown area in Section 25, Township 7 North, Range 10 East at approximately 940'. The elevation of the monitoring site is approximately 700' and receives drainage from almost 10 square miles. The creek then flows southeast 3.2 miles to the South Canadian River located in Section 10, Township 6 North, and Range 11 East. The Coal Creek monitoring site is isolated and heavily wooded. The main land use in the area is Timber, Oil Production, Cattle and Wildlife. This sites limited stretches of long waterways could be a factor in limiting the number of species and habitat. The total length of Coal Creek from headwater to where it empties into the South Canadian River is only about 7.10 miles.

Stream Condition and Habitat Overview

The habitat assessment starting at Coal Creek at EW 137 Road and walking down the creek ¼ of a mile on 6/22/2011 scored high/good in four areas: Instream Cover (which includes rocks, aquatic vegetation, woody debris in the water needed for small organisms to use as cover or protection from predators); Canopy Cover Shading (that shading which still allows enough light through for plant growth while still reducing heat); Pool Variability (where there is a mix of pool depths to provide a healthy habitat for a number of diverse species of fish) and Streamside Cover (includes those plants, grasses, shrubs and trees along the stream banks that provide shade, energy and food). This site scored moderate in two categories: Bank Stability and Bank Vegetation Stability. Some of the creek's banks showed signs that there was active erosion going on and the banks were also lacking in vegetation in some areas. There are five areas in which this site scored very low/poor: Pool Bottom Substrate (not as stable due to sediment/dirt eroding into the stream channel that covers up the rocks); Presence of Rocky Runs or Riffles (there was a limited amount of these turbulent areas which provide enriched dissolved oxygen levels for creek bugs and fish); Flow ; Channel Alteration (there was a large amount of sandbars and siltbars which means the channel is less stable); and Channel Sinuosity (there are few curves). The overall habitat score at this monitoring site (87.1) was below the average score (103.9) of high quality creeks (reference conditions) in the Arkansas Valley ecoregion. So Coal Creek at this monitoring site receives a "B" grade (normal A-F grading scale) for its habitat score.

Biological Conditions

Fish

A fish sample was also collected on 6/22/2011 by seining from the monitoring site to a 1/4 mile downstream. Fish collections represent the long term history of the stream and can give an estimate for up to a 20 year time frame. Using the average of reference streams in the Arkansas Valley ecoregion as a benchmark, Coal Creek ranks well below the average for this region, with significant decrease in variety and diversity. This site scored only 55% as good as reference conditions, a "D" grade. This is partially due to the fact that there is little headwater for this site. A total of 476 fish representing 14 different species (plus one unidentified topminnow specie) were found at this site: Central Stoneroller (6), Red Shiner (5), Redfin Shiner (3), Suckermouth Minnow (1), Bluntnose Minnow (13), Blackstripe Topminnow (1), Mosquitofish (15), Brook Silverside (53), Green Sunfish (5), Warmouth Sunfish (2), Bluegill Sunfish (73), Longear Sunfish (254), Largemouth Bass (10), Orangethroat Darter (6) and Unidentified Fundulus Topminnow (29). Reference conditions averaged 25 different species of fish. The overwhelming majority of species collected, 92%, were insectivores (eats mainly insects). The rest were: 3% piscivores (eat mainly fish); 1% herbivores (eats mainly plants) and 4% as omnivores (eats both plants and animals). Seven species (77%) were in the tolerant to pollution category and seven species (23%) were in the Intermediate category (somewhat pollution tolerant) and only one species, Suckermouth Minnow, (less than 1%) was in the Intolerant category. Arkansas Valley reference conditions averaged 33% of the fish population to be tolerant to pollution, meaning there were more sensitive fish. These sensitive fish also came from an average of 6 species versus the 1 sensitive species from Coal Creek. Reference conditions also averaged better population diversity than at Coal Creek.

Benthic Macroinvertebrates (creek bugs)

Benthic Macroinvertebrates were collected from the Coal Creek site during the winters of 2010, 2011, and 2012. Summer collections were not conducted due to lack of stream flow or lack of water. As stated, this site is located less than four miles from the headwaters so there is very little water present unless there is a storm event, especially in the summer months. Macroinvertebrate collections represent the short term history of the stream and can give an estimate of stream health for up to 12-15 months.

Using the average of reference streams in the Arkansas Valley ecoregion as a benchmark, Coal Creek ranks decent during 2010 (79%) and 2012 (57%) but poor in 2011 (43%). In February 2010 there were 13 species: riffle beetles, biting/non-biting midges, small squaregills/pronggills/flatheaded mayflies, narrow winged damselflies, green/common/perlodid/slender winter stoneflies and various black flies. Of these, 35% were pollution intolerant species, 65% were moderately pollution tolerant and less than 1% was pollution tolerant. The diversity of the population over the 13 species found was evenly distributed. In March 2011 there were 13 species: round/flat worms, crane fly, horse/deer flies, black flies, riffle beetles, biting/non-biting midges, small squaregill mayflies and Northern Case Maker/Fingernet Caddisflies. Of these, 4% were pollution intolerant species, 84% were moderately pollution tolerant and 12% were pollution tolerant. The diversity of the population over the 13 species found was evenly distributed. This sample scored the lowest due to the lower number of sensitive bug species (3 species versus 7 species in 2010) and very low population of these sensitive bugs. In February 2012 the species number dropped to 9: biting/non-biting midges, black flies, small squaregill/pronggill mayflies, slender winter/common/perlodid stoneflies and fingernet Caddisflies. Of these, 34% were pollution intolerant species, 66% were moderately pollution tolerant and there were NO (0%) pollution tolerant species. The diversity was not as good as it had been so this is why the 2012 overall bug score was less than in 2010.

Chemical Condition

Chemical data were collected nine times between 7/14/2009 and 10/13/2010. Chemical collections represent the stream water quality at the exact moment of the collections.

Dissolved Oxygen. The average oxygen saturation level was 105.5% which is in the Normal range (80-130%). Three of the data points lie in the poor range, below 80%. One data point is above 150%. This could be attributed to the summer heat, as well as, limited water and aquatic plants found at the site. There is little opportunity for the water to flow over riffles to provide more oxygen. The November 2009 oxygen sample was not collected.

pH. The pH level average was 7.0 for this site which is well within the normal range.

Nitrate/Nitrite Nitrogen. The nitrate/nitrite levels were all below detection except for the November 2009 collection which was 1.3mg/L N. This reading could have been attributed to potential runoff from a .25" rainfall on the day of testing.

Ammonia Nitrogen. The ammonia levels remained relatively low throughout testing. The range was from below detection to 0.4mg/L N in August 2010. All collections were well within normal ranges.

Orthophosphate Phosphorus. The Orthophosphate Phosphorus level averaged 0.007mg/L P which is well within the normal range of 0.04mg/L P. The data points ranged from below detection to 0.047mg/L P.

Chloride. The chloride levels ranged from 10mg/L Cl in December 2009 to 140mg/L Cl in July 2009 with the majority of tests being well within the normal range for the area. The high July 2009 reading could be attributed to there being only one test run as the volunteers ran out of reagents before the second test could be performed and also as this was the 1st time for these volunteers to perform testing, the results could have been misinterpreted.

Synopsis

Coal Creek is a short creek that runs south and east out of the Horntown/Lamar area into the South Canadian River in Hughes County, Oklahoma. The monitoring site has the limited amount of headwater available for species diversification. This site is well below the Arkansas Valley ecoregion average for fish but decent for the physical habitat and macroinvertebrates while the chemical conditions are doing well. Coal Creek is in a remote and heavily wooded area which main activities of timber, oil production, cattle and wildlife limit the amount of non-point source pollution commonly found in towns and cities.

Doe Creek: Yearling Road

SE SW SE

Section 32-24N-1W

Noble County

Latitude: N 36.50706°

Longitude: W -97.32506°

WBID#: OK621200-05-0170F

Blue Thumb Volunteer Monitoring Data Review – December, 2014

Written by: Pat Hoerth and Ann McFerron-Denney

Description of Watershed and Monitoring Site:

Doe Creek is about equidistant from Tonkawa to the north and Perry to the south. Our monitoring site on Doe Creek is just north of Yearling (E 350 Rd.) and between I-35 to the west and CR 90 to the east. The headwaters of Doe Creek are three miles north/northeast. Doe Creek, flowing north to south, empties into Grassy Creek (about 1.5 miles south of our monitoring site), which empties into the larger, deeper Red Rock Creek. About 5 square miles of range land and crop land drain down to our Doe Creek monitoring site. There are very few houses and they are spread far apart. Our monitoring site is about ¼ mile downstream from a flood control dam and reservoir. A large, 20-year-old active beaver dam stretches across the stream 50 feet north of our monitoring site. A wetland covers a large area north of the beaver dam. Doe Creek is in the Central Great Plains ecoregion.

Stream Condition & Habitat Overview

On June 2, 2011 a habitat assessment was conducted on Doe Creek, starting at our monitoring site and ending ¼ mile (400 meters) downstream. In this stretch of the creek there was lots of wonderful instream habitat (woody debris and some aquatic plants) for fish and creek bugs to utilize. There was also high quality vegetation along the banks of the creek at the water's edge and tall trees that created canopy/shading over the water to keep it cooler. There were some signs of active bank erosion, most of this was on the south side of Yearling Road where the land was a cattle pasture and really did not have any natural area. Some newly formed point bars were present meaning the streambed was a little unstable and shifting. Habitat qualities that scored low were the presence of rocky riffles (there were none), there was very little to no flow, the creek was pretty much knee deep the entire way (no deep pools nor very shallow areas which would help with fish and creek bug diversity), the bottom of the creek is very mucky with clay/silt/sand and unstable. The bank vegetation was rather good up to Yearling then there really was no bank vegetation. The habitat was like night and day with Yearling being the divider line; very good natural habitat on the north side and very very poor habitat on the south side. Doe Creek received an overall habitat score of 64.3 whereas high quality streams in the Central Great Plains ecoregion (reference conditions) averaged a score of 77.6.

Biological Conditions

Fish

A fish collection was also conducted on June 2, 2011 with an overall score of 58% (D grade) as good as reference conditions. A total of 11 different fish species were found, not too far off from reference conditions average of 13 species, but there were no intolerant (sensitive to pollution) species found. This really hurt the overall score. What did score exceedingly well was the number of sunfish species. Doe Creek had 7 species of sunfish while reference conditions only averaged 4 species. The more sunfish species the better as each species likes different types of habitat and food. So Doe Creek had the diversity in habitat and food source to support 7 different types of sunfish. But the absence of sensitive fish, as well as minnows, darkens this shining star. The conditions aren't healthy enough for sensitive/intolerant fish and minnows.

Benthic Macroinvertebrates (bugs)

There were 2 winter and 2 summer bug collections conducted at our site on Doe Creek.

The winter collections averaged 65% as good as reference conditions; winter 2010 scored 70%, winter 2011 scored 60%. Both collections had a good number of bug species, 2010 had more species than reference conditions, but were lacking in the sensitive species; very similar story to the fish collection. The bugs are also saying that there is organic pollution in the creek. The diversity of the samples is pretty good.

The summer collections averaged 62.5% as good as reference conditions: summer 2009 scored 54%, summer 2011 scored 71% (there was no summer 2010 collection due to the creek not flowing). There were only 9 species of bugs found in 2009, this increased in 2011 to 12 species but still below reference conditions of 16 species. Like the winter collections, summer collections were also lacking in the sensitive bug species. Summer bugs still showing signs of organic pollution. The diversity was really good, 2011 had better diversity than reference conditions.

Chemical Testing

Chemical data were collected monthly between 6/10/2009 and 1/17/2011.

Dissolved Oxygen. Oxygen saturation indicates when there are problems with the amount of oxygen available in the water for aquatic life. Too little or too much are indicators of problems. The average dissolved oxygen saturation level for our site was 60% which is in the caution zone between 80%-50%. Only 4 of the 18 data points were in the normal zone, above 80%. Eight of the data points were at 50% or less, and in the poor zone. The creek has flow issues. We wonder if the beaver dam just above restrains the flow to any significant degree. As the drought began, the water level in the creek became very low, sometimes 3-4 inches. We think these conditions affect the oxygen saturation.

pH. The pH at the monitoring site was good; from 7.5 to 8.

Soluble Nitrogen. An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Our nitrogen levels were within the normal zone (below 0.8mg/L N) except for 2 monitoring dates: 2/18/2010 nitrate nitrogen was 2mg/L N (poor zone), and 8/19/2010 nitrate nitrogen was 1mg/L N (caution zone).

Orthophosphate Phosphorus. Phosphates were in normal zone (below 0.05mg/L P) 44% of the time. The remaining data points were evenly split between the caution and poor zones. The highest reading was 1.667mg/L P on 3/19/2010; significant algae was observed on this date. The watershed, which is in an agricultural area where farmers regularly spread or spray fertilizer, might be contributing to the high phosphorous levels at times.

Chloride. Chlorides were stable and within the normal zone for the area.

On 11/19/2010 we discovered a fish kill in the pool above the beaver dam. The water was green and there were many large, dead fish floating up against the northern edge of the beaver dam. Doe Creek at our monitoring site on that date was only 3-4 inches deep; normally about 8 inches deep. We surmise there was not enough oxygen for the fish.

Synopsis

While the chemistry of the stream at our monitoring site is not horribly bad, the oxygen saturation is most likely a limiting factor for the health of the fish and bugs and could be partially due to the extensive drought in Oklahoma during this time of monitoring. There were no sensitive fish found in the stream and very few sensitive bugs found in the stream.

There was a very interesting observation when we did the fish collection in June 2011. Above Yearling Road, on our property, there is heavy vegetation in the riparian area. Below Yearling Road, the creek winds through land that is farmed right up to the edge of the creek. There is no vegetation, or very little, in the riparian zone. And there were very few fish in that part of the creek—mostly only crawdads. This was a very important learning event for us; the value of the vegetation for the health of the stream and its inhabitants.

We also wonder what the impact of the beaver dam is on the stream below it. It would be interesting to monitor both below and above the beaver dam to see if there are differences. The stream has a deep layer of mud at the bottom and many fallen tree limbs, very few rocks. It's pretty muddy water, when there is water. The creek has been dry now for a couple of years, and the beavers have moved out.

Fourche Maline: Black Loop

SW/SW/SE

Section 8-5N-20E

Latimer County, Oklahoma

Lat: N 34.9184⁰

Long: W -95.2174⁰

WBID#: OK220100-40-0020P

Blue Thumb Volunteer Monitoring Data Review - December 9, 2014

Written By: Eddie Woods

Description of Watershed and Monitoring Site

This monitoring site is located on Fourche Maline Creek approximately 1.5 miles south of the southeastern Oklahoma town of Panola in Latimer County. The Fourche Maline is a third order stream in the Arkansas Valley ecoregion and flows from west to east through Latimer and LeFlore Counties. It eventually discharges into Wister Lake which supplies water for over 40,000 people in LeFlore County.

The creek is monitored on Black Loop Road. The watershed for this point is approximately 85 square miles in area and is located in the north central portion of Latimer County. The headwaters originate in the San Bois Mountains which are vegetated with oak-hickory-pine forests. From its headwaters the Fourche Maline flows south through Robbers Cave State Park and then turns east just north of Wilburton, the county seat of Latimer County with a population of approximately 2,800 residents.

Two major tributaries within the watershed are Bandy Creek and Cunneo Tubby Creek. Bandy Creek originates on the prairie west of and in the mountains south of Wilburton. The headwaters of Bandy Creek that originate in the mountains south of Wilburton flow into Lake Loyd Church which is the municipal water supply for Wilburton. Wilburton's waste water and sewage treatment plant discharges into Bandy Creek south of town and eventually flows through the monitoring site. The headwaters of Cunneo Tubby Creek originate in the mountains in the northeast portion of the watershed and flow into Cunneo Tubby Lake, a flood control lake maintained by the Latimer County Conservation District. Cunneo Tubby Creek joins the Fourche Maline north of Wilburton.

Other small lakes within this watershed include Lake Wayne Wallace, Lake Carlton, and Coon Creek, which are all located within the boundaries of Robbers Cave State Park north of Wilburton, and Double Falls Lake, also located north of Wilburton.

Major land use practices within the watershed include recreation at Robbers Cave State Park, urban Wilburton, forest management, pasture, and natural gas drilling activities. Logging and natural gas drilling activities have declined significantly in the last 5 to 6 years due to slow economic conditions; however logging activities have begun to rebound recently due to improved timber prices.

Stream Condition & Habitat Overview

A run of Fourche Maline Creek flows south and bends to the east at the monitoring site along Black Loop County Road. Rip-rap had been installed several years ago along the south bank of this bend to stabilize the bank and Black Loop Road. The run ends in a riffle that flows into a deep pool that flows around an old low water dam constructed many decades ago at the site. The pool terminates with a riffle as the creek bends north and east. A series of short runs and riffles follows. The substrate of the pool and runs are predominantly silt and sand while the riffles consist of coarse gravel and cobble. Woody debris and submerged logs are common particularly in the pool area east of the low water dam. The stream banks are moderately stable with a mix of bottomland hardwoods which provide an adequate canopy cover for the creek. Other vegetation consists of grasses, shrubs, and vines which also contribute to stream bank stability. Aquatic plants are abundant in the shallows and along the riffles of the creek which provides cover for a variety of aquatic organisms.

The habitat for this site (starting at the monitoring site and ending 400 meters, ¼ mile, downstream) has been assessed three times beginning in August 2000, then in June 2007, and again in July 2011. Results from these assessments indicate that the habitat conditions have generally remained fairly constant for 2000 (105 points) and 2007 (102.5 points) but a drop in 2011 (75 points); reference sites in the Arkansas Valley ecoregion averaged 103.9 points. During 2011 a severe drought was in progress at the time of that assessment. There was no stream flow with water only present in pools and deeper runs. Streamside vegetation was sparse providing little cover and lowered stream bank stability. Current conditions based on recent monitoring events indicate that the stream habitat conditions have rebounded considerably from 2011.

Biological Conditions

Fish

Fish were collected on the same dates as the habitat assessments in the summers of 2000, 2007, and 2011. Results indicate that the fish population has remained fairly constant for the time period involved, except for a slight decrease in 2011. A total of 24 species were found in 2000, 22 in 2007, and 21 in 2011. The results of the 2011, while slightly lower than the previous two collections, were collected during a severe drought in which there was no streamflow and water present only in pools and deeper runs. Water temperatures at that time were high and dissolved oxygen content was low. The creek received a score of C (73%) for the 2011 drought year and scores of B in 2000 (82%) and 2007 (91%) as compared with reference sites in the Arkansas Valley ecoregion. The lower score in 2011 was mainly due to only 1 intolerant specie (brindled madtom) found, as opposed to 3 intolerant species in the previous collections. The most common species collected included mosquitofish, central stoneroller, spotted bass, and 8 species of sunfish.

Benthic Macroinvertebrates (creek bugs)

Benthic macroinvertebrates have been collected from rocky riffles during summers and winters since 2000. Data from these collections indicate that conditions for Fourche Maline Creek have generally improved over time, until effects of drought started to show up in 2012 and 2013. Collections during summers and winters of 2000 to 2002 consistently graded B and C. Collections from summers and winters of 2009 to 2011 have consistently graded A and B. The number of species and number of sensitive species have remained fairly constant for winter collections from 2000 to 2012 but have increased significantly from summer collections from 2000 to 2013 indicating water quality and/or habitat quality has gotten better.

Chemical Testing

Chemical data for Fourche Maline at Black Loop Road has been, for the most part, collected monthly between 08/08/2001 and 10/24/2013.

- DO** Dissolved oxygen saturation for the monitoring period has consistently ranged from 50% to 80%; with some low readings ~30% and some high readings of ~110%. This is below the optimum range of 80% to 130% and indicates possible occasional problems with the amount of oxygen available for aquatic life probably attributed to periods of low flow. The monitoring period from 2009 to 2013 indicates an increase in percent oxygen saturation to closer to the optimum range with a median percentage of 76%.
- pH** pH has consistently been ~7.0, neutral, and in the normal range.
- Nitrogen** Soluble nitrogen is estimated by adding the ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen. Fourche Maline has little to no detectable available nitrogen during the monitoring period with the exception of a few instances during the 2004-2008 monitoring period. Six data points were above the normal range of 0.8mg/L N with the highest reading of 1.35mg/L N. This could be partially due to agricultural fertilizer application or natural gas drilling activity. No recent problems have been detected.
- Phosphorus** In 2003 Wilburton wastewater treatment plant updated their system/equipment creating better quality of effluent into Bandy Creek, which flows in to Fourche Maline, and this really helped to decrease the orthophosphorous levels at our site on Fourche Maline. Prior to the plant's upgrades, the average orthophosphorous reading was 0.033mg/L P with many readings above the normal level of 0.05mg/L P. From 2004-2008 there were very few detections of orthophosphorous. From 2004-2013 there was an increase but was only above the normal range three times.
- Chloride** Chloride has remained consistently at 15-20mg/L Cl during the monitoring period. This is low and constitutes no water quality issues.

Synopsis

Based on the data from habitat assessments, biological community assessments, and water quality monitoring Fourche Maline Creek is a relative healthy stream and is nearly as good as the average high quality streams in the Arkansas Valley ecoregion. Water chemistry parameters indicate water quality to be good to excellent with the exception of occasional low dissolved oxygen levels. Stream habitat is good and supports a healthy and diverse biological community as indicated from fish and benthic aquatic invertebrate collections; however, there is a slight lower population of both sensitive fish and bug species.

The upgrades to the Wiburton waste water treatment plant in 2003 was perhaps part of the reason why both the fish and bug results improved after 2003 and was certainly the reason why the amount of orthophosphates really decreased. Fourche Maline did have a battle with severe drought around 2010-2012 but is hopefully recovering. Major concerns that could impact the health of the stream in the future include the proximity to Black Loop County Road and periodic trash and other problems associated with easy access by the general public. Land use practices by adjacent landowners and the impact on riparian areas could also have a major impact on the stream habitat and resultant stream health.

Lake Creek: Wintersmith Bridge

SW NE SE

Section 3-3N-6E

Pontotoc County

Latitude N 34.75786°

Longitude W -96.65497°

WBID#: OK410400-04-0010X

Blue Thumb Volunteer Monitoring Data Review – December 31, 2014

Written by: Kay Gamble

Description of Watershed and Monitoring Site:

Lake Creek at Wintersmith Bridge is part of a city park in Ada, Oklahoma and is fed by Wintersmith Lake which in turn is fed by 4 streams merging from the north into the lake. The most northwestern stream flows through ECU campus, the next stream to the east crosses the Country Club golf course, the third stream travels through residential areas as does the most easterly stream. Because of the bowl-shaped topography of Ada, the watershed from precipitation and water use is approximately 4 square miles radiating out from the creek. This is mostly residential area along with ECU campus and the Country Club golf course. The monitoring site is downstream (south) of the lake, upstream (north) of the Wintersmith Bridge along Pine Street and adjacent to the Wintersmith Amphitheater. The site was chosen for its proximity to Ada High School (AHS). Monitoring is done by AHS Science Club students and me, their sponsor. Lake Creek empties in to Clear Boggy Creek southeast outskirts of Ada and is in the Cross Timbers ecoregion.

Stream Condition & Habitat Overview

On July 28, 2011 a habitat assessment was performed on a 400 meter (1/4 mile) stretch of the creek. The site was given a habitat assessment score of 85.8; slightly above the Cross Timbers ecoregion reference average of 84.0. This site has high instream cover (lots of woody debris and some aquatic vegetation) and streamside cover (grasses, shrubs, trees at the creek edge) and canopy cover shading (the creek is lined with trees to keep the water shaded and cooler in temperature). The pool bottom substrate is quite sandy/silty thus moderately stable. There is one big pool by Pine Street but the rest of the creek is waist deep or ankle deep. The city park department is doing a decent job allowing some riparian (natural area of trees, shrubs, grasses) area to grow along the banks of the creek but there are still signs of some active erosion. There are very few rocky runs or riffles and usually low/no flow unless there is abundant precipitation. The creek is also pretty straight, really no bends/curves to dissipate the speed of the water when the creek does flow. At times there is some litter, usually fast food containers, and detritus from leaf fall.

Biological Conditions

Fish

A fish collection was conducted on the same day as the habitat assessment and on the same 400 meter stretch of Lake Creek. 947 fish were caught of 14 different species. Reference conditions averaged 19 species. There were no darter/benthic species (ecoregion reference averaged 4 species). These fish disappear with increasing siltation, decreasing/low oxygen levels and little/no cobbles/gravel. Lake Creek did have 8 different sunfish which is better than reference 7 sunfish species. Only 1 intolerant species was found (Bigeye shiner), reference averaged 2 species. The proportion of tolerant species was high at 91% of the total population, reference averaged 70%. Mosquitofish was the most common species (27%), followed by Green sunfish (23%), Longear sunfish (16%), and Bluegill sunfish (13%), Redear sunfish (8.3%), and Golden shiner (8.1%). The remaining species found were fewer than 2%. This fish collection for our site on Lake Creek scored 73% (“C” grade) as good as reference conditions.

Benthic Macroinvertebrates (creek bugs)

Macroinvertebrates were collected from woody detritus in Lake Creek at the monitoring site in winter 2011. Lake Creek does not flow much so that is the limiting factor as to why there have not been more bug collections. There were a surprising 17 species found (reference averaged 12 species), but only 1 was a sensitive species (reference averaged 4 sensitive species). The high species number really helps to give the creek a good score for the Shannon-Weaver Diversity. This metric increases as the total population gets more evenly distributed among the different species. Another downfall is the bugs are telling us that there is more organic pollution here than in reference conditions. Overall, the one bug collection from Lake Creek scored 70% (“B” grade) as good as reference conditions.

Bacteria Testing

Bacterial testing was undertaken mostly for the education of my students. The initial test was done with 5 ml of sample water and had to be decreased to 1ml in order for the colonies to be countable. Coliforms were noted and fully expected as there is a large waterfowl population and many people walking dogs in the park.

Chemical Testing

Chemical data were collected 12 times between 11/13/2010 and 10/26/2013.

DO Dissolved oxygen saturation can indicate a problem when it is too high or too low. Chemical data show the mean dissolved oxygen content at 70%; which is within cautionary levels (80-50%). Normal level ranges from 80% to 130%. Lake Creek range went from 17% to 97%. DO fluctuated with the flow or lack of flow of water.

pH	pH mean was 7.6 and fluctuated from 7.2 to 8; very normal levels.
Nitrogen	An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Lake Creek soluble nitrogen readings were well within normal (below 0.8mg/L N), except for 2 times when the nitrate nitrogen was 1.0mg/L N.
Phosphorus	Orthophosphate phosphorus levels were well within the normal range (below 0.05mg/L P) with a median result of 0.0235mg/L P.
Chloride	The chloride median result was 30mg/L Cl with a range of 15- 60mg/L Cl. Normal for this area.

Synopsis

The habitat quality of Lake Creek at Wintersmith Bridge was as good as reference conditions, although there is really no rocky riffles and flow is very low to nonexistent during droughty conditions. Central Oklahoma has been in a severe drought from about 2010 to roughly 2013. The fish collection resulted in a good number of species but with there being no sensitive species, this pulled the total score down. Very similar story with the macroinvertebrate collection, but it was the even distribution over the high number of bug species that created a higher score than what the fish received. It appears the habitat and water quality of Lake Creek at Wintersmith Bridge is sufficient to support a range of species while not of the quality to support more sensitive species. There is something in Lake Creek that is limiting the existence of sensitive biologies. Perhaps it is the low oxygen conditions; lack of flow many times. This could easily be related to the drought, although as this is a park, the flow is not always due to natural forces but can fluctuate as maintenance and park projects are undertaken.

Sharp Creek

Beaver County

Blue Thumb Volunteer Monitor Data Review – December 2014.

Written by: Bill Smith, Coordinator

Participants: Chris Guyer, Don Hayes, Nick Kroeker, John T Smith

Locale and Watershed Description

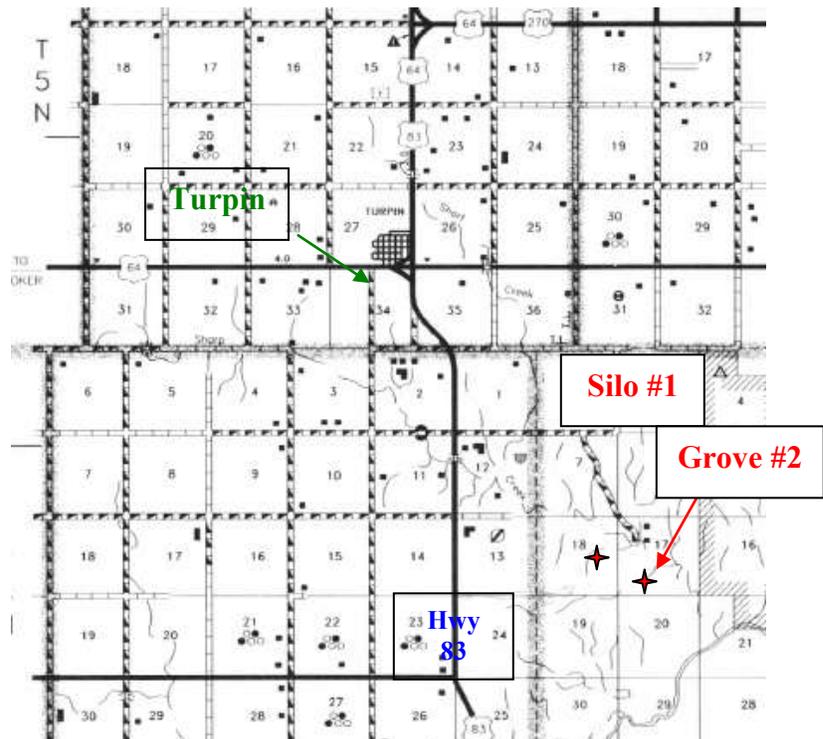
Sharp Creek is located in Beaver County Oklahoma, the most eastern of the three Panhandle counties. Its western county line is 3-4 miles west of the small town of Turpin which is about 13 miles south of Liberal, KS.

The Sharp Creek watershed exceeds 50 thousand acres (nearly 80 square miles) upstream of the monitoring sites. The drainage area also includes Short Creek which starts approximately 1.5 miles NNW of Turpin and feeds into Sharp Creek.

Typical of watersheds in the High Plains Ecoregion, a relatively short creek can drain a large land area due to the flatness of the region.

There are several springs that feed Sharp Creek.

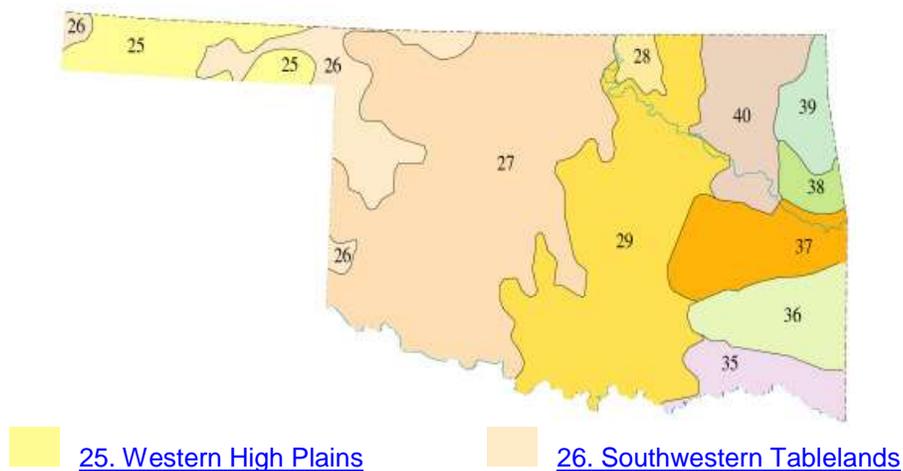
Surface water begins approximately 7 miles upstream of the **Silo - #1** (left star) site, 3-4 miles WSW of Turpin. The creek then flows SE through the **Grove - #2** (right star) site and eventually empties into the Beaver (North Canadian) River approximately 2-3 miles downstream from the monitoring sites.



Ecoregions

Ecoregions describe areas of similarity in the type, quality, and quantity of environmental resources and are designed to provide a framework for comparison of the research, assessment, management, and monitoring of ecosystems and their components. Western Beaver County has been classified as having characteristics of the **Western High Plains (#25)** and **Southwestern Tablelands (#26)** Ecoregions.

Level III Ecoregions of Oklahoma – Revised April 2000
National Health and Environmental Effects Research Laboratory
U.S. Environmental Protection Agency

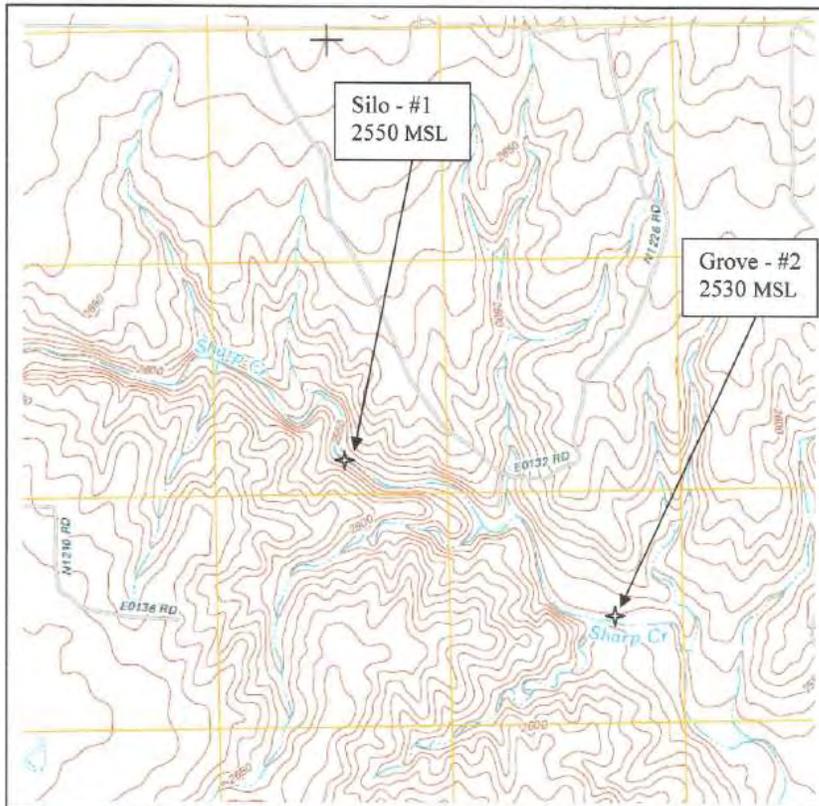


25. Western High Plains. This Ecoregion #25 consists of smooth to irregular, semiarid plains that are studded with playas and stock ponds and underlain by sand and gravel deposits. Elevations range from 2,400 to 2,800 feet (Sharps Creek at 2,500), and are highest in the west. Precipitation averages only 17 to 20 inches annually, and is erratic. Natural vegetation is mostly short grass prairie, but sagebrush and bluestem grass is native on scattered sand plains and sand hills. Cropland (mostly winter wheat and grain sorghum) is extensive. Rangeland is found in areas that are too sandy or steep for farming. Both cropland and rangeland require proper management to limit wind erosion. Groundwater irrigation, drawing down the Ogallala Aquifer, is common. This has caused many streams to go dry, some to the point that no defined channels remain. The remaining streams and pools are shallow and have sandy substrates. Conditions in these intermittent streams are intensely stressful for many species of fish. The remaining streams and pools are shallow and have sandy substrates. As a result, both the diversity and richness of fish species are lower than in any other ecoregion in Oklahoma. Historically the most common fishes in Ecoregion 25 are the red shiner and the plains killifish. **To everyone's memory Sharp Creek has always had running water. However, the area has been affected by the drawdown in the aquifer from irrigation, and to many long-time residents its flow, depth and pools appear to have decreased.**

26. Southwestern Tablelands. Ecoregion #26 is made up of plains, hills, canyons, escarpments, breaks, buttes, mesas, and terraces. It is more rugged than neighboring ecoregions. Rangeland and grassland occur but, unlike adjacent ecoregions, there is little cropland. The mean annual rainfall ranges from 16 to 20 inches in the western parts and is highly variable from year to year. Natural vegetation in this semiarid to dry, sub-humid area is mostly short grass prairie; there is also mesquite–buffalo grass in the southwest, sand sagebrush and bluestem grass on dunes. Small streams are often dry except after storms, but short, spring-fed runs occur. **The diversity and richness of fish species is greater than in the High Plains (25).** Historically common fishes in this ecoregion include the red shiner, sand shiner, suckermouth minnow, and plains killifish. Isolated populations of the Arkansas River darter occur in a few spring-fed tributaries of the Cimarron River.

Monitoring Sites

Sharp Creek (where flowing) is located almost totally in a corridor that has more similarities to the Southwestern Tablelands in that it is rough terrain with steep banks in areas, some rock outcrops, cottonwood trees and plum thickets along and near the banks. Above the stream and away from the corridor it transitions into native pasture with a lot of sage brush and yucca plants. It is used almost exclusively for grazing in a range cattle operation.



Two sites were selected, one nearer the up-stream beginning of flow and the second approaching 2 miles down stream before exiting the ranch into the Beaver River. The west site has been identified as the “**Silo**” site for a nearby trench silo formerly used for grain storage in cattle feeding. The east site has been identified as the “**Grove**” site for a nearby grove of trees bordering a

sandy bank used primarily for picnics and family gatherings 60-100 years ago.

Sharp Creek – Silo Site
(Site #1)

SE NE NE
Section 18-4N-21E
Beaver County
36.816239, -100.830817
WBID #: OK720500-02-0430G



Silo Site

Habitat Assessment

8/1/2011

Score: 91.9

Stream Conditions & Habitat Overview

The physical habitat assessment is a subjective/objective view and description of the testing location. For this 8/1/2011 physical habitat assessment a stretch of 400 meters was assessed, starting just upstream of the monitoring site and continuing downstream.

High quality factors: instream cover, pool variability, bank stability, and channel alteration.

Medium quality factors: pool bottom substrate, canopy cover shading, streamside cover, and bank vegetation stability.

Low quality factors: presence of rocky runs or riffles, flow, and channel sinuosity.

Points were assigned to the quality factors and when combined these added up to a **total score of 91.9 which beat the average score of 82.3 for high quality sites in the Southwestern Tablelands ecoregion.** Overall the habitat on Sharp Creek is good. Some factors could be improved upon such as pool bottom substrate (the bottom of the creek is quite silty and mucky), bank vegetation stability and streamside cover (fence out cattle so grasses and other vegetation can be allowed to grow to protect the creek bank from erosion). But on some factors such as the lack of rocky runs and riffles, flow and

canopy cover shading are inherently lacking on our stream because of the geology and the character of the land.

Data have also shown Sharp Creek’s consistency of **base** and **stable flow** throughout our observation period. Essentially, the depth and width of Sharp Creek water volume is constant. The stream has depths of 6 inches to 1 foot (15 to 30 m) in depth in the riffle areas and 3 to 4 feet (1 to 1.5 meters) feet deep in the pools as wide as 20 feet (6 meters) plus.

Fish Collection for Silo Site - 8/1/2011

The summer 2011 collection indicated 1,758 total numbers of fish comprising 11 individual species. All collected species except for one intermediate species (Redear Sunfish) are considered “tolerant,” meaning they can withstand pollution and changes to the habitat in which they live.



Species caught include:	#fish		#fish
Red Shiner	22	Longear Sunfish	27
Common Carp	271	Redear Sunfish	3
Fathead Minnow	401	Sunfish Hybrid	1
Yellow Bullhead Catfish	20	Mosquitofish	388
Plains Killifish	91	Green Sunfish	333
Orangespotted Sunfish	58	Bluegill Sunfish	143

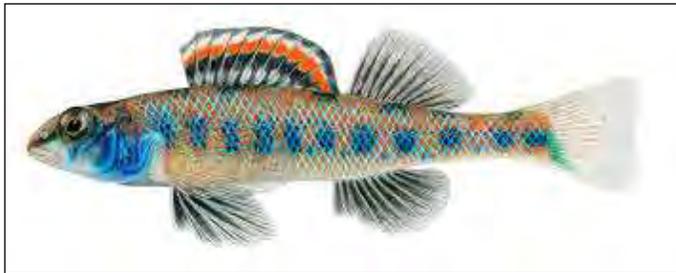
In comparison to the Southwestern Tablelands, the Silo site has a variety of 11 individual species while the Tablelands average 12 individual species. Silo site data indicate no sensitive benthic (darters, madtoms, sculpins) or intolerant species with the Tablelands reporting 1 species. The number of Sunfish species (6) was better than the Tablelands average of 4 species and Silo site had slightly better population distribution. The fish collection at the Sharp Creek Silo site as compared to Southwestern Tablelands reference

data received a C grade (64%). Silo site shows fair numbers and species diversity. The table below shows the Index of Biotic Integrity (IBI) which is the fish diversity in the creek.

Index of Biotic Integrity (IBI) score interpretation for fish.

% Comparison to the Reference Score	Integrity Class	Characteristics
>97%	Excellent	Comparable to pristine conditions, exceptional species assemblage
80 - 87%	Good	Decreased species richness, especially intolerant species
67 - 73%	Fair	Intolerant and sensitive species rare or absent
47 - 57%	Poor	Top carnivores and many expected species absent or rare; omnivores and tolerant species dominant
26 - 37%	Very Poor	Few species and individuals present; tolerant species dominant; diseased fish frequent

The lack of benthic species could be attributed to the sandy substrate characteristic of the testing site. **Benthic** is a term referring to animals that make their living on or near the bottom of a body of water.

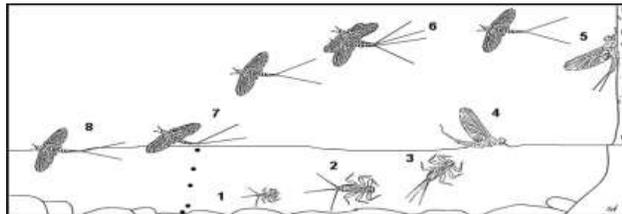


Although it is noted by the US Fish & Wildlife Service that the Arkansas River Darter (left), a more rare species, which resides mainly in the rocky bottom of riffles (moving water) can be found in Beaver County.

Benthic Macroinvertebrates (aquatic insects/bugs) for Silo Site

Macro refers to the size being big enough to see with the naked eye.

Invertebrates are any animal that does not contain a true internal skeleton.



The **aquatic insects** that occur in a stream are bugs that can be used to monitor its overall health. They are important species in the stream because they provide food for fish and other animals. They are what is known as a biological indicator, or biomonitor. These biomonitors can be defined as an organism that provides information on the quality of the environment around it. The

basic principle behind the study of **aquatic insects** is that some are more sensitive to pollution than others. Therefore, if a stream site is inhabited by organisms that can tolerate pollution and the more pollution sensitive organisms are missing then a pollution problem is likely.

The method for rating stream water quality for insect life is complex. It is based on 5 categories: **1)** Overall Taxa Richness (total number species), **2)** EPT abundance (quantity of each sensitive species found), **3)** HBI (Hilsenhoff Biotic Index -the amount of organic pollution tolerant species present), **4)** % Contribution dominants, **5)** Shannon-Weaver Diversity (measures the evenness of species distribution). These 5 categories together are used to arrive at percentage scores shown in the following paragraph. The table below indicates an interpretation of the scores.

Aquatic insect collections were done **7** times from summer 2010 to winter 2013; **4** were done during the summer and **3** were done in winter. They were taken from both riffle areas and stream side vegetation. All of the scores from each category are then compared against our closest reference area scores, which is the Southwest Tablelands Ecoregion. **Silo site summer scores ranged from a low of 25% (C) in 2012 and 2013 to a high of 92% (A) in 2010 and 2011. Silo site winter scores ranged from a low of 60% (B) in 2011 to a high of 71% (B) in 2013.**

Bioassessment score interpretation for macroinvertebrates.

% Comparison to the Reference Score	Biological Condition	Characteristics
>83%	Non-impaired	Comparable to the best situation expected in that ecoregion; balanced trophic and community structure for stream size
54 - 79%	Slightly Impaired	Community structure and species richness less than expected; percent contribution of tolerant forms increased and loss of some intolerant species
21 - 50%	Moderately Impaired	Fewer species due to loss of most intolerant forms; reduction in EPT index
<17%	Severely Impaired	Few species present; may have high densities of 1 or 2 taxa

The indicator groups of insects that are sensitive to pollution are **Ephemeroptera**, **Plecoptera**, and **Trichoptera** (mayflies, stoneflies, and caddisflies) or **EPT**. When rating the environment of the stream for aquatic insect life there is what is known as the **EPT taxa richness** score (how many different species were found of these three groups).

The raw scores show that the Silo site had an average of **1.3** sensitive species found in the winter collections whereas the Southwestern Tablelands reference data averaged 4.75 sensitive species in the winter. In the summer collections, the Silo site averaged 2.25

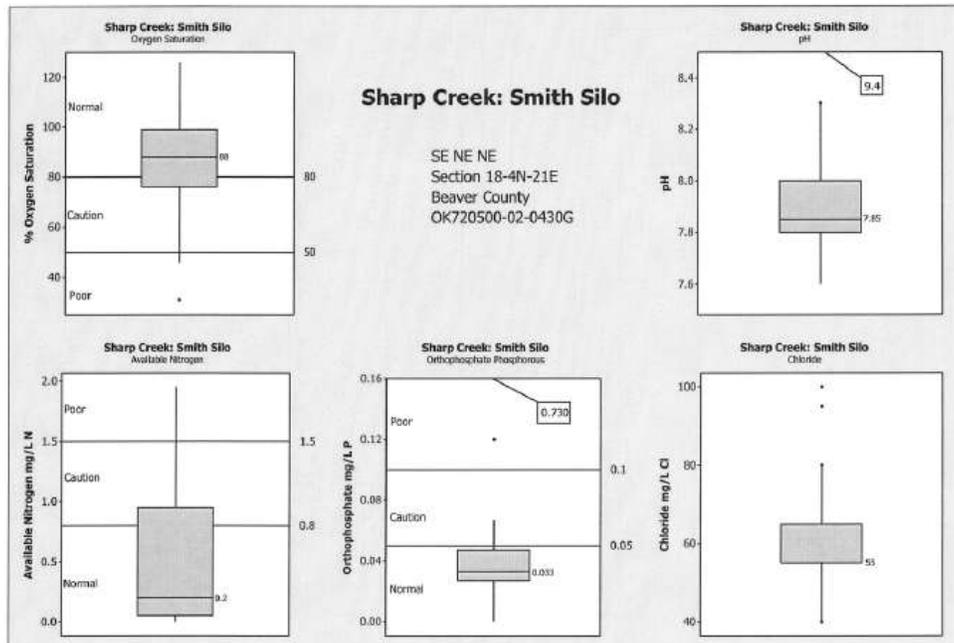
sensitive species and reference conditions averaged 4.5 sensitive species. So **the Silo site is lacking sensitive bug species.**

All the collections show signs that there is some organic pollution but there is a trend that the aquatic insects are showing the organic pollution has been decreasing, but this organic pollution could be contributing to the lack of sensitive bug species (as well as the silty/mucky bottom of the creek).

Overall, the bug populations are pretty evenly distributed amongst the different bug species that were collected at the Silo site.

Chemical Testing Data for Silo Site

Chemical data were collected monthly between 3/7/2010 and 2/1/2014. The following plot is of the Silo data collected.



Dissolved Oxygen:

Dissolved oxygen saturation shows when there are problems with the amount of oxygen available in the water for aquatic life. Adequate dissolved oxygen is necessary for good water quality. All forms of life within the stream require the element oxygen to carry on physiological processes and natural stream purification processes require adequate oxygen levels. **Oxygen Saturation averaged 88% during our study period and falls within a normal range.** Fluctuations and low % generally occurred during times of relatively high water temperatures, but also in May 2010, February and March 2013. **A Range of 80-130% is normal.**

pH:

The greatest natural cause for change in pH in a stream is the seasonal and daily variation in photosynthesis. The pH of water determines the solubility and biological availability of chemical constituents such as the nutrients (e.g., phosphorus, nitrogen, and carbon) which are the natural building blocks of biological tissue. Silo site **average was 7.7** during the study period. One high reading of 9.4 was recorded on 5/19/2011 but that is possibly a recording error. **Normal range is 6 to 9.**

Nitrogen:

Nitrogen occurs naturally in the environment and is also introduced through fertilizers. Chemical fertilizers or animal manure is commonly applied to crops to add nutrients. Excess nitrogen can cause an overstimulation of aquatic plants and algae. Excessive growth can clog waterways and reduce flow, as well as, decrease the levels of dissolved oxygen as they decompose. Normal levels of nitrates usually do not have a direct effect on aquatic insects or fish. However, excess levels of nitrates in water can make it difficult for aquatic insects or fish to survive. **A median of 0.2mg/L of available nitrogen (adding together nitrate, nitrite and ammonia nitrogens) during our study period falls within normal parameters. Natural levels of nitrate are usually less than 1mg/L.** Concentrations over 10mg/L will have an effect on the freshwater aquatic environment. 10mg/L is also the maximum concentration allowed in human drinking water by the U.S. Public Health Service. It's interesting how the available nitrogen levels above 1mg/L all occurred in the late fall to winter season (about October to February); this happened in 2010, 2011 and 2012. Nitrate and Ammonia Nitrogen were the majority of the cause with occasional Nitrite Nitrogen levels.

Phosphorus:

The biologically active form of phosphorus (orthophosphate) can cause water quality problems by over stimulating the growth of algae. In addition to being visually unappealing and causing taste and odor issues in water supplies, excess algal growth can contribute to the loss of oxygen needed by fish and other organisms. Elevated levels of phosphorus in streams can result from fertilizer use, animal wastes, wastewater, and the use of phosphate detergents. **A median Orthophosphate level of 0.033mg/L during our study period falls within normal parameters. On two occasions was the reading in the poor range above 0.1mg/L; 6/7/2010 the reading was 0.120mg/L and the following month 7/5/2010 the reading was higher at 0.730mg/L. On 6/7/2010 it was noted that the sample was collected after a rain and the creek level was slightly elevated. On 7/5/2010 it was noted that the feed lot retention ponds (~1.25 miles WNW) overflowed and was reported and officially inspected.** Larger streams may react to phosphate only at levels approaching 0.1mg/L, while small streams may react to levels of phosphorus at levels of 0.01mg/L or less. In general, concentrations over 0.05mg/L will likely have an impact while concentrations greater than 0.1mg/L will certainly have impact.

Chloride:

Elevated chloride can inhibit plant growth, impair reproduction, and reduce the diversity of organisms in streams. Chloride in our rural watershed may be natural sources of salt

and brine in geologic deposits, or from natural and human sources in precipitation. A median **Chloride level of 55mg/L** during our study period is within an acceptable range. **A range of 45 – 155mg/L is normal for the area.**

Bacterial Counts

Coliform bacteria are commonly used as a bacterial indicator of the sanitary quality of foods and water. One of the more common forms of this type of bacteria is *Escherichia coli* or **E.coli**. The origin of E.coli is almost entirely fecal, so it is an indicator of animal manure in the stream. Most strains of E.coli are harmless but some can cause illness such as diarrhea, stomach cramps, and fever if ingested in the water.

The water at the Silo site was tested for E.coli 22 times from November 2010 to August 2013. The samples were taken throughout different seasons of the year. **Sharp Creek Silo site average number CFU's (Coliform Forming Units) was 188 with a geometric mean of 9.8.**

The state law says that if the geometric mean for the E.coli data is **over 126 CFU's** then the creek is not supportive for primary human contact, meaning people getting into the water and swimming. It is also stated that if any one event is over **400 CFU's** then that is not a positive indicator of stream health. **At the Silo site there were 4 events over 400 CFU's but the geometric mean is well below 126 CFU's** during the study period. Notwithstanding some events being over the desired CFU's during the monitoring period, Blue Thumb Program staff indicate that overall the creek is doing fairly decent in this regard considering the presence of cattle in the area (still would not advise swimming in the creek), but suggest it is something that should continue to be considered and monitored.

Sharp Creek – Grove Site
(Site #2)

NW NW SE
Section 17-4N-21E
Beaver County
36.810928, -100.819867
WBID #: OK720500-02-0430D



Grove Site

Habitat Assessment

8/1/2011

Score: 87.6

Stream Conditions & Habitat Overview

The physical habitat assessment is a subjective/objective view and description of the testing location. For this 8/1/2011 physical habitat assessment a stretch of 400 meters was assessed, starting at the monitoring site and continuing upstream.

High quality factors: instream cover and channel alteration.

Medium quality factors: pool bottom substrate, pool variability, flow, bank stability, streamside cover, and bank vegetation stability.

Low quality factors: canopy cover shading, presence of rocky runs or riffles and channel sinuosity.

Points were assigned to the quality factors and when combined these added up to a **total score of 87.6 which just beats the average score of 82.3 for high quality sites in the Southwestern Tablelands ecoregion.** Compared to the upstream Silo site, the Grove site, even though it scored an overall lower score, has more rocky riffles and the water has better flow. The Grove site is suffering more erosional problems. The creek is nearly all the same depth for the entire 400 meters. Also, there is less canopy shading due to the creek being wider and steep banks at this site. The Grove site, just like the Silo site, has been observed to consistently be at **base** and **stable flow** during the testing period.

Fish Collection for Grove Site - 8/1/11

The summer 2011 collection indicated 2,326 total numbers of fish comprising 14 individual species.

Species caught include:	#fish		#fish
Spotted Gar	1	Black Bullhead Catfish	12
Red Shiner	563	Yellow Bullhead Catfish	12
Common Carp	269	Plains Killifish	30
Sand Shiner *	64	Mosquitofish	635
Suckermouth minnow *	1	Green Sunfish	48
Fathead Minnow	224	Bluegill Sunfish	154
Largemouth Bass	6	Longear Sunfish	307

* Intolerant or intermediate tolerant species.

The fish collection at the Grove site as compared to Southwestern Tablelands reference data received a B grade (82%). Sharp Creek Grove site shows good numbers and species diversity as interpreted from the table below.

Index of Biotic Integrity (IBI) score interpretation for fish.

% Comparison to the Reference Score	Integrity Class	Characteristics
>97%	Excellent	Comparable to pristine conditions, exceptional species assemblage
80 - 87%	Good	Decreased species richness, especially intolerant species
67 - 73%	Fair	Intolerant and sensitive species rare or absent
47 - 57%	Poor	Top carnivores and many expected species absent or rare; omnivores and tolerant species dominant
26 - 37%	Very Poor	Few species and individuals present; tolerant species dominant; diseased fish frequent

The Grove site showed favorable numbers in comparison to the Southwestern Tablelands reference numbers. The Grove site produced more individual fish species (14) than the



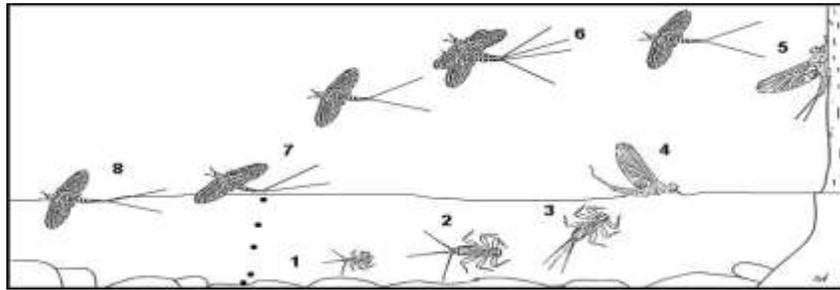
Tablelands reference (12). Two are indicator species: the **suckermouth minnow** (intolerant) and the **sand shiner** (intermediate tolerant). Overall this points to **the Grove site as a more robust habitat for fish.**

Benthic Macroinvertebrates (aquatic insects/bugs) for Grove Site

The method for rating stream water quality for insect life is complex. It is based on 5 other categories: **1)** Overall Taxa Richness (total number species), **2)** EPT abundance (quantity of each sensitive species found), **3)** HBI (Hilsenhoff Biotic Index -the amount of organic pollution tolerant species present), **4)** % Contribution dominants, **5)** Shannon-Weaver Diversity (measures the evenness of species distribution). These 5 categories together are used to arrive at percentage scores shown in the following paragraph. The table below indicates an interpretation of the scores.

Aquatic insect collections were done **7** times from summer 2010 to winter 2013; **4** were done during the summer and **3** were done in winter. They were all taken from riffle areas except the summer 2012 collection was taken from stream side vegetation. All

of the scores from each category are then compared against our closest reference area



scores, which is the Southwest Tablelands Ecoregion. **Grove site summer scores ranged from a low of 62% (B) in 2011 to a high of 115% (A) in 2010. Grove site winter scores were all 100% or better than reference conditions.**

Bioassessment score interpretation for macroinvertebrates.

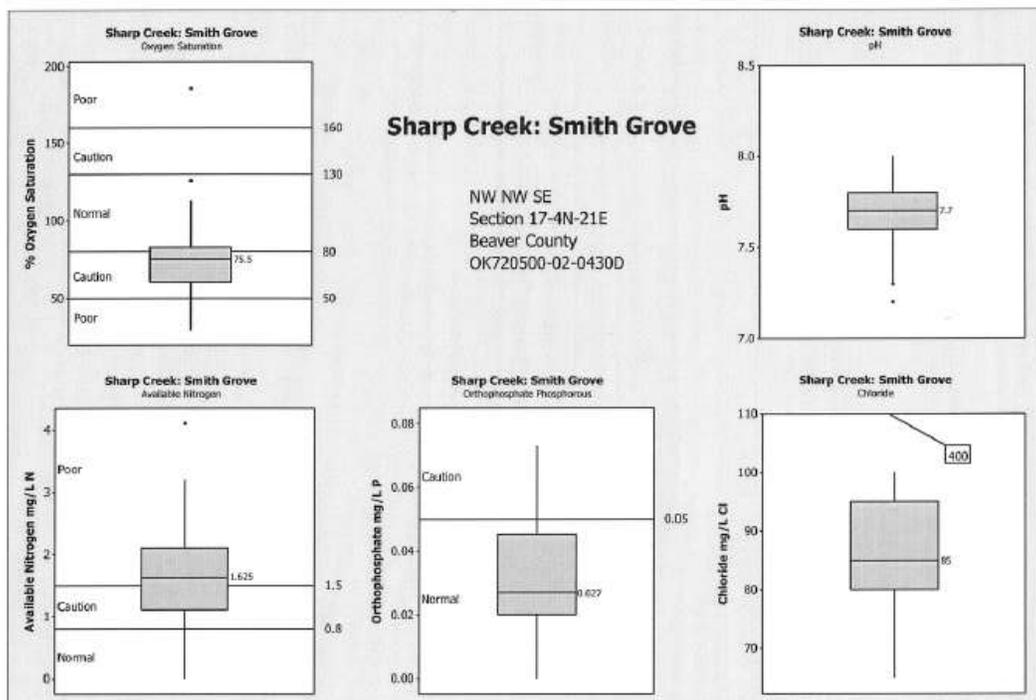
% Comparison to the Reference Score	Biological Condition	Characteristics
>83%	Non-impaired	Comparable to the best situation expected in that ecoregion; balanced trophic and community structure for stream size
54 - 79%	Slightly Impaired	Community structure and species richness less than expected; percent contribution of tolerant forms increased and loss of some intolerant species
21 - 50%	Moderately Impaired	Fewer species due to loss of most intolerant forms; reduction in EPT index
<17%	Severely Impaired	Few species present; may have high densities of 1 or 2 taxa

The indicator groups of insects that are sensitive to pollution are **Ephemeroptera**, **Plecoptera**, and **Trichoptera** (mayflies, stoneflies, and caddisflies) or **EPT**. When rating the environment of the stream for aquatic insect life there is what is known as the **EPT taxa richness** score (how many different species were found of these three groups).

The raw scores show that the Grove site had excellent numbers of EPT bugs in the winter collections but in the summer collections were struggling. The summer collections produced a good population of sensitive bugs but from half as many species when compared to reference conditions. So the diversity of sensitive bugs in the summers was not as good as it could be. Unlike the Silo site, the Grove site bugs are not indicating signs of organic pollution (the HBI scores are better here). **All of this indicates that the Grove site has a more robust species profile than the Silo site.**

Chemical Testing Data for Grove Site

Chemical data were collected monthly between 3/7/2010 and 2/1/2014. The following plot is of the Grove data collected.



Dissolved Oxygen:

Dissolved oxygen saturation shows when there are problems with the amount of oxygen available in the water for aquatic life. **Oxygen Saturation averaged 75.5% during our study period and falls within the low cautionary range (80-50%).** Out of all the readings, nearly $\frac{3}{4}$ of them were below 80%; with 15.5% of the data points being in the low poor range (less than 50% oxygen saturation). A range of **80-130% is normal.**

pH:

The greatest natural cause for change in pH in a stream is the seasonal and daily variation in photosynthesis. The pH of water determines the solubility and biological availability of chemical constituents such as nutrients (e.g., phosphorus, nitrogen, and carbon). Grove site **average was 7.7** during our study period. **Normal range is 6 to 9.**

Nitrogen:

Nitrogen occurs naturally in the environment and is also introduced through fertilizers. Chemical fertilizers or animal manure is commonly applied to crops to add nutrients. Excess nitrogen can cause an overstimulation of aquatic plants and algae. Excessive growth can clog waterways and reduce flow, as well as, decrease the levels of dissolved oxygen as they decompose. Normal levels of nitrates usually do not have a direct effect on aquatic insects or fish. However, excess levels of nitrates in water can make it difficult for aquatic insects or fish to survive. **A median of 1.625mg/L of available nitrogen (adding together nitrate, nitrite and ammonia nitrogens) during our study period falls within the poor range, greater than 1.5mg/L. Natural levels of nitrate are usually less than 1mg/L. The highest reading at the Grove site was 4.1mg/L on 12/3/2011 and 3/3/2012.** The majority of the nitrogen is in the form of nitrate nitrogen, followed closely by low levels of ammonia nitrogen and occasionally very low readings of nitrite nitrogen. **Nitrate Nitrogen levels at the Grove site are consistently higher (.5-2mg/L greater) than at the Silo site. Ammonia and Nitrite nitrogen levels stay pretty comparable at both sites.**

Phosphorus:

The biologically active form of phosphorus (orthophosphate) can cause water quality problems by over stimulating the growth of algae. In addition to being visually unappealing and causing taste and odor issues in water supplies, excess algal growth can contribute to the loss of oxygen needed by fish and other organisms. Elevated levels of phosphorus in streams can result from fertilizer use, animal wastes, wastewater, and the use of phosphate detergents. **A median Orthophosphate level of 0.027mg/L during our study period falls within normal parameters. A few readings were in the caution area, greater than 0.05mg/L, with the highest reading of 0.073mg/L on 6/7/2010 which was after a rain event.**

It's interesting that on 7/5/2010 when the feed lot retention ponds overflowed the highest reading at the Silo site was 0.730mg/L but at the Grove site downstream the reading was a lot lower at 0.027mg/L and in the normal range.

Chloride:

Elevated chloride can inhibit plant growth, impair reproduction, and reduce the diversity of organisms in streams. Chloride in our rural watershed may be natural sources of salt and brine in geologic deposits, or from natural and human sources in precipitation. A median **Chloride level of 85mg/L** during our study period is within the acceptable range. **A range of 45 – 155mg/L is normal.** On 4/26/2013 the chloride reading was 400 mg/L; we are not sure what happened here since all the other readings were below 105mg/L.

Bacterial Counts

Coliform bacteria are commonly used as a bacterial indicator of the sanitary quality of foods and water. One of the more common forms of this type of bacteria is *Escherichia coli* or **E.coli**. The origin of E.coli is almost entirely fecal so it is an indicator of animal manure in the stream. Most strains of E.coli are harmless but some can cause illness such as diarrhea, stomach cramps, and fever if ingested in the water.

The Grove site was also tested for E.coli 22 times from November 2010 to August 2013. The samples were taken throughout different seasons of the year. **Grove site average number CFU's (Coliform Forming Units) was 242.6 with a geometric mean of 38.2; higher than the results at the Silo site.**

The state law says that if the geometric mean for the E.coli data is **over 126 CFU's** then the creek is not supportive for primary human contact, meaning people getting into the water and swimming. It is also stated that if any one event is over **400 CFU's** then that is not a positive indicator of stream health. At the Grove site there were **4 events over 400 CFU's but the geometric mean is well below 126 CFU's** during the study period. Notwithstanding some events being over the desired CFU's during the monitoring period, Blue Thumb Program staff indicate that overall the creek is doing fairly decent in this regard considering the presence of cattle in the area (still would not advise swimming in the creek), but suggest it is something that should continue to be considered and monitored.

Synopsis

The data that we collected over the last four years gives us a baseline on which to go forward. That is, we know what the standard state of the stream should be given the factors of the ranch environment. Some factors such as the presence of domestic animals and cattle are things that have been more or less consistent for many years. The creek, during our monitoring period (March 2010 – present), indicates for the most part, a healthy and stable environment. There are, however, some areas of concern such as lower bug results at the Silo site, some high nitrogen and bacterial counts, and low oxygen levels at the Grove site. In the past the feedlot located on Hwy 83 in the drainage area less than a mile upstream from our Silo site has been a source of sewage pollution during flood events. This has not been as much of a factor during the testing period due to the lack of rain events from the drought. Further, within the last year the feedlot has shutdown its operation because of the cattle market & economy so its future is unknown.

As a result of this stream monitoring we will have information in the future on which to base decisions as it pertains to the water resources of the ranch. Sharp Creek is a unique waterway to Oklahoma and we are lucky to be the caretakers. We hope that this report was helpful in elucidating a better understanding of the current state of the creek.

Credits:

This report could not have happened without the help of our volunteers. We would like to thank Nick Kroeker, Donald Hayes, and Chris Guyer, the latter two faculty of Seward Co. Community College. This study and report was a great undertaking. We could not have done it without your



help. We greatly appreciate all your efforts in data collection (during cold weather and hot), bacterial incubation, and report writing over the last four years. Thank you.

Photo below, Bill Smith and John Smith.

Above, Nick Kroeker and Chris Guyer.



Left, Don Hayes.

And not the least, we thank Director Cheryl Cheadle and Kim Shaw of the Oklahoma Blue Thumb for their constant prodding, tolerance of our ineptness, and constantly but subtly looking over our shoulders.

Seward County Community College/Area Technical School (SCCC/ATS) is also acknowledged for allowing the use of their facilities and students on occasion and recognizing the educational aspects of the Blue Thumb program.

The support of the tenants George & Shirley Kroeker and the XX, LC members for the Sharps Creek testing program is truly appreciated.

Sixmile Creek: Kouba

NE SE NW

Section 14-12N-7W

Canadian County

35.518465°, -97.911867°

WBID#: OK520530-00-0050J

Blue Thumb Volunteer Monitoring Data Review- 12-8-2014

Written By: Anna Greenway & Jacob Neptune

Description of Watershed and Monitoring Site:

Sixmile Creek begins about 3 miles south and a little west of El Reno, OK. The creek flows east approximately three miles then northeast 4 miles through the east outskirts of El Reno and through land owned by the Kouba family and this is where the monitoring site is. Up to the monitoring site, Sixmile Creek has just 1 tributary and drains close to 20 square miles of land; rural pastures, farmlands, small portion of urban El Reno. The site where we monitor is on a cow pasture where the cattle have access to the creek at certain times of the year. Sixmile Creek then changes course flowing east for approximately four more miles into the North Canadian River, gaining a few tributaries along the way. This is all within the big Central Great Plains Ecoregion.

Stream Condition & Habitat Overview

The habitat assessment for Sixmile Creek was conducted on 7/27/2011 and the creek was very dry in the quarter mile (400 meters) observed; only five pools of water, because of this many readings were low. Streamside cover scored well because it was measured from bank to bank and not at current water level. Channel alteration also scored high due to the drastic water level change. With only a few pools of water there were no signs of newly formed point bars; new point bars indicate unstable streambed, less support for fish and creek bugs. Canopy cover shading also scored well as the creek is lined with trees and some small shrubs. This creates a lot of shade on the creek water which keeps water temp lower and oxygen levels higher which is less stressful for many aquatic organisms. Bank vegetation stability is important to a stream's health because it keeps point bars more stable and lessens erosion; Sixmile Creek scored a medium on this. There was low instream cover since the stream was so dry. This means the aquatic organisms didn't have much habitat in the water to hide in or around; woody debris, aquatic plants, rocks/gravel. Pool variability scored low since the pools didn't offer much depth change in the creek. Pool bottom substrate scored low which means poor creek bottom soil for burrowing organisms to live and bottom spawning fish to spawn. Sixmile Creek is very mucky clay/silt/sand and unstable. The presence of rocky runs or riffles were absent because of dryness so that scored low; runs and riffles are important to increase oxygen in stream and help the creek have more diversity. We had no flow due to lack of water in the creek. There was low bank stability meaning there was active erosion. In the 400 meters measured for the assessment the channel sinuosity was low

meaning the creek was more strait than curvy. The overall habitat score for Sixmile Creek was 53.6 and the high quality streams in the Central Great Plains Ecoregion (CGPE) averaged a score of 77.6.

Biological Condition

Fish

A fish collection was also conducted on 7/27/2011. The number of fish species (12) found in the creek was quite good considering the lack of water; the CGPE averaged 13 species. There were 6 sunfish species found in Sixmile Creek and only 4 in the CGPE average. This is important to note because different sunfish species have different habitat and food preferences, and indicates our creek has a wide diversity in the habitats sunfish need. The number of fish species that make up 75% of the total fish population in the creek (5) is greater than that of the CGPE average (3) meaning better diversity in Sixmile Creek. Of all the fish collected in Sixmile Creek, 90% were tolerant to pollution. This indicates the poor condition of the creek due to the lack of pollution intolerant species. There were no insect eating minnows or intolerant species found. This fish collection for Sixmile Creek scored 58% out of 100%, receiving a “D” grade on a scale of A to E.

Benthic Macroinvertebrates (creek bugs)

Bug samples were collected from Sixmile Creek in Winter 2011 and Summer 2013. Sampling at different times of year helps show the health of the stream in the different seasons. Through our data you can find that there was only one sensitive species of macroinvertebrate found in our creek in both winter and summer collections. The CGPE average was 3 sensitive species for winter and 6 sensitive species for summer. The taxa richness (number of species) for Sixmile Creek in Winter 2011 was 8. The CGPE average for taxa richness was 11. The Summer 2013 taxa richness was 12, while the CGPE average was 16. This shows that the summer yielded more species of insects but the sensitive species did not increase from the winter. The HBI index of our creek was 6.68 in winter and 7.98 in the summer which was much higher than the CGPE average. HBI index rates the pollution tolerant and intolerant species of insects in the creek. It is scored 0-10 with 0 being the most pollution intolerant and 10 being the most pollution tolerant. So our data shows that there was much more pollution tolerant insects found. The percent contribution of species found in the winter and summer were higher than that found in the CGPR average. This shows Sixmile Creek had a high concentration of fewer species indicating a bad distribution of species found during the collections. The Shannon-Weaver diversity was slightly lower than the CGPE average because we had a high concentration of two species instead of an even number of species throughout our collection. The overall scores for Sixmile Creek was 40%, C grade, in Winter 2011 and 38%, C grade, in Summer 2013.

Chemical Testing

The chemical testing was conducted 16 times from 4/5/2012 through 6/3/2014.

- DO Dissolved Oxygen Saturation shows when there are problems with the amount of oxygen available in the water for aquatic life. Too little or too much are indicators of problems. Chemical data show that our DO level was consistently lower than normal (below 80%), or poor (below 50%). The middle data point for our creek was 51% dissolved oxygen saturation, just barely above poor.
- pH pH was consistent, never higher than 8 and never lower than 7.3.
- Nitrogen An estimate of Soluble Nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Levels of soluble nitrogen were half in the normal range (below 0.8mg/L), $\frac{1}{4}$ in the caution range (0.8-1.5mg/L) and $\frac{1}{4}$ in caution range (above 1.5mg/L). Our highest readings were on 5/5/2014 (2.95mg/L) and 6/3/2014 (3.3mg/L).
- Phosphorus The Orthophosphate Phosphorous was consistently poor (above 0.1 mg/L). Only two readings were in the normal level (below 0.05mg/L).
- Chloride Our Chloride readings were acceptable for the area we are testing in.

Overall our creek (Sixmile Creek) had average pH and Chloride, fair Nitrogen levels with few spikes but poor Orthophosphate Phosphorous and % Oxygen Saturation levels.

Synopsis

We find Sixmile Creek to be unhealthy compared to the average stream in the Central Great Plains Ecoregion. This is because our data shows unhealthy levels of Orthophosphate Phosphorous and moderately high nitrogen levels and the oxygen level is quite low. The bugs and fish are showing that sensitive species are very few or not at all, so something is limiting their existence. Drought is perhaps one of the limiting factors; the drought started in late 2010 or early 2011 so all this monitoring on Sixmile Creek has been during drought conditions. Our creek does however have a seemingly healthy and diverse population of sunfish. The physical habitat assessment was conducted when the creek was near dry so that assessment is skewed but it did give information about the creek in drought conditions and it scored fair. This data is an accumulation of only three years of spotty samples, and we look forward to seeing the life of our stream progress with further future testing.

Soldier Creek: County Road 75

SW SE SE
Section 19-17N-1E
Logan County
Latitude N 35.927659°
Longitude W -97.232834°
WBID#: OK620900-03-0160E

Blue Thumb Volunteer Monitoring Data Review – December 17, 2014
Written by: Raymond Faucette

Description of Watershed and Monitoring Site

The monitoring site is on Soldier Creek where it passes under County Road 75, southeast of the town of Langston and about 0.8 miles east of Indian Meridian Road in North-East Logan County, Oklahoma. Soldier Creek flows north until turning east, directly east of Langston, and empties into the Cimarron River. Our monitoring site is roughly 3 miles downstream (north) from the headwaters of Soldier Creek. The watershed is approximately 3,163 acres (determined using Web Soil Survey) up to where we monitor. The land is rolling moderately eroded range land with slopes ranging from 1% to 45% (Web Soil Survey). The area has wooded areas adjacent to the stream (Google Earth). The land is not suitable for crop production. Our monitoring site is also just downstream from an approximately 13 acre impoundment that modifies the flow and water quality. Soldier Creek is in the Central Great Plains ecoregion.

Stream Condition & Habitat Overview

A habitat assessment was conducted at our monitoring site on June 3, 2011; starting at the monitoring site and going downstream ¼ mile. Soldier Creek's habitat score of 66.1 was close to the Central Great Plains Reference Average (CGPRA) of 77.6. The Central Great Plains Reference Average is an indication of a stream's health, a condition based on scores of several high quality streams over several years and is an average that indicates the maximum potential of a stream in this ecoregion. The creek at our monitoring site is under the county road bridge. The creek channel is broad and shallow with a very low flow and a deep pool immediately upstream from our sampling point. The entire length of the habitat assessment presented very few rocky riffles and was mostly silted in with mud approximately 6 inches deep. There was a moderate amount of vegetation (mainly grasses with some shrubs) on the banks but they were still actively eroding in many places. This stretch of the creek was incised approximately 18 feet with a cattle crossing 60 meters downstream that was more eroded than the rest. The majority of the creek segment had walls too steep to climb. The sampled stretch was approximately 4 to 10 feet wide along the entire length. The floodplain at the bottom of the incised area was 2 feet on each side in most places. The sampled area was 3 feet deep in most places but was shallower in some places and slightly deeper in others. What did score well was that there was lots of aquatic vegetation and some woody debris in the water for instream

habitat for the creek bugs and fish. This also created shade for the water to keep it cooler thus increasing the oxygen level in the water since cooler water holds more oxygen.

Biological Conditions

Fish

A fish collection on Soldier Creek was conducted on the same day as the habitat assessment and in the same ¼ mile stretch. The overall score for Soldier Creek, when compared to CGPRA, was 58% (“D” grade). Eleven fish species were collected, which is close to the CGPRA 13 species. The Shannon’s Diversity (measures the evenness of the population distribution over the different species) of 1.621 for Soldier Creek was the same as the CGPRA which is excellent for our stream, then it goes downhill from there. There were no sensitive benthic species collected, such as darters, madtoms, sculpins. The number of sunfish species (3) was good when compared to 4 for the CGPRA. There were 3 fish species comprising 75% of the total population of the fish collection, the same as the CGPRA but no intolerant species. All the fish collected are tolerant to pollution. There were no insectivorous cyprinids collected, minnows that eat insects.

The fish species collected were: Red Shiner (10), Common Carp (2), Golden Shiner (9), and River Carpsucker (1); omnivores. Black Bullhead Catfish (3), Yellow Bullhead Catfish (7), Channel Catfish (1), Green Sunfish (20); generalists/insectivores. Mosquitofish (68), Bluegill Sunfish (118), Longear Sunfish (39); insectivores.

Benthic Macroinvertebrates (bugs)

Benthic macroinvertebrates were collected from streamside vegetation on March 1, 2011 (winter sample) and June 3, 2011 (summer sample).

The total score for the winter sample equaled the CGPRA but was very low in some categories and higher in other categories. Soldier Creek had 17 species which was way better than CGPRA with just 10 species. The real low point for Soldier Creek was only having 1 sensitive species of bug while CGPRA had 3 sensitive species. But that 1 species did make up 12% of the total population so that abundance equaled the CGPRA. The diversity of the Soldier Creek winter sample was better than the CGPRA but had a lower score when it came to the HBI score which measures the bugs’ sensitivity to organic pollution.

The summer collection is a totally different story; total score of 38%, “C” grade. Only 6 species were captured, 16 for CGPRA. There were no sensitive species found. The HBI score was very good and equaled the CGPRA. The diversity was moderate. In general, summer is a more stressful time for creek bugs as the water is warmer which decreases the oxygen level.

Chemical Testing

Chemical data were collected 6 times between August 27, 2009 and January 25, 2011.

- DO Dissolved oxygen saturation averaged 64.8% and ranged from 45-100% saturation. The normal range is 80-130% and caution range is 50-80%. So Soldier Creek majority is in the low caution range.
- pH pH ranged from 7.5 to 8.5 which is normal.
- Nitrogen An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Soldier Creek levels were all normal ranging from below detection to 0.5mg/L N.
- Phosphorus Orthophosphate phosphorous had an average in the caution range of 0.092mg/L P, but ranged from 0.047mg/L P (normal range) to 0.140mg/L P (poor range).
- Chloride Chloride was relatively low with an average of 32.5mg/L Cl ranging from 25-50mg/L Cl.

Dissolved oxygen levels were highest in the one springtime sample at 100% saturation and lowest in the three late fall and winter samples at 59-45% saturation. It is well known that more oxygen is saturated in colder water than in warmer water. This is reflected in both a larger number benthic macroinvertebrate taxa and sensitive species collected in winter than summer. Another factor in the lower number of macroinvertebrates in the summer samples may have been the tendency of ammonia, or available nitrogen to be more toxic to sensitive or intolerant organisms especially with slightly alkaline pH levels when temperatures are higher (Kutty, 1987). Ammonia excreted as a result of respiration in aquatic organisms is either taken up by aquatic vegetation or quickly converted to the ammonium ion. In a natural environment, populations of *Nitrosomonas* spp. and *Nitrobacter* spp. oxidize ammonia quickly to nitrate which is another form of nitrogen used by plants. Our water quality results showed one ammonia reading of 0.2mg/L N on 4/6/2010, one nitrate reading of 0.5mg/L N on 8/27/2009, and one nitrite reading of 0.15mg/L N on 11/2/2010 which can be slightly toxic to some intolerant species. Ammonia is also produced by the decay of any organic matter in the stream such as dead organisms, dead vegetation and woody debris, and any other trash. Phosphorus is also released from this decay of organic matter but usually in small amounts and is taken up quickly when the Nitrogen/Phosphorus Ratio is higher and is not often a problem in Oklahoma waters. Chloride levels in our water samples were adequate at all time to aid in osmoregulation in the animals in our collections and allowed their bodily process to work more efficiently. This reduces stress in animals and helps them to resist diseases and infections. It also helps fish to maintain a good mucus layer on their external surfaces that is an additional layer of protection.

Synopsis

Our assessment of Soldier Creek at our sampling site under County Road 75 Bridge is that it is slightly impaired. The stream had a silted bottom that probably inhibited bottom reproduction by many of the species collected. The benthic macroinvertebrates reproduced in the vegetated areas along the stream but were fewer in numbers than we expected. There was only one summer and one winter collection so we cannot know if the Winter 2011 score of 100% was the norm or a fluke. The fish assemblage was interesting in that all the species collected were pollution tolerant. The reduced water quality parameters can partially be explained by the low flow, silt, turbidity and shaded conditions found along our stretch of the stream. We did not notice any external sources of pollution in the stream other than the normal amount of trash found along rural streams. With very few chemical monitoring episodes it is extremely hard to get a visual of when dissolved oxygen is steadily higher or lower or if it is constantly fluctuating, or if the phosphorous is higher in the spring or remains high year round. More thorough testing would need to be done to even begin to start seeing any trends, but the data that we do have is saying that Soldier Creek at County Road 75 was certainly struggling in 2010 and 2011.

Site Selection for Aquaculture: Chemical Features of Water. M.N. Kutty. 1987. Lectures presented at ARAC for the Senior Aquaculturists course, African Regional Aquaculture Centre, Port Harcourt, Nigeria. African Regional Aquaculture Centre, Port Harcourt, Nigeria. United Nations Development Programme. Food and Agriculture Organization of the United Nations. Nigerian Institute for Oceanography and Marine Research. PROJECT RAF/82/009

Spring Creek: Horinek

NW SE NW
Section 10-27N-2E
Kay County
Latitude N 36.835617°
Longitude W -97.078907°
WBID#: OK520610-01-00205M

Blue Thumb Volunteer Monitoring Data Review – December 2014
Written by: Theresa Horinek and Michael Horinek

Description of Watershed and Monitoring Site:

Spring Creek starts approximately 1.5 miles north of the small town of Newkirk, Oklahoma (north of Ponca City), flowing from north to south, and empties into Bois d'Arc Creek. Spring Creek is a secondary creek; one tributary flowing into it. The monitoring site, located about five miles south from where the creek initiates, is at a bridge located on West Brake Road about ½ mile west of Highway 77. The area has farm ground with cattle, rural homes and small town urban, as well as lagoons used for the town of Newkirk. This creek site has some months that are not monitored, typically during the summer months, due to little or no flow.

Stream Condition & Habitat Overview

A habitat assessment for Spring Creek was performed on June 20, 2011, starting at the monitoring site and going downstream 400 meters (1/4 mile). Spring Creek scored lower for habitat than the Central Great Plains ecoregion reference conditions (64.8 compared to 77.6). The creek scored high for instream cover, streamside cover, and canopy cover shading, which leads to cooler water temperatures and less variation in temperatures, benefiting stream organisms. The high scoring instream and streamside cover also gives structure in the creek for fish and bugs to utilize as habitat; woody debris, some rocks and aquatic vegetation. The creek was assessed to have medium bank vegetation stability with some erosion. Characteristics assessed as low include pool variability. There were 1 or 2 waist deep pools but the rest of the creek was ankle to mid-calf deep. The presence of rocky runs or riffles was in just 2 small areas of the creek. With all the sand and silt new point bars have always been forming meaning the bottom of the creek is very unstable. The creek was not flowing on this date so we could not get a flow measurement. In several places the creek banks were steep and actively eroding.

Biological Conditions

Fish

The fish collection for Spring Creek was also performed on June 20, 2011 and within the same 400 meter stretch. Spring Creek scored an 83% (“B” grade) when compared to the Central Great Plains ecoregion reference conditions. The number of fish species at Spring Creek (15 species) was better than reference conditions (13 species). Only one pollution sensitive species (Suckermouth minnow) was found, reference conditions had 2 sensitive species. Spring Creek also had a higher proportion (85% versus 74% reference conditions) of pollution tolerant species meaning there was more pollution or something that was limiting the sensitive species. Over half of the total fish collection was Longear sunfish (61%). The population of minnows that eat insects was also really low meaning the quality and quantity of their food (creek bugs) was poor.

Benthic Macroinvertebrates (creek bugs)

The macroinvertebrate population was assessed in the winters of 2011 and 2012. The taxa richness, or number of species found, was 8 in 2011 and 5 in 2012, both years being below the reference condition number of 11. However, the Shannon-Weaver Diversity (measures the evenness of total population over the number of species) value for winter 2011(1.56) was slightly higher than the reference condition value of 1.37. The number of sensitive bug species was very low for Spring Creek; 0 species in 2011, 1 specie in 2012 and reference condition had 3 species. The grades for the winter collections were a B (60%) in winter 2011 and in winter 2012 dropped to a C (30%) as compared to an A (100%) for the reference condition.

During the summers of 2010, 2011 and 2013, macroinvertebrate collections were taken with the taxa richness values being 13, 17, and 10 respectively, with the reference conditions value being 16. The Shannon-Weaver values for Spring Creek summers 2010 and 2011 were better than reference conditions. However, summer 2013 was slightly below reference conditions. There was a steady decrease in the number of sensitive bug species: 4 in 2010, 3 in 2011 and 2 in 2013 (reference condition had 6). The grades for the summer collections were a B (71%) for both 2010 and 2011 and decreased to a C (44%) in 2013.

Bacteria Testing

Bacteria was not tested regularly so no data is available.

Chemical Testing

Chemical data were collected 34 times between 04/13/2010 and 05/15/2014.

DO	Dissolved oxygen saturation shows when there are problems with the amount of oxygen available in the water for aquatic life. Too little or too much are indicators of problems. Chemical data show that the oxygen levels are within the 50-80% range which is the caution range. Normal range is 80-130%. Low to no flow conditions could contribute to this.
pH	pH usually tested between 7.7 and 7.9 which is normal.
Nitrogen	An estimate of soluble nitrogen is made by adding the amounts of ammonia-nitrogen and nitrate/nitrite-nitrogen found in the water. Spring Creek levels range from below detection to 5.2mg/L N, with a median of 1.0mg/L N which is in the caution range (0.8-1.5mg/L N). As Spring Creek has farm ground bordering it, these values may be affected by rains washing fertilizer into the water.
Phosphorus	Orthophosphate phosphorus levels are in the poor range with 75% of the data being above 0.1mg/L P. The highest data point was 0.667mg/L P. Eight data points were within the normal range, below 0.05mg/L P.
Chloride	Chloride level averaged 200mg/L Cl which is on the high side of normal for this area.

Overall Spring Creek: Horinek falls into the caution range for oxygen and nitrogen, poor range for phosphorus, and normal range for chloride and pH. This may affect the biodiversity of the fish and macroinvertebrate species.

Synopsis

Spring Creek: Horinek falls slightly below for the habitat conditions when compared to the Central Great Plains ecoregion reference conditions. A positive for Spring Creek: Horinek is the higher number of fish species; however, well over the majority were pollution tolerant fish species. An overall fish score of 83% is not too bad. The macroinvertebrates overall scores of 71-30% is not good. Perhaps these lower bug scores are limiting some of the fish species, especially the minnows that eat these bugs. The creek bugs may be affected by the chemicals or the condition of sometimes losing flow, especially in drought conditions that have hit Oklahoma hard around 2010-2013. Spring Creek: Horinek is suffering but is still supporting a decent biological community.

Appendix D – Monthly Reports

January Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: January 1 - 31, 2014

Winter macroinvertebrate collections and field quality assurance sessions are now taking place across the state. All staff members are involved. In addition, all staff members spent at least one day going with new volunteers to sites to help them with their initial monitoring.

Education/Events Calendar

- ✓ 1/8 – OCC Communication Committee – Jeri
- ✓ 1/9 – Stillwater Children’s Museum (Wondertorium) – Jeri
- ✓ 1/13 – Twin Mounds 4-H Group (Yale) Blue Thumb presentation – Jeri
- ✓ 1/14 – Soil Health Workshop (Wagoner) - Jeri
- ✓ 1/15 – “All About Trees” workshop (Claremore) Cheryl, Jeri, Candice, and Kim
- ✓ 1/21 – Blue Thumb staff meeting
- ✓ 1/21 – Boeing Planning Meeting for Earth Day (OKC) - Candice, Jeri, Cheryl
- ✓ 1/30 – Green Country Sierra Club (Tulsa) Blue Thumb Presentation – Cheryl
- ✓ 1/31 – City of Tulsa Creek Cleanup Meeting - Cheryl

Blue Thumb Training Sessions, etc.

- ✓ 1/10 – Southwestern Oklahoma State University (Weatherford) Blue Thumb mini-academy – Kim
- ✓ 1/24 & 25 - Blue Thumb Training for New Volunteers (Norman) Kim, Candice, and Cheryl

Additional Work taking place

- ✓ Planning for Water Quality Staff Retreat
- ✓ Preparing for new Leadership Workshops for Blue Thumb Volunteers
- ✓ Travel for macroinvertebrate collections and quality assurance sessions
- ✓ Employee PMP meetings and evaluations

Upcoming

- ✓ Leadership Workshops for Blue Thumb Volunteers (February 20, 25, 27, and March 1, 2014)
- ✓ Environmental Education Expo (February 7)
- ✓ Water Quality Staff Retreat (February 12 & 13)

February Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: February 1 - 28, 2014

Winter macroinvertebrate collections and field quality assurance sessions continue to take place across the state. All staff members are involved.

Education/Events Calendar

- ✓ 2/3 – Social Media Training – Candice, Kim, Jeri, Cheryl
- ✓ 2/7 – OKAEE Environmental Education Expo (Blue Thumb Presentation) – Cheryl, Jeri, Candice
- ✓ 2/12 & 2/13 – OCC Water Quality Staff Retreat
- ✓ 2/16 – Central Technical School Open House (Drumright) - Candice
- ✓ 2/18 – Stream Trailer Training, Stillwater – Kim, Candice, Jeri, Cheryl
- ✓ 2/20 – Oklahoma Blue Thumb Association Board meeting
- ✓ 2/21 – North Canadian River Teachers Traveling Workshop Planning Meeting

Blue Thumb Training Sessions, etc.

- ✓ 1/31 – Blue Thumb Mini-academy with Natural Resources and Environmental Management students, OSU, Stillwater – Jeri
- ✓ 2/14 – Blue Thumb Mini-academy with Spiro Middle School Students, Spiro – Cheryl
- ✓ 2/20, 25, 27, and 3/1/2014 – Blue Thumb Leadership Workshops for Volunteers (Goal is to create a “tier” of leadership volunteers to help new volunteers gain confidence in their monitoring abilities – Kim, Jeri, Candice, and Cheryl)

Additional Work taking place

- ✓ Preparing for new Leadership Workshops for Blue Thumb Volunteers
- ✓ Preparing for Oklahoma Association of Conservation Districts State meeting

Upcoming

- ✓ Blue Thumb Training session in Stillwater, March 29 & 30
- ✓ Oklahoma Clean Lakes and Watersheds Annual Conference, April 2, 3, and 4
- ✓ Blue Thumb Earth Day Event for Boeing, April 22

March Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: March 1 - 31, 2014

Winter macroinvertebrate collections and field quality assurance sessions continue to take place across the state. All staff members are involved.

Education/Events Calendar

- ✓ 3/5 – OSU Environmental Science Graduate Students, Blue Thumb Presentation (Jeri)
- ✓ 3/7 – Issue with the Land Conservation Series, National Cowboy and Western Heritage Hall of Fame (Cheryl and Jeri)
- ✓ 3/10 – OSU Chemistry Club, Blue Thumb Presentation (Jeri)
- ✓ 3/10 – Interview with OSU Newspaper, Blue Thumb Program (Jeri)
- ✓ 3/12 – OSU Natural Resources students, Blue Thumb Presentation (Jeri)
- ✓ 3/13 – Murray County Cooperator Appreciation Banquet, Blue Thumb exhibit and honor of volunteer Randy Fehr (Kim, Candice, Cheryl)
- ✓ 3/13 – Camp McFadden visit, Blue Thumb opportunities (Jeri)

- ✓ 3/14 - Issue with the Land Conservation Series, National Cowboy and Western Heritage Hall of Fame, Part II (Cheryl)
- ✓ 3/15 – Bass Pro Shop, Broken Arrow, EnviroScape and Fish Printing (Jeri)
- ✓ 3/17 – Chambers Creek investigation, Rogers County (Cheryl)
- ✓ 3/19 – Oklahoma Aquarium, Spring Break kids event, EnviroScape and Fish Printing (Jeri)
- ✓ 3/24 – Conservation Day at the Capitol (Candice, Jeri, and Cheryl)
- ✓ 3/25 – Blue Thumb staff meeting (Cheryl, Kim, Candice, and Jeri)
- ✓ 3/25 – Oklahoma Blue Thumb Association board meeting (Jeri, Candice, Cheryl and Kim)
- ✓ 3/26 & 27 – NW Tour to plan for North Canadian River Teacher Tour this summer (Cheryl and Debi)

Blue Thumb Training Sessions, etc.

- ✓ 3/11 – Jenks West Mini-academy (Cheryl)
- ✓ 3/12 – Groundwater Screening, Creek County (Kim, Candice, Cheryl)
- ✓ 3/29 & 30 – Blue Thumb Training for New Volunteers, Stillwater (Jeri, Candice, Kim, Cheryl)

Additional Work taking place

- ✓ Performance Management Process with staff members
- ✓ Completion of Blue Thumb Final Report
- ✓ New Blue Thumb face book page launched
- ✓ Blue Thumb website is being revised

Upcoming

- ✓ Blue Thumb Earth Day Event for Boeing, April 22
- ✓ Multiple natural resource days on the calendar
- ✓ Oklahoma Clean Lakes and Watersheds annual conference
- ✓ Spring Quality Assurance sessions and macroinvertebrate sub-sampling

April Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: April 1 - 30, 2014

Winter collections have all been completed. Spring quality assurance sessions and macroinvertebrate subsampling are now taking place, with all staff involved.

Education/Events Calendar

- ✓ 4/1 – Low Impact Development Symposium, Blue Thumb Exhibit, Tulsa, staffed by volunteers Julie Monnot and Alani Taylor
- ✓ 4/2 & 3 – Oklahoma Clean Lakes and Watersheds Annual Conference, Stillwater (Kim, Jeri, Cheryl, and Blue Thumb volunteers Beth Landon, Jahna Hill, Ariel McAffrey, Ava, McAffrey, Katie Prior, Karen Prior, and Karen Chapman)
- ✓ 4/2 & 3 – Belle Isle Enterprise School, Blue Thumb presentation (Cheryl)
- ✓ 4/4 – Video Contest Meeting for Blue Thumb, Tahlequah (Jeri)
- ✓ 4/8- North Canadian River Meeting (Debi, Jeri, Cheryl)
- ✓ 4/8 – Boeing earth day event planning meeting (Kim, Jeri, Cheryl)
- ✓ 4/10 & 11 – Oklahoma Water Law Workshop, Tulsa (Jeri)

- ✓ 4/10 - WhizKids, Crutch Elementary, Blue Thumb Presentation (Kim)
- ✓ 4/11 – Blue Thumb Intern Interviews (Kim and Candice)
- ✓ 4/15, 22, and 29 – Wondertorium “Science Tuesday”, Stillwater, Blue Thumb Presentation (Jeri)
- ✓ 4/17 – Oklahoma Blue Thumb Association Meeting (Jeri and Cheryl)
- ✓ 4/18 – Tulsa Community Zoology Class Creek Walk (Cheryl)
- ✓ 4/19 – Oklahoma Scenic Rivers Commission Mini-BioBlitz, Tahlequah (Candice and Cheryl)
- ✓ 4/22 – Boeing Earth Day, Midwest City (Cheryl, Debi, Jeri, Kim, Candice, Judith, and John Harrington)
- ✓ 4/22 – Oklahoma City University, Earth Day Event (Candice, Jeri, Kim, and Cheryl)
- ✓ 4/24 – Dell earth day, Tulsa (Jeri)
- ✓ 4/24 – ScienceFest @ Oklahoma City Zoo (Kim and volunteers Karen Prior and Katie Prior)
- ✓ 4/25 – Wondertorium, Blue Thumb Presentation, Stillwater (Jeri)
- ✓ 4/27 through 5/2 – Kim Shaw will attend National water Quality Monitoring Conference.
- ✓ 4/29 – Pawnee Fairgrounds, Blue Thumb Presentation, (Cheryl)

Additional Work taking place

- ✓ Final edits to Blue Thumb final report
- ✓ Screening of applicants and interviews for summer intern

Upcoming

- ✓ May 4 - Illinois River Heritage Festival, Tahlequah
- ✓ May 8 – Murray County Natural Resource days
- ✓ May 10 – Bass Pro Shop Environmental Education
- ✓ May 13 – Otoe-Missouria Tribe Blue Thumb Presentation
- ✓ May 14 – OCC All Staff meeting
- ✓ May 22 – Soil Health Training
- ✓ May 31- Tulsa Creek Clean-Up

May Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: May 1 - 31, 2014

Spring quality assurance sessions and macroinvertebrate subsampling are now taking place, with all staff involved. Staff members offered Quality Assurance sessions and macroinvertebrate subsampling on May 1, 5, 6, 8, 12, 13, 14, 15, 16, 20, 21, 22, and 23.

Education/Events Calendar

- ✓ 5/3 & 4: Camp McFadden (Kay County) Outdoor Expo, Blue Thumb activities, Jeri and two volunteers
- ✓ National Water Quality Monitoring Conference, Cincinnati, Kim
- ✓ May 4: Illinois River heritage festival, Tahlequah, Cheryl
- ✓ 5/6: Awards and Recognition Committee Meeting, Candice
- ✓ 5/7 & 8: Caney Valley Natural Resource Days, Candice
- ✓ 5/8: Murray County CD Natural Resource Day, Cheryl
- ✓ 5/9: Kay County CD Natural Resource Day, Jeri
- ✓ 5/8 & 9: Recruitment for Blue Thumb Training in Kiamichi CD, Cheryl
- ✓ 5/10: Mother’s Day at Bass Pro Shop, Broken Arrow, Jeri and Cheryl

- ✓ 5/12: Oklahoma Blue Thumb Association meeting, OKC, Jeri and Cheryl
- ✓ 5/13: Otoe-Missouria Tribe, Red Rock, Blue Thumb Presentation, Cheryl
- ✓ 5/14: OCC Staff Meeting, Jeri and Cheryl
- ✓ 5/14: Stephens County CD Natural Resource Day, Candice
- ✓ 5/15: Fish Training and Habitat Assessment Quality Assurance, Kim and Candice
- ✓ 5/16: Stillwater Natural Resource Day, Candice
- ✓ 5/16: Stream Restoration Project Meeting, Tahlequah, Jeri
- ✓ 5/17: Juniors Acquiring Knowledge, Ethics, and Skills (JAKES), Grove, Candice
- ✓ 5/20: Camp McFadden Natural Resource Day, Jeri
- ✓ 5/21: Deer Creek High School, Blue Thumb Presentation, Kim
- ✓ 5/22: Soil Health Workshop, Cheryl
- ✓ 5/27 – 30: SW Stream Restoration Conference (presented information), Jeri
- ✓ 5/31: Made in Oklahoma Festival, Midwest City, Blue Thumb exhibit, Kim and volunteers
- ✓ 5/31: Creek Cleanup, Tulsa, Cheryl

Additional Work taking place

- ✓ Planning of Blue Thumb biennial conference and celebration has begun
- ✓ Work taking place for presentations during North Canadian River tour
- ✓ Recruitment efforts for Kiamichi Conservation District Blue Thumb training
- ✓ Intern joins workforce on May 19

Upcoming

- ✓ June 16 & 17: Blue Thumb Training for New Volunteers, Hugo
- ✓ August 1 & 2: Oklahoma Blue Thumb Association Retreat
- ✓ August 23 and 24: Blue Thumb Training for New Volunteers, near Selman Oklahoma

June Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: June 1 - 30, 2014

Blue Thumb has sprang into summer while it is still spring by making fish collections. The Great Plains eco-region is being fished. Some collections have been rained out, but nobody is complaining about that! Quality assurance sessions and bug collections will begin in July, and fishing will continue.

Education/Events Calendar

- ✓ 5/31 – Made in Oklahoma Festival, Midwest City, Kim and Volunteers
- ✓ 5/31 – Coal Creek Cleanup, Tulsa, Cheryl
- ✓ 6/4 – CPR, OKC, Kim, Jeri, JT (intern)
- ✓ 6/5 – Deep Fork River wetlands education, Cheryl and volunteer
- ✓ 6/5 – Problem Creek Monitoring, Cheryl and volunteer
- ✓ 6/6 – Creek walk, Eastern Band Shawnees, Seneca, Cheryl
- ✓ 6/8 – Oklahoma Aquarium, Blue Thumb presentation, Jenks, Jeri
- ✓ 6/9 – Girl Scout Camp, Blue Thumb Presentation, Stillwater, Jeri
- ✓ 6/10 – 12 – North Canadian River traveling educator tour, Candice, Jeri, Cheryl
- ✓ 6/23 – Flat Rock Creek monitoring/mini-academy, Cheryl
- ✓ 6/24 – 26 H2Ology Camp at Wondertorium, Jeri and Cheryl

- ✓ 6/26 – Sapulpa Library, Blue Thumb Presentation, Cheryl
- ✓ 6/27 – Otoe/Missouria tribe, Red Rock environmental camp, Cheryl and volunteer
- ✓ 6/28 – 4-H parent and volunteer workshop, Blue Thumb presentation, Stillwater, Jeri

Blue Thumb Training/Field Work

- ✓ May 27 – Jimmy Creek Fish Collection, Lawton area, Kim, Candice, JT, and Cheryl (plus volunteers)
- ✓ June 2 – Four Mile Creek fish collection, near El Reno, Kim, Candice, and JT (plus volunteers)
- ✓ June 3 – Six Mile Creek fish collection, near El Reno, Kim, Candice and JT (plus volunteers)
- ✓ June 5 – Spring Creek fish collections, Kay County, Kim, Candice, and JT (plus volunteers)
- ✓ June 10 – 12 – Blue Thumb Training for New Volunteers, Kiamichi Conservation District, Cheryl, Kim, and Candice (15 volunteers)
- ✓ June 19 – Crutch Creek fish collection, Oklahoma County, Kim, Candice, and JT (plus volunteers)
- ✓ June 23 – Deer Creek, Oklahoma County, Kim, Candice, and JT (plus volunteers)
- ✓ June 23 – Flat Rock Creek monitoring and mini-academy, Cheryl

Additional Work taking place

- ✓ Planning of Blue Thumb biennial conference and celebration has begun
- ✓ Work taking place for presentations during North Canadian River tour
- ✓ Recruitment efforts for Selman Living Laboratory and Harper CC District Blue Thumb training

Upcoming

- ✓ August 1 & 2: Oklahoma Blue Thumb Association Retreat
- ✓ August 23 and 24: Blue Thumb Training for New Volunteers, near Selman Oklahoma
- ✓ September 19 & 20: “Thumbs Up! For Blue Thumb!” Biennial Conference and 20 year celebration

July Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: July1 - 31, 2014

Quality assurance sessions and benthic macroinvertebrate collections are taking place now on Blue Thumb streams. Fish collections continue, many have been rescheduled due to rain.

Education/Events Calendar

- ✓ 7/09 – Bug Camp at Oklahoma State University, Stillwater, Jeri
- ✓ 7/16 – STEM Camp at Southwestern State University in Weatherford, Cheryl
- ✓ 7/16 – OBTA Membership Committee Meeting, Cheryl
- ✓ 7/17 – Vision 20/20 exhibit, Oklahoma City, Cheryl and Oklahoma Blue Thumb Association volunteers
- ✓ 7/17 – Oklahoma Blue Thumb Association Board Meeting, Oklahoma City, Jeri and Cheryl
- ✓ 7/19 – OSU/Tulsa Blue Thumb Water Chemistry training, Cheryl
- ✓ 7/24 – 4-H Roundup, Blue Thumb Presentation, Jeri
- ✓ 7/29 – Jim Jones Education Event, Broken Bow Boys and Girls Club, Candice, Jeri, and Cheryl

- ✓ Blue Thumb fishing crew has been active in streams in the central portion of the state. (Kim Shaw, Candice Miller, JT Darling, and sometimes Jeri Fleming)

Blue Thumb Training/Field Work

Fish collections this month include:

- ✓ Sand Creek, Osage County
- ✓ Little River, Oklahoma County
- ✓ Crutcho Creek, Oklahoma County
- ✓ Boomer Creek, Payne County
- ✓ Feather Creek, Payne County
- ✓ Stillwater Creek, Payne County (more streams will enter this list August 1)

Additional Work taking place

- ✓ Planning of Blue Thumb biennial conference and celebration has begun
- ✓ Recruitment efforts for Selman Living Laboratory and Harper CC District Blue Thumb training
- ✓ Promoting Blue Thumb

Upcoming

- ✓ August 23 and 24: Blue Thumb Training for New Volunteers, near Selman Oklahoma
- ✓ September 19 & 20: “Thumbs Up! For Blue Thumb!” Biennial Conference and 20 year celebration

August Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: August 1 - 31, 2014

Quality assurance sessions and benthic macroinvertebrate collections are taking place now on Blue Thumb streams. Fish collections continue, many have been rescheduled due to rain. Fish Collections are slated to take place on ten days in August and macroinvertebrate collections are slated to take place on eleven days in August.

Education/Events Calendar

- ✓ 7/29 – Jim Jones memorial education day Choctaw Boys and Girls Club, Broken Bow, Candice, Jeri and Cheryl
- ✓ 8/9 - Ecology and Environment Day at Har-Ber Village, Grove, Cheryl
- ✓ 8/11 – Oklahoma Clean Lakes and Watersheds Board Meeting, Jeri
- ✓ 8/12 – Awards and Recognition Committee meeting, Candice
- ✓ 8/21 – Oklahoma Blue Thumb Association board meeting, Jeri and Cheryl
- ✓ 8/29 – September 1 – Choctaw Nation Festival, Blue Thumb Exhibit, Bryan County Conservation District, Jeri

Blue Thumb Training/Field Work

- ✓ 8/23 & 24 - Blue Thumb Training for new volunteers, Selman Living Laboratory, west of Alabaster Caverns State Park, Woodward County Conservation District, Kim, Candice, and Cheryl

- ✓ 8/25 – Blue Thumb mini-academy for Hodgen Middle School, LeFlore County Conservation District, Candice
- ✓ 8/26 – Blue Thumb mini-academy for Sapulpa Middle School Indian Education, Creek County Conservation District, Candice
- ✓ 8/29 – Blue Thumb mini-academy for Southwestern Oklahoma State University, Deer Creek Conservation District, Cheryl

Additional Work taking place

- ✓ Planning of Blue Thumb biennial conference and celebration

Upcoming

- ✓ August 23 and 24: Blue Thumb Training for New Volunteers, near Selman Oklahoma
- ✓ September 3 & 4: Blue Thumb Planning Retreat
- ✓ September 19 & 20: “Thumbs Up! For Blue Thumb!” Biennial Conference and 20 year celebration
- ✓ September 23 – 25: Oklahoma Municipal League, Blue Thumb Exhibit

September Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: September 1 - 30, 2014

Fish collections and macroinvertebrate collections have been completed for Blue Thumb sites. Staff will now begin planning for fall quality assurance sessions and macroinvertebrate subsampling.

Education/Events Calendar

- ✓ August 30 – September 1: Choctaw Nation Festival (Jeri)
- ✓ September 3 & 4: Blue Thumb Planning Retreat (Jeri, Candice, Kim, Cheryl)
- ✓ September 5: Osage County Fair (Cheryl)
- ✓ September 6: SeptemberFest at Governor’s Mansion (Jeri and Cheryl)
- ✓ September 16: Comanche County Conservation District Natural Resource Day (Candice)
- ✓ September 17: OCC Staff Meeting
- ✓ September 18: Department of Environmental Quality Brown Bag Lunch Series (Jeri and Blue Thumb volunteers Katie Prior, Ariel and Ava McAffrey)
- ✓ September 18: Teacher’s Night at Stillwater Wondertorium (Jeri)
- ✓ September 23: Hughes County Conservation District Natural Resource Day (Candice)
- ✓ September 24 & 25: Oklahoma Municipal League Annual Conference, Blue Thumb Exhibit (Jeri, Kim, and Cheryl)
- ✓ September 25: Illinois River Conference (Jeri and Cheryl)

Blue Thumb Training/Field Work

- ✓ September 6: Groundwater Screening and Presentation, Oklahoma County Conservation District, Spencer (Kim and Cheryl) 56 samples
- ✓ September 12: Mini-academy Undercroft Montessori, Tulsa (Cheryl)
- ✓ September 16: Mini-academy Cameron University, Lawton (Kim)
- ✓ September 19 & 20: “Thumbs Up!” For Blue Thumb Volunteers” Celebration and Conference (Candice, Jeri, Kim, and Cheryl)

Additional Work taking place

- ✓ Conference and Celebration planning was a big part of September, then mop-up activities
- ✓ Exhibit planning for events
- ✓ Employee evaluations
- ✓ Suggestions for Blue Thumb Workplan 2015

Upcoming

- ✓ Fall macroinvertebrate subsampling
- ✓ Blue Thumb training in Tulsa October 10 & 11

October Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: October 1 - 31, 2014

Fish collections and macroinvertebrate collections have been completed for Blue Thumb sites. Staff will now begin planning for fall quality assurance sessions and macroinvertebrate subsampling.

Education/Events Calendar

- ✓ 10/06: Data Report preparation/Ray Faucette (Jeri and Kim)
- ✓ 10/07: Data Report preparation/Eddie Woods (Kim)
- ✓ 10/08: H2Oklahoma @ Robbers Cave State Park (Candice)
- ✓ 10/15: Blue Thumb staff meeting Bristow (Cheryl, Jeri, Kim, Candice)
- ✓ 10/22: Data Report preparations/Anna Greenway and Jacob Neptune (Kim)
- ✓ 10/22: Oklahoma Blue Thumb Association Membership Committee Meeting (Cheryl, Anna, and Jacob)
- ✓ 10/25: Panhandle Museum Fundraiser (Cheryl)
- ✓ 10/26: Monitoring set up for Woodward County site (Cheryl)
- ✓ 10/29: Area III OACD Meeting (Jeri, Candice, Cheryl)

Blue Thumb Training/Field Work

- ✓ 10/10 & 10/11: Blue Thumb Training for New Volunteers (Candice, Kim, and Cheryl)
- ✓ 10/21: Langston University mini-academy (Jeri)
- ✓ 10/21: Deer Creek Conservation District Groundwater Screening (Kim)
- ✓ Quality Assurance events and macroinvertebrate subsampling was held: Oklahoma City; Ada; Stillwater; Lawton; and Tahlequah

Additional Work taking place

- ✓ Planning for Blue Thumb Participation in Oklahoma Association of Conservation Districts Area meetings
- ✓ Workplan efforts for 2015 Blue Thumb
- ✓ Support to Volunteers for data reports

Upcoming

- ✓ Continued Blue Thumb Quality Assurance and Macroinvertebrate Subsampling

- ✓ Area meetings
- ✓ Stream Restoration Event in Tahlequah

November Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:

Water Quality Division ~ Oklahoma Conservation Commission

Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: November 1 - 30, 2014

Fish collections and macroinvertebrate collections have been completed for Blue Thumb sites. Staff will now begin planning for fall quality assurance sessions and macroinvertebrate subsampling.

Education/Events/Meetings Calendar

- ✓ 11/1: Blue Thumb Education at Camp McFadden, Kaw Lake (Jeri)
- ✓ 11/3 (and previously 10/29 in Tahlequah) Natural Stream Bank Restoration @ Blue Thumb Tahlequah and Tulsa QA sessions for Volunteers – Presenters: Jeri Fleming and Gina LeVesque
- ✓ 11/5: Awards and Recognition Committee, OKC (Candice)
- ✓ 11/6: Blue Thumb Presentation for Entomology Class (Jeri)
- ✓ 11/8: Oklahoma Blue Thumb Association Retreat (Cheryl and Jeri)
- ✓ 11/12, 13, & 14: Introduction to Fluvial Geomorphology (Tahlequah), attended by Candice, Kim, Jeri, Cheryl
- ✓ 11/15: Blue Thumb Presentation to Girl Scouts at University of Central Oklahoma, Edmond (Kim)
- ✓ 11/18: Retirement Party for Debi Carnott, Geary (Kim and Cheryl)
- ✓ 11/22: Blue Thumb Children's Presentation, Myriad Gardens, OKC (Cheryl)

Blue Thumb Training/Field Work

- ✓ 11/6 and 11/17: Blue Thumb two-part mini-academy at Street School, Tulsa (Candice)
- ✓ 11/19: Blue Thumb mini-academy for Spiro Middle School (Cheryl)
- ✓ Quality Assurance and Macroinvertebrate Subsampling took place in: Tulsa, Ponca City, Dustin, Hodgens, Edmond, Stillwater, Wilburton

Additional Work taking place

- ✓ Support to Volunteers for data reports

Oklahoma Association of Conservation Districts Area Meetings

A Blue Thumb staff member was present at each area meeting to provide calendars, make announcements for groundwater screenings, and offer educational activities to students participating in poster and speech contests (October 29, November 6, November 13, November 18, and November 20).

Upcoming

- ✓ Continued Blue Thumb Quality Assurance and Macroinvertebrate Subsampling
- ✓ Preparation for Watershed Education Activities in 2015

December Monthly Summary ~ 2014

Blue Thumb ~ Water Pollution Education Program:
Water Quality Division ~ Oklahoma Conservation Commission
Report for: Candice Miller; Kim Shaw; Jeri Fleming; Cheryl Cheadle.

Timeframe: December 1 - 31, 2014

Macroinvertebrate subsampling has been completed. Final sessions for subsampling and QA were held in Hugo, Valliant, Haworth, Miami, Cheyenne, Sapulpa, and Liberal, Kansas. In January and February, quality assurance sessions (on site) will be done, and winter macroinvertebrate collections will be made.

Education/Events/Meetings Calendar

- ✓ 12/3: Blue Thumb Presentation for Edmond Rotary Club, Cheryl
- ✓ 12/9: Blue Thumb Staff meeting, Candice, Cheryl, Jeri, Kim
- ✓ 12/10: Oklahoma Conservation Commission Staff Meeting, Edmond
- ✓ 12/10: Spring Creek Coalition Board Meeting, Cheryl
- ✓ 12/12 & 12/13: Tulsa Farm Show shift, Jeri and Cheryl

Additional Work taking place

- ✓ Blue Thumb end of year Volunteer Newsletter
- ✓ Review of volunteer written data interpretations
- ✓ Completion of fish identification field guide
- ✓ Recruitment for upcoming Blue Thumb Training
- ✓ Education planning for Blue Thumb targeted watersheds (2015)
- ✓ Planning for Water Quality staff retreat

Upcoming

- ✓ Blue Thumb field collections and QA sessions
- ✓ Water Quality Staff Retreat – Lake Keystone, January 28 and 29, 2015
- ✓ Blue Thumb Training for New Volunteers – Edmond, January 30 and 31

Instead of the pictorial summary, the Blue Thumb "end of year" volunteer newsletter is a part of this report in Appendix F.

Appendix E – Monthly Pictorial Reports

Each month, along with the monthly narrative report, the Coordinator includes a pictorial report so the Commissioners can see what the Blue Thumb staff and volunteers do every month versus just reading about it. They say a picture is worth a thousand words, and we like to show what we do with as few words as possible! Enjoy the pictorial look at 2014.



Blue Thumb Pictorial Report

January, 2014



Blue Thumb New Volunteer Training, Norman, January 24 & 25, 2014



New volunteers at work on Chambers Creek in Rogers County.



Candice, Kim, and Jeri at the "All About Trees" workshop. Karla Beatty (OCC) and Robert Gibbs (Rogers CCD) were the instructors.



Too cold for secchi disks.



Stillwater Girl Scouts begin their monitoring experience. Notice two OCC staff members in the back: Janet Stewart and Jeri Fleming!



Lindsey, David, and Chris, from East Central University in Ada make their winter bug collection.



Kay Gamble, Ada High School teacher and Blue Thumb volunteer. Kay and students monitor Lake Creek in Ada.



Candice Miller looks for bugs in Rock Creek in Sulphur.



Regardless of the weather, the monitoring goes on!!!



Blue Thumb Pictorial Report

February, 2014

Oklahoma Conservation Commission

Water Quality Division Staff Retreat ~ 2014



1. Blue Thumb's Kim Shaw introduces some nice aquatic macroinvertebrates to attendees at the 2014 WQ staff retreat.
2. Caddisfly, helgramite, and mayfly
3. Candice Miller gives retreat participants the chance to actually "test" some water from Bandy Creek
4. Jeri Fleming shows the Water Quality group a few of the many tools Blue Thumb staff and volunteers use during public education events. A few people even made their own fish print!





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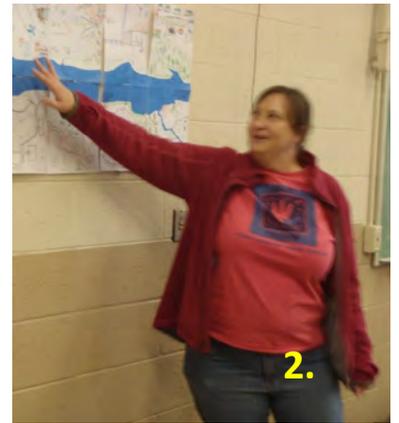
4

1. Spiro Middle School students monitor at Holi Tuska Creek in LeFlore County.
2. Candice demonstrates pollution prevention at Central Technical School’s Open House in Drumright on 2/16/14.
3. Jeri continues the ever important recording of information during macroinvertebrate collections in Cherokee County.
4. Cheryl provides a program on “Volunteers” at the Environmental Education Expo in Oklahoma City on 2/07/14.



Blue Thumb Pictorial Report

March, 2014



Blue Thumb Training for New Volunteers

Stillwater, March 29 & 30, 2014

1. Twenty new volunteers came to Blue Thumb Training. A great variety of ages and backgrounds were represented!
2. Jeri is an active participant in the Project WET “Sum of the Parts” activity.
3. Kim overs a volunteer filling her sample bottle.
4. The Blue Thumb team relaxes for a photograph.



Above—volunteers and staff at the Creek County Conservation District screen groundwater samples. Over forty samples were brought in by Creek County residents.



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7.

March was a busy month!!!

1. North Canadian River in Harper County.
2. Pauline Hodges, dust bowl survivor and historian, agrees to participate as an educator in the Traveling Teacher Tour this summer.
3. Hal Clark receives recognition during "Conservation Day at the Capitol."
4. A Blue Thumb volunteer receives instruction during a stream site QA session in Tulsa.
5. "Cheryl" the crawdad.
6. Jenks West Intermediate School goes through a Blue Thumb mini-academy.
7. Micky from Camp McFaddon learns from Jeri what Blue Thumb can offer to his youth camp (Kay County).



Blue Thumb Pictorial Report

April, 2014



- 1 Kim Shaw works with students and their tutors at Crutch Elementary School in Oklahoma City. The students are learning where pollutants come from and how they can be reduced.
- 2 Beth Landon, right, Ariel and Ava McAffrey, Katie Prior (Center), and Kim Shaw at the OCLWA conference in Stillwater. The students gave a Blue Thumb presentation AND provided a check to the Oklahoma Blue Thumb Association.
- 3 The volunteers sold their book "Bob has a Blue Thumb" at the conference.
- 4 Belle Isle Middle School students (Oklahoma City) learn about pollution prevention and stream life.



April Activities

1. **Tulsa Community College Zoology Students take a Blue Thumb Creek walk.**
2. **The TCC Crowd pauses for the camera.**
3. **Conservation Day at the Capitol—Candice Miller helps a small citizen with fish printing.**
4. **Sequoyah High School students (Tahlequah) learn the art of pollution reduction.**
5. **The “fish and bug” team at the Oklahoma Scenic Rivers Commission mini-BioBlitz in Tahlequah on April 19.**
6. **Banded darter—this guy is from Baron Fork Creek and is actually posing for the camera. Photo taken at the mini-BioBlitz.**





Blue Thumb Pictorial Report

May, 2014



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- 1 Over 70 children participated in the Blue Thumb “stream life” portion of the Jakes* Festival on May 17 (Candice)
- 2 Candice works with children at the Sangre Ridge Elementary School in Stillwater.
- 3 The Illinois River Heritage Festival (Tahlequah) saw large numbers of people, adults and children alike, learn what they can do to protect streams and rivers (Cheryl).
- 4 Macroinvertebrate subsampling with students at Harding Fine Arts Academy, Norman (Kim).
- 5 Tahlequah Blue Thumb volunteers participate in their quality assurance program (Jeri and Cheryl)/
- 6 Visitors to the Oklahoma City University Earth Day event meet some aquatic macroinvertebrates (Kim)



1.



2.

May—Within the month of May, staff members devoted thirteen work days to macroinvertebrate subsampling and quality assurances sessions and eleven days to “natural resource days” with students. Adult water quality education took place during events on four additional days.



5.

1. Jeri and a small volunteer seek fish for the Camp McFadden (Kay County) youth education event.
2. Jeri and children at the Kay County Conservation District’s natural resource day.
3. Cheryl preparing for an education event at Bass Pro Shop (with Jeri)
4. Volunteer John Harrington educates about flooding at Oklahoma City University
5. Happy young participants at the Pawnee County Conservation District natural resource day (Cheryl)



4.

Follow us on Facebook! <http://facebook.com/bluethumbok>



3.





Blue Thumb Pictorial Report

June, 2014



The month of June has held field work, an educational tour, and lots of education work with children!

1. Blue Thumb wetlands presentation at the Deep Fork National Wildlife Refuge south of Okmulgee.
2. Pollution prevention demonstration at Girl Scout Camp Sylvia Stapely in Stillwater (Jeri)
3. World Ocean Day at the Oklahoma Aquarium (fish printing, Jeri)
4. Volunteer Ranae Smith, Rogers County, monitoring at her site on Chambers Creek. This month her creek showed very low dissolved oxygen.



2.



Blue Thumb fish collections are the primary field work that takes place each summer. Volunteers work with staff (Kim Shaw, Candice Miller, and JT Darling) to fish a 400 meter section of stream. This summer, the Central Great Plains eco-region Blue Thumb streams are being collected.

1. Six Mile Creek in Canadian County
2. Creek Chub from Jimmy Creek
3. Spring Creek in Kay County



An additional educational activity of June was a fishing derby held in Seneca (Oklahoma side) with the Eastern Band Shawnee Tribe, hence photographs 4 and 5.

Follow us on Facebook! <http://facebook.com/bluethumbok>



3.

North Canadian River Traveling Educator Tour, June 10—12, 2014

Both traditional and non-traditional educators learned all about the North Canadian River Watershed (history, geology, agriculture, and water quality) on the traveling educator tour.

Dr. Pauline Hodges, a dust bowl survivor, was a special guest on the tour. After viewing a segment of the Ken Burns' Dust Bowl documentary, Pauline shared with the tour participants details of her life as she grew up in the panhandle during the dust bowl.

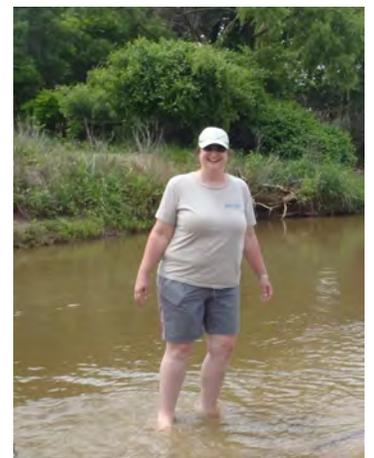
Pauline's real-life accounts, tempered with her good humor and excellent ability to tell a story, brought a long-ago disaster home to the group.



Debi Carnott, OCC, and Tammy Huffstutler, land owner, tell tour participants about how water quality is protected on the ranch. Far right: tour participants get a real tour of the Huffstutler property, including conservation practices.



What's a watershed tour without spending time in the water? There were three stops along the way that allowed the class members to actually experience the North Canadian River.



Group participation allowed the students to learn through Project WET activities and to find out what makes a healthy soil as NRCS and OCC staff brought soil profiles of local land for inspection.



Blue Thumb Training, Hugo, OK (Kiamichi Conservation District)

June 16 & 17, 2014

A new set of Blue Thumb volunteers graduated from training on Tuesday afternoon, June 17. These volunteers went through the most recent training in Hugo. The new group was introduced to:

Stream ecology

Field collections

Nonpoint source pollutants

Water testing

On-site observations

Watersheds and much more.





Blue Thumb Pictorial Report

July, 2014



1. Blue Thumb staff at work on Boomer Creek (fish collection) in Stillwater
2. Staff and volunteers collecting fish from Crutcho Creek (Oklahoma City)
3. Large Mouth Bass from Little River (near Moore)
4. Volunteers and staff members at fish collection at Little River.



1.



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1. Blue Thumb Volunteer and Oklahoma Blue Thumb Association Board member Beth Landon educates a visitor at the Vision 20/20 conference for educators in OKC.
2. Summer Camp students at “Insect Adventure” in Stillwater.
3. OSU Tulsa students from Kevin Gustavson’s Stream Field Assessment class learn about Blue Thumb chemical monitoring.
4. Girls going into the 8th grade were introduced to stream health at the “Tech Trek” summer camp in association with Southwestern Oklahoma State University in Weatherford.
5. Water Quality Division staff members who also help Blue Thumb volunteers prepared for quality assurance sessions.





Blue Thumb Pictorial Report

August, 2014

Below—Jimbo Jones Memorial Education Event for
Choctaw Boys and Girls Club, July 29, Broken Bow

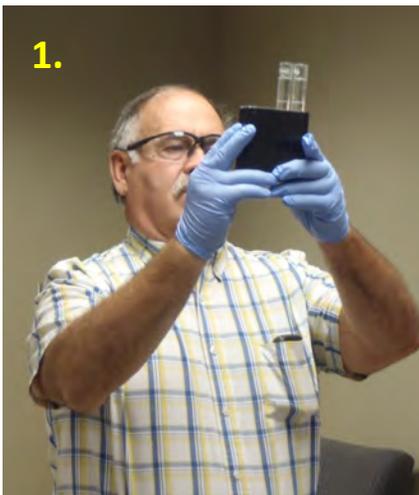


1. Over 70 children learned about outdoor ethics and conservation. Each child received a special “Jimbo” Jones bandana.
2. Children played with and learned about the live bugs in the stream!
3. Canoe and kayak safety was fun for all!
4. Erosion and channel stability was a lesson at the always popular stream trailer.
5. EnviroScape offered pollution prevention information and was enjoyed by all!

1. Volunteer Mark DeGrasso helps with the habitat assessment on Spring Creek, OKC.
2. Part of the fish collection crew for Spring Creek.
3. Kim, Jeri, and Candice at work on Chisholm Creek fish collection in OKC.
4. Diane Stevenson completing her quality assurance session on Parkhill Branch near Tahlequah.



1. (Below) OCC Chairman Carl Jett tries his hand at water testing during the recent Woodward County Conservation District Blue Thumb training.
2. New volunteers at Alabaster Caverns State Park.





Blue Thumb Conference and Celebration
9/19 & 20/2014
Lake Arcadia

Kayaking



Presentations



Exhibits



Celebration



Soil Painting



Rainfall Simulator



Awards

**Blue Thumb
Pictorial Report
September
2014**



**Bluff Creek
Dead Fish and Meal for something**



**Cameron University (Lawton)
Blue Thumb Mini-academy**



Fish Collection/Bluff Creek



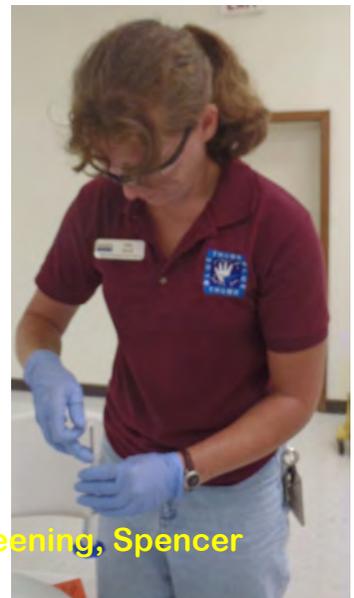
**Hughes County Conservation District
Natural Resource Day**



**September Fest
Governor's Mansion**



Groundwater Screening, Spencer





Blue Thumb Pictorial Report

October 2014



October was a big month for education!

- #1) Candice Miller at H2Oklahoma at Robbers Cave
- #2) Blue Thumb volunteer Elle Fowler at Jenks West Intermediate
- #3) Natural Resource Day in Oklahoma County (Candice)
- #4) OCC staff member Larry Caldwell with 2nd Grade students in Owasso



New volunteers Aaron and Kellie Kidd at Chisholm Creek in Oklahoma County.



Blue Thumb Training for New Volunteers—Tulsa, October 10 and 11, 2014





Blue Thumb Pictorial Report

November 2014



November Sampling of Activities:

- 1) Entomology students at Oklahoma State University studying benthic macroinvertebrates brought in by Jeri Fleming.
- 2) Volunteers Chris and Ed at the Deer Creek groundwater screening led by Kim Shaw
- 3) Kim's Awesome Big OKC Quality Assurance day!
- 4) Street School (Tulsa) mini-academy, Candice Miller
- 5) Blue Thumb mini-academy with Langston University students, Jeri



Fluvial Geomorphology Introductory Workshop ~ Tahlequah, 2014

Attended by Various Water Quality staff members



Oklahoma Conservation Commission staff members who attended "Fluvial Geomorphology training in Tahlequah in November. Instructor Greg Jennings from NorthState Environmental



Roots help to hold soil in place.



Learning to determine the area called "BANKFULL">



Working as a team.



Calculating

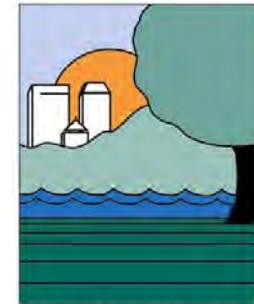
Appendix F – Publications

Blue Thumb produces several publications during the year. Attached are a copy of each of the major publications done during 2014. Included is the “Volunteers Field Guide to the Stream Fish of Oklahoma” at page 138, a copy of our “Catalog of Services” at page 122 and “Living on the Land” at page 152 and “Living in Town” at page 162. Also, in this appendix is the end-of year newsletter sent to all Blue Thumb volunteers summarizing 2014 activities and introducing some exciting things for 2015.



Join us for the
20th Annual Creek Clean –up of Coal Creek
on May 31st from 9am to 1pm.

Meet at the
Tulsa Zoo in the Helmerich Discovery Center.



TULSA AREA
CONSERVATION
FOUNDATION



Light Breakfast and lunch will be provided

**Free Zoo passes for the first 100 people who sign up including free train
and carousel rides**

Door prizes and prizes for the most unusual piece of trash

**To sign up please contact Julie Monnot at 918-591-4375 or go to
eventbrite.com and search for Zoo Creek Clean-up**



Tips for Volunteers who help with the Creek Clean up

- Wear close toe shoes that you won't mind getting wet.
- Long pants and sleeved shirts will help protect from poison ivy and sunburn.
- You may want to bring sunscreen and insect repellent.
- Heavy duty gloves are helpful.
- Bring a container for water.
- Watch for sharp objects and pick them up only if you feel you can do so safely.
- Do not touch anything that looks like medical waste or drug paraphernalia, but do point out such items to your team leader. We will take care of the situation.
- Do not over extend yourself if you need to rest and tell your team leader if you're feeling like you need medical attention.
- Participation is at your own risk. We appreciate your help but don't want anyone getting hurt for any reason.
- The goal of the Clean up is to have fun, learn about water quality and perform a needed public service.

The 2014 Creek Clean-up would not be possible without the help of these sponsors



Protect Riparian Areas!

One of the most important things Blue Thumb does is to educate the public on keeping our streams healthy through riparian areas. A healthy riparian area helps reduce erosion, provides essential aquatic and terrestrial habitat, filters pollution, provides travel corridors for local wildlife and provides flood protection.

A healthy riparian area looks like the picture below. You see vegetation, trees and grasses that stabilize banks and provide shade, woody debris that provides a home to fish and aquatic insects and a good connection to the flood plain. All of these elements work together to provide a healthy ecosystem which protects your drinking water.

We hope you will use the tools outlined in this catalog to educate citizens about the importance of our streams!



Blue Thumb Education



Catalog of Services

Stream Protection through Education

Oklahoma Conservation Commission ~ Water Quality Division ~ Blue Thumb

What is the Blue Thumb Program?

The Blue Thumb Water Quality Education Program is a part of the Oklahoma Conservation Commission's Water Quality Division. Blue Thumb's mission is "stream protection through education." We work with "citizen scientist" volunteers to collect stream data, and offer information to the public at large about stream and river protection.

What do Blue Thumb volunteers do?

Most of our volunteers are involved in stream monitoring. They learn to perform water chemistry tests on a stream of their choice. The volunteers also work with Blue Thumb staff in the stream to collect aquatic insects and fish, and complete other field work.

Many of our volunteers spend time on education activities, like speaking to civic groups or setting up exhibits that help people understand how to reduce water pollution.

How can I get involved in Blue Thumb?

Typically volunteers come aboard by participating in a free two-day training that introduces the Blue Thumb Program, stream ecology, and water quality monitoring. You can contact a Blue Thumb staff member to learn when there will be a training near you. Additional opportunities include simply working with a Blue Thumb staff member, or attending a monitoring event in your area to gain knowledge about what we do and gain a better understanding of water pollution impacts. Contact us to begin your Blue Thumb experience!

What is the purpose of the catalog?

This small catalog offers a glimpse of how Blue Thumb volunteers and staff members protect Oklahoma's streams and rivers. By using a variety of educational tools and events, we find a way to meet local water quality education needs.

Whether you are interested in becoming a volunteer, or you are simply looking for a great creek adventure for a scout troop, let the Blue Thumb catalog of services introduce you to the Blue Thumb world of water quality education!

Bring Blue Thumb Events and Tools to Your Area!

Talk to your local Conservation District ~ Blue Thumb works closely with Oklahoma's conservation districts. Let your district know you have an interest in local water quality.

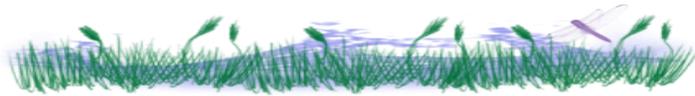
Make contact with a Blue Thumb staff member ~ Consider a group to which you belong – would they enjoy a creek walk? Would your municipality benefit from the "Quality Urban Streams" Workshop? Our travel takes us all over the state.

Cost for events ~ Blue Thumb offers many events free of charge. When there are expenses, like providing a lunch, or lots of handouts, a small fee might be charged. This can be discussed during planning of activities.



Exhibits and Handouts

Blue Thumb frequently makes exhibit materials available to volunteers who are working with us to get the “stream protection” message out. A variety of scenic panels work as a background. Several panels tell more about the Blue Thumb Program. Handouts are available as well, and we often work with people to tailor a handout just for their specific audience.



While the Oklahoma Blue Thumb Water Quality Education Program is a part of state government, more funds are needed to maintain a solid corps of volunteers who can help spread the word about stream and river protection.

The new “Oklahoma Blue Thumb Association” was formed as a non-profit organization with the mission to promote clean and healthy water ecosystems in Oklahoma, with an emphasis on fishable and wadeable streams and rivers, through education, stewardship and public outreach.

By partnering with the Blue Thumb program the Association adds a “citizen scientist” volunteer voice to the State of Oklahoma’s Blue Thumb efforts and provides additional funds to continue to build an effective stream and river protection program.

For more information about the Oklahoma Blue Thumb Association email ok.bluthumb.association@gmail.com.

Blue Thumb Staff and Contacts



Contact Information:

Cheryl Cheadle ~ 918-398-1804
cheryl.cheadle@conservation.ok.gov

Kim Shaw ~ 405-522-4738
kim.shaw@conservation.ok.gov

Candice Miller ~ 701-659-0008
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Jeri Fleming ~ 405-334-6343
jeri.fleming@conservation.ok.gov

This publication is issued by the Oklahoma Conservation Commission as authorized by Mike Thralls, Executive Director. Three hundred were printed by Central Printing, Office of Management and Enterprise Services and distributed at a cost of \$1.39 each with funding from a U.S. Environmental Protection Agency grant. Copies have been deposited with the Publications Clearinghouse of the Oklahoma State Department of Libraries [74 O.S. 2001 § 3105(B)]. JF 1013

Creek Walk

-  A creek walk is really a stream ecology experience
-  Learn what lives in a nearby creek by seining and looking under rocks
-  Healthy streams have a lively community of fish and insects and everyone should jump in and learn about stream life
-  A creek walk lays the foundation for development of an environmental ethic
-  Blue Thumb staff will help your group or class learn what lives in our waters and why it is important



WaterWise Gardening Workshop

Take your yard from a short green monoculture to a lively native plant sanctuary! Invite birds and butterflies to your home, and cleanse stormwater before it leaves your property. A WaterWise Workshop will cover:

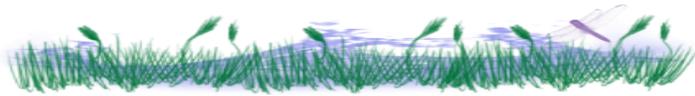
-  Why native plants are best
-  Where water pollution comes from
-  Landscape features that reduce runoff and filter water

In some cases, WaterWise Garden Workshops can include the building and planting of a rain garden. Contact Kevin Gustavson at 918-801-2150 or kevin.gustavson@conservation.ok.gov to schedule a workshop.



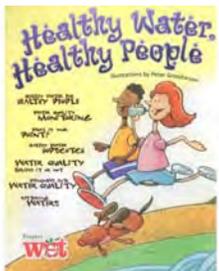
Fish Printing

-  Based on ancient Japanese art called “gyotaku”
-  Provides an easy-to-make item that can be taken home
-  Includes water quality information on the back of the paper
-  Several types of rubber fish available with a variety of colored daubers
-  Available for checkout



Project WET

-  Teaches the value of water through fun, interactive lessons
-  Provides classroom-ready teaching aids
-  Has activities for art, social studies, math or geography



For more information about
Project WET contact
Karla Beatty
405-521-6788

Karla.Beatty@conservation.ok.gov



Quality Urban Streams Seminar

This six-hour seminar targets neighborhood associations, municipal and county staff members, as well as city counselors and county commissioners. This seminar promotes:

-  Better understanding of the relationship that exists between land and water
-  Low Impact Development strategies that improve landscapes and waterways
-  Saving money through better land care practices
-  Beauty and habitat within your community
-  Better understanding of EPA stormwater regulations

Contact Kevin Gustavson at 918-801-2150 or kevin.gustavson@conservation.ok.gov to organize a seminar in your community.



Groundwater Screening and Groundwater Model

While about 75% of Oklahomans drink surface water, an important minority drink groundwater. These people are often curious to know what is in their water, so the Blue Thumb Program offers Groundwater Screenings. While bacteria is not included, several parameters, including nitrates, are tested for. Volunteers perform the testing, with Conservation Districts the usual sponsors of these events.

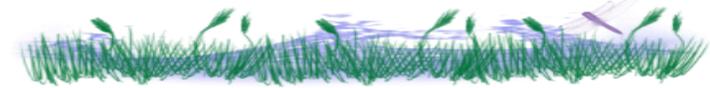
Often at a groundwater screening, a groundwater model is used to educate volunteers and the public about this mysterious water beneath the surface of the earth.

-  Shows how groundwater and pollution move through the earth
-  Helps people understand that pollution isn't limited to surface water
-  Shows the interaction between ground and surface water
-  Can be used in conjunction with a groundwater screening



EnviroScape

-  Helps people understand they live in a watershed
-  Shows how both urban and rural areas affect water quality
-  Uses harmless food coloring to show how pollutants travel into streams and lakes
-  Easy to use
-  Available for check-out



Storm Sewer in a Suitcase

-  Used to educate urban citizens about nonpoint source pollution (NPS)
-  Neighborhood lawns hold pollution until it "rains"
-  A good tool to help begin the dialogue on how NPS pollution can be reduced
-  Actually see the subsurface drainage system
-  Available for check-out



Blue Thumb Training for Outreach and Education

Spread the word about keeping water clean! A Blue Thumb introduction to several of our special education models and tools is available.

- ✈ Learn the “buzz words” that help people stop and listen
- ✈ Find out how to check out, set up, clean up, and return Blue Thumb models
- ✈ Listen to an expert provide a demonstration
- ✈ Try your hand at water quality education in a non-threatening environment



Creek Cleanup

- ✈ Local volunteers remove litter and junk from streams
- ✈ Participants learn about nonpoint source pollution
- ✈ Motivates participants to educate others about problems caused by trash in streams
- ✈ Know of a stream that needs cleaning? Call Blue Thumb for help in planning your event!



Blue Thumb Training Session for New Volunteers

The most important aspect of the Blue Thumb Program is our volunteers. Without them, no data would exist for many of our Oklahoma streams. Volunteers begin with training.

- ✧ Held in Tulsa, Oklahoma City and your area
- ✧ Two days of free training and a test kit loaned to those who monitor
- ✧ Learn about watersheds, chemical monitoring and life in the water
- ✧ Prepares volunteers for data collection
- ✧ Prepares volunteers for the role of educator



Blue Thumb Mini-Academies

- ✧ Designed to help teachers train their students
- ✧ Tailored to individual teacher needs
- ✧ One (or less) day training to prepare students for monitoring
- ✧ Allows students to perform real science
- ✧ Can be conducted at the beginning of each year or semester





*What have you done
for a stream lately?*

Blue Thumb Water Quality Education Program

Like Us!!!



www.facebook.com/BlueThumbOK

918-398-1804

*Become a "Citizen Scientist" volunteer and do your part
to protect Oklahoma's streams and rivers!*

See the back of this flyer for more information.



What do Blue Thumb volunteers do?

Blue Thumb volunteers attend a training session and then they monitor streams to learn whether or not they are healthy. Volunteers also work with members of their community to get information out about how to keep streams and rivers clean.

Who can be a Blue Thumb volunteer?

People of different ages and backgrounds come aboard as volunteers. High school teachers and college professors, and their students, often volunteer. Rural landowners with a stream flowing through their property will become involved to learn more about their stream. Citizens who live near a park may want to know more about a stream that attracts the public, so they will volunteer. Retired professionals who want to "give back" get in touch with Blue Thumb.

Why get involved?

We all need clean water...to drink, for laundry, for food production, for fish and wildlife, for recreation. It is easy to take clean, available water for granted. But please don't! Help the Blue Thumb Program protect the streams and rivers you care about! Call the number on the front of this flyer, check out the face book page, or send an email to:

cheryl.cheadle@conservation.ok.gov

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for a stream lately?*

Blue Thumb Water Quality Education Program

Like Us!!! →

www.facebook.com/BlueThumbOK

918-398-1804

*Become a “Citizen Scientist” volunteer and do your part
to protect Oklahoma’s streams and rivers!*

See the back of this flyer for more information.





Blue Thumb

Training for New Volunteers

Sponsored by—Kiamichi Conservation District and Oklahoma Conservation Commission

*Blue Thumb
Water Quality
Education
Program*

Training Date:
Monday and Tuesday,
June 16 & 17, 2014
8:30 a.m. to 4:00 p.m.

Training Location:
Choctaw County Extension
Center
415 E. Rena
Hugo, OK 74743

To Register—call or
email:
Cheryl Cheadle
918-398-1804
cheryl.cheadle@
conservation.ok.gov



Protect Your Streams!

Come to this Blue
Thumb training and learn
about:

- ⇒ stream ecology
- ⇒ pollutants
- ⇒ water testing
- ⇒ watersheds
- ⇒ field collections

Who can become a Volunteer?

- ⇒ Teachers & students
- ⇒ 4-H members & leaders
- ⇒ retired folks
- ⇒ professionals
- ⇒ farmers & ranchers
- ⇒ college students
- ⇒ anyone with an interest in clean water

Become a water quality monitor!
Do your part for local streams!

Blue Thumb Volunteer Training

Training is Free ~ Register by June 10 please

Day One

8:30 a.m. Welcome/Introductions

9:00 Blue Thumb and Streams

9:45 Watersheds/Project WET Activity
(Break during this too)

11:00 Blue Thumb Data Sheet

11:30 LUNCH

12:45 Safety

1:15 Head to the Creek!

We will cover:

- ✓ Macroinvertebrates
- ✓ Fish
- ✓ On-site monitoring activities

Adjourn— around 4:00 p.m.

Day Two

8:30 a.m. Recap of Stream Activity

9:00 Monitoring Training and Test Kit
Maintenance

12:15 LUNCH

1:15 p.m. EnviroScape Watershed Model

1:45 Data Exercise

2:30 Quality Assurance

3:15 Volunteer Responsibilities

3:30 Teams and Monitoring

About the Blue Thumb Training.....

Blue Thumb is a nonpoint source water quality education program that uses volunteers to:

- ✓ monitor streams
- ✓ screen groundwater
- ✓ and educate the public about pollution prevention.

Blue Thumb is sponsored by Oklahoma's Conservation Districts and the Oklahoma Conservation Commission.

Attire:

Dress for comfort. Day One has an outdoor component—please be prepared to be in a creek. During summer trainings, we go into the creek in close-toed shoes and old shorts. It is recommended to have a change of clothes and different shoes, and to bring a towel. Additional items you may want to bring to Blue Thumb training, especially for the field....

- ✓ Drinking water
- ✓ Hat
- ✓ Towel
- ✓ Sunscreen
- ✓ Bug repellent

Blue Thumb Contact information:

*Cheryl Cheadle 918-398-1804
cheryl.cheadle@conservation.ok.gov*

*Kim Shaw, 405-522-4738
kim.shaw@conservation.ok.gov*



Stream Protection Through Education



*Blue Thumb is an education program of the Water Quality
Division of the Oklahoma Conservation Commission.*



*Blue Thumb
Water Quality
Education
Program*

Training Date:

Saturday and Sunday,
August 23 & 24, 2014
8:30 a.m. to 4:00 p.m.

Training Location:

North of Woodward, OK
University of Central OK's
Selman Living Laboratory

To Register—call or
email:

Cheryl Cheadle
918-398-1804
cheryl.cheadle@
conservation.ok.gov

Blue Thumb

Training for New Volunteers

Sponsored by—Harper County Conservation District, UCO's Selman Living Laboratory, and the
Oklahoma Conservation Commission



*Location and lodging
information is on the
back of this flyer!*

Protect Your Streams!

Come to this Blue
Thumb training and learn
about:

- ⇒ stream ecology
- ⇒ pollutants
- ⇒ water testing
- ⇒ watersheds
- ⇒ field collections

Who can become a Volunteer?

- ⇒ Teachers & students
- ⇒ 4-H members & leaders
- ⇒ retired folks
- ⇒ professionals
- ⇒ farmers & ranchers
- ⇒ college students
- ⇒ anyone with an interest in clean water

**Become a water quality monitor!
Do your part for local streams!**

Blue Thumb Volunteer Training

Training is Free ~ Register by August 15 please

Day One

8:30 a.m. Welcome/Introductions

9:00 Blue Thumb and Streams

9:45 Watersheds/Project WET Activity
(Break during this too)

11:00 Blue Thumb Data Sheet

11:30 LUNCH

12:45 Safety

1:15 Head to the Creek!

We will cover:

- ✓ Macroinvertebrates
- ✓ Fish
- ✓ On-site monitoring activities

Adjourn— around 4:00 p.m.

Day Two

8:30 a.m. Recap of Stream Activity

9:00 Monitoring Training and Test Kit
Maintenance

12:15 LUNCH

1:15 p.m. EnviroScape Watershed Model

1:45 Data Exercise

2:30 Quality Assurance

3:15 Volunteer Responsibilities

3:30 Teams and Monitoring

About the Blue Thumb Training.....

Blue Thumb is a nonpoint source water quality education program that uses volunteers to:

- ✓ monitor streams
- ✓ screen groundwater
- ✓ and educate the public about pollution prevention.

Blue Thumb is sponsored by Oklahoma's Conservation Districts and the Oklahoma Conservation Commission.

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*Kim Shaw, 405-522-4738
kim.shaw@conservation.ok.gov*

Location information and over-night lodging:

Actual directions to the Selman Living Laboratory will be provided to people who sign up for the training.

Because it is a study area, limited bunk or camping opportunities exist. If you require overnight accommodations, get in touch with Rebecca Pace (rpace2@uco.edu) of the University of Central Oklahoma. She will let you know if there is space for you at the facility and/or will provide phone numbers for area hotels.





*Blue Thumb
Water Quality
Education
Program*

Training Date:
Saturday and Sunday,
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8:30 a.m. to 4:00 p.m.

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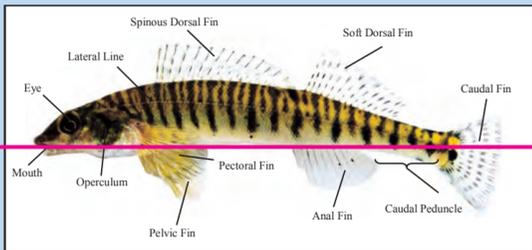
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A VOLUNTEER'S FIELD GUIDE TO THE STREAM FISH OF OKLAHOMA

This guide is designed to assist volunteers in the field identification of fish most commonly encountered during Blue Thumb fish collections. You are encouraged to familiarize yourself with the diagram below listing the major parts of a fish's external anatomy as many of these terms will appear in the short descriptions provided for each species. A distribution map, using data collected by the Oklahoma Conservation Commission is included along with a photograph and identifying features for each species. Please note that individuals may be found outside of the observed distribution area.



Next to each fish's common name and scientific name is an indication of water quality and habitat tolerances. Tolerance values range from 1 (Intolerant) to 4 (Tolerant) and are categorized using the following scale:

- Intolerant (I): 1.0 - 1.7
- Moderately Intolerant (MI): 1.8 - 2.5
- Moderately Tolerant (MT): 2.6 - 3.3
- Tolerant (T): 3.4 - 4.0

¹ Jester, D.B., Echelle, A.A., Matthews, W.J., Pigg, J., Scott, C.M., and Collins, K.D. 1992. The fishes of Oklahoma, their gross habitats, and their tolerance of degradation in water quality and habitat. Proceedings of the Oklahoma Academy of Sciences 72: 7-19.

A special thank you to Brandon Brown, our major photo contributor, for the use of his photographs in this publication.



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Orangethroat darter (*Etheostoma spectabile*) Water Quality: MI Habitat: MI

- 7 - 10 dark brown saddles
- 2 orange spots at base of caudal fin
- Dark bars on sides (breeding males with orange between blue/green)
- Found in shallow gravel to rocky riffles, runs and flowing pools, of headwaters, creeks and small rivers
- Dusky teardrop

Redfin darter (*Etheostoma whipplei*) Water Quality: MI Habitat: MI

- Slender darter with pointed snout and large head
- Mottled olive colored body
- Many small spots, red (male) or yellow (female), on side
- Found in sandy to rocky riffles of headwaters, creeks, and small rivers with low to moderate gradients
- Dusky teardrop

Fantail darter (*Etheostoma flabellare*) Water Quality: MI Habitat: I

- Deep-bodied darter with short caudal peduncle
- Banded caudal fin
- Short spinous dorsal fin with gold knobs on dorsal spines
- Lower jaw protrudes beyond upper jaw
- 8-15 crossbars running the length of the body
- Found in gravel to rocky riffles of creeks and small to large rivers with moderate to high gradients

Loggerperch (*Percina caprodes*) Water Quality: MI Habitat: MI

- Oklahoma's largest darter
- Conical snout
- Yellow to olive coloration with 15 - 20 dark bars along side with alternate bars longer and more prominent
- Black spot at the base of the caudal fin
- Found in sandy to rocky riffles and pools in creeks and small to medium rivers; lakes
- Dusky teardrop

Banded sculpin (*Cottus carolinae*) Water Quality: I Habitat: I

- Reddish-brown sculpin with 4 or 5 saddle bars
- Dorsal fins separate to base
- Fins faintly banded except pelvic
- Found in gravel and rubble riffles of headwaters, creeks, and small rivers; springs
- Pelvic fins white

Largemouth bass (*Micropterus salmoides*) Water Quality: MT Habitat: MT

- Slender, elongated sunfish with a large mouth; jaw extends beyond the rear margin of the eye
- Broad, dark band on sides
- Spinous and soft dorsal fins nearly separated by a deep notch
- Found in backwaters and pools of creeks and small to large rivers, usually over mud or sand; ponds and lakes

Spotted bass (*Micropterus punctulatus*) Water Quality: MI Habitat: MI

- Slender, elongated sunfish with a large mouth; jaw extends to the rear margin of the eye
- Tooth patch on tongue
- Spinous and soft dorsal fins broadly jointed
- Found in flowing pools and runs of creeks and small to medium rivers
- Dark blotches on side form band

Smallmouth bass (*Micropterus dolomieu*) Water Quality: I Habitat: I

- Slender, elongated sunfish with a large mouth; jaw never extending beyond the rear margin of the eye.
- Red eye
- Spinous and soft dorsal fins broadly jointed
- No dark band on side
- Found in clear, gravel-bottom runs and flowing pools of small to large rivers; lakes

White crappie (*Pomoxis annularis*) Water Quality: T Habitat: MT

- Silvery appearance
- Faint vertical bars on sides
- 5 - 6 dorsal spines

Black crappie (*Pomoxis nigromaculatus*) Water Quality: MT Habitat: MT

- Dark appearance
- Irregular blotching on sides
- 7 - 8 dorsal spines

Warmouth (*Lepomis gulosus*) Water Quality: MT Habitat: MT

- Red eye
- Tooth patch on tongue
- Brown and yellow streaks extend from eye to rear margin of gill cover
- Mottled coloration
- Spinous and soft dorsal fins broadly jointed
- Found in quiet water areas of streams, usually over mud; ponds and lakes

Bluegill (*Lepomis macrochirus*) Water Quality: MT Habitat: MT

- Deep, slab-sided sunfish with a small mouth
- Large black spot at base of the soft dorsal fin
- Pectoral fin long and pointed, extending past eye when bent forward
- Found in pools of creeks and small to large rivers; ponds and lakes

Green sunfish (*Lepomis cyanellus*) Water Quality: T Habitat: T

- Thick-bodied sunfish with a large mouth
- Large black spot at rear of soft dorsal and anal fin bases
- Pectoral fin short and rounded, not extending past eye when bent forward
- Found in quiet pools and backwaters of sluggish streams; lakes and ponds; often near vegetation
- Blue/green iridescent mottling on head

Longear sunfish (*Lepomis megalotis*) Water Quality: MT Habitat: MT

- Deep-bodied sunfish with a moderately small mouth
- Breeding males with brilliant coloration
- Elongated opercular flap in adults
- Found in rocky and sandy pools of headwaters, creeks, and small to medium rivers, usually near vegetation
- Pectoral fin short and rounded, not extending past eye when bent forward

Orangespotted sunfish (*Lepomis humilis*) Water Quality: T Habitat: MT

- Small sunfish with a moderately large mouth
- Large sensory pits between eyes
- Scattered brown or orange spots on sides
- Found in quiet pools of creeks and small to large, often turbid, rivers, usually near brush
- Pectoral fin short and rounded

Redear sunfish (*Lepomis microlophus*) Water Quality: MT Habitat: MT

- Short opercular flap with a bright red posterior crescent (in adults)
- Sunfish with small mouth
- Pectoral fin long and pointed, extending past eye when bent forward
- Found in vegetated pools, usually with mud or sand bottoms, of small to medium rivers; ponds and lakes

Channel catfish (*Ictalurus punctatus*) Water Quality: MT Habitat: MT

- Slender catfish with gray/blue coloration
- Rounded anal fin
- Deeply forked caudal fin
- Found in deep pools, often with submerged cover, and runs over sand or rocks in creeks and small to large rivers with low to moderate gradients; lakes
- Random spots on sides, except in largest and smallest individuals
- Young have black-tipped fins

Flathead catfish (*Polydictis olivacea*) Water Quality: MT Habitat: MT

- Large, flat-headed catfish with mottled coloration
- Light colored chin barbels
- Slightly notched caudal fin
- Found in pools with cover in low- to moderate-gradient, small to large rivers; young in rocky and sandy runs and riffles; lakes
- Lower jaw protrudes beyond upper jaw
- Short, rounded anal fin

Yellow bullhead (*Ameiurus natalis*) Water Quality: T Habitat: MT

- Robust catfish with yellow coloration
- Anal fin with 24 - 27 rays
- Caudal fin nearly rounded
- Found in soft-bottomed pools and backwaters of creeks and small to large rivers; ponds, oxbows, impoundments
- Light colored chin barbels

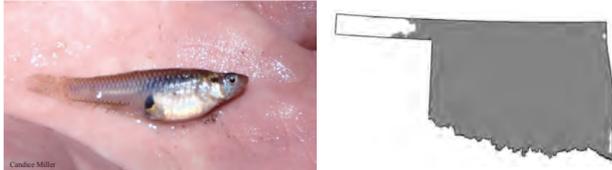
Black bullhead (*Ameiurus melas*) Water Quality: T Habitat: T

- Robust catfish with dark coloration
- Anal fin with 19-23 rays
- Slightly notched caudal fin
- Found in soft-bottomed pools and backwaters of creeks and small to large rivers; ponds, oxbows, impoundments
- Dark colored chin barbels

Slender madtom (*Noturus exilis*) Water Quality: MI Habitat: I

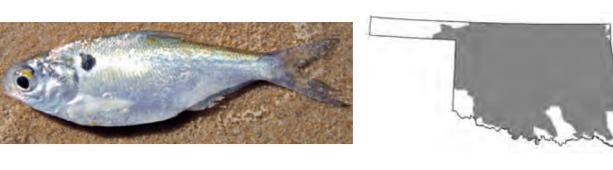
- Slender, unicolored madtom
- Unpaired fins with black margins
- Long, low adipose fin that is slightly notched at the origin of the caudal fin
- Anal fin with 17 - 21 rays
- Fins are not blotched or spotted
- Found in gravel riffles, runs, and flowing pools of clear creeks and medium rivers

Mosquitofish (*Gambusia affinis*) Water Quality: T Habitat: T



- Small, stout livebearer
- Terminal, upturned mouth
- 1-3 rows of black spots on dorsal and caudal fins
- Black anal spot on pregnant females
- Found in backwaters and quiet pools of creeks; ponds and lakes

Gizzard shad (*Dorosoma cepedianum*) Water Quality: MT Habitat: T



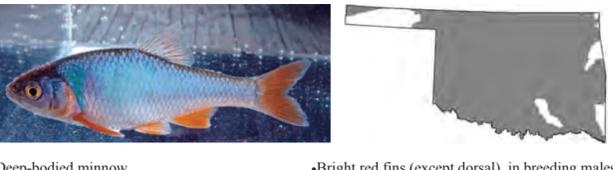
- Silver-blue to silver-white coloration
- Blunt snout with subterminal mouth
- Last dorsal ray long and whiplike
- Large purple/black spot behind gill
- Found in creeks and small rivers with well-developed pools; open water of medium to large rivers; lakes

Central stoneroller (*Camptostoma anomalum*) Water Quality: MI Habitat: MI



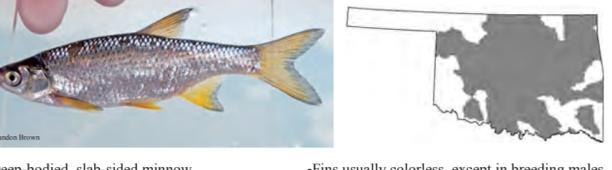
- Slender, brown minnow
- Lower sides and belly silver-white
- Lower jaw with hard cartilaginous ridge
- Short, rounded fins
- Fins are colorless except in breeding males (orange)
- Found in rocky riffles, runs, and pools of headwaters, creeks, and small to medium rivers having moderate to high gradients

Red shiner (*Cyprinella lutrensis*) Water Quality: T Habitat: T



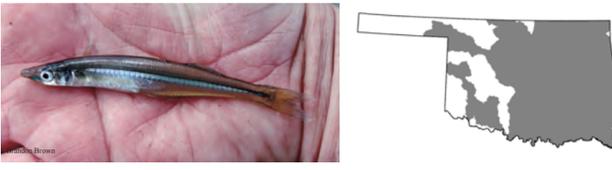
- Deep-bodied minnow
- Diamond-shaped scales
- Small eyes and terminal mouth
- Dusky blue triangular bar behind head on side
- Bright red fins (except dorsal) in breeding males and blue back and sides
- Found in silty, sandy, and rocky pools and runs, sometimes riffles, of creeks and small to medium rivers

Golden shiner (*Notemigonus crysoleucas*) Water Quality: T Habitat: T



- Deep-bodied, slab-sided minnow
- Small, upturned mouth
- Scaleless keel from anus to pelvic fins
- Deeply curved lateral line
- Fins usually colorless, except in breeding males
- Found in vegetated lakes, ponds, swamps, backwaters and pools of creeks and small to medium rivers

Brook silverside (*Labidesthes sicculus*) Water Quality: MT Habitat: MI



- Slender, silvery fish
- Beak-like snout
- 2 widely separated dorsal fins
- Bright silver stripe along side
- Long sickle-shaped anal fin
- Found in quiet pools of creeks and small to large rivers; ponds and lakes

Longnose gar (*Lepisosteus osseus*) Water Quality: T Habitat: T



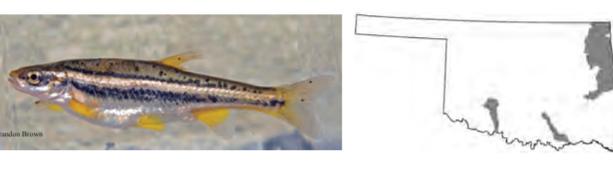
- Slender, cylindrical fish
- Unpaired fins spotted; juveniles with black stripe on side
- Long, narrow snout with large teeth in upper jaw
- Found in sluggish pools, backwaters, and oxbows of medium to large rivers; lakes

Suckermouth minnow (*Phenacobius mirabilis*) Water Quality: MI Habitat: I



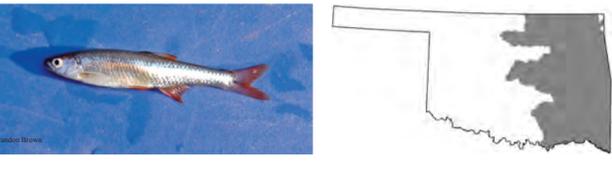
- Slender minnow with long, blunt snout
- Sucker-like mouth
- Dusky stripe along side ending with prominent spot at caudal peduncle
- Thin dark stripe along back
- Darkly outlined scales on back and upper sides
- Found in sand and rubble riffles and runs of creeks and small to large rivers

Southern redbelly dace (*Phoxinus erythrogaster*) Water Quality: I Habitat: I



- Slim minnow with small head and large eye
- Very fine scales
- Breeding fish have bright red undersides and yellow fins
- 2 black stripes along side
- Found in rocky, usually spring-fed pools of headwaters and creeks

Redfin shiner (*Lythrurus umbratilis*) Water Quality: MI Habitat: MI



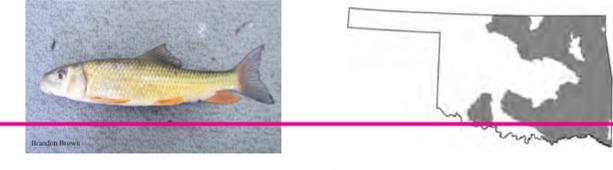
- Deep-bodied, compressed
- Breeding males develop an iridescent blue color and at least some red pigment in the dorsal, anal, and caudal fins
- Dark blotch at dorsal fin origin
- Dusky stripe along back
- Found in quiet to flowing pools of headwaters, creeks, and small to medium rivers

Freshwater drum (*Aplodinotus grunniens*) Water Quality: MT Habitat: MT



- Deep-bodied, silvery fish with subterminal mouth
- Long dorsal fin
- Strongly arched body
- Pointed caudal fin
- Outer pelvic ray a long filament
- Found in medium to large rivers; lakes

Golden redbhorse (*Moxostoma erythrurum*) Water Quality: MI Habitat: MI



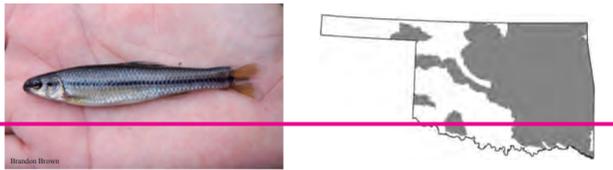
- Stout-bodied sucker with coarse scales
- Lower lips in parallel folds, forming V-shaped angle
- 40-42 scales in lateral line; 9 rays in pelvic fin
- 12 scales around caudal peduncle
- Found in pools, runs, and riffles of creeks and small to large rivers; lakes

Common carp (*Cyprinus carpio*) Water Quality: T Habitat: T



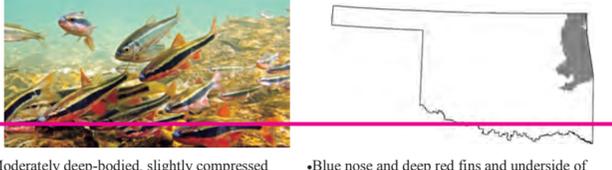
- Deep-bodied minnow with a strongly arched back
- Long dorsal fin, first ray hard and serrated
- Terminal mouth with two pairs of barbels
- Gray to brassy green coloration
- Adult with red-orange caudal and anal fins
- Found in pools of small to large rivers; ponds and lakes

Bluntnose minnow (*Pimephales notatus*) Water Quality: MT Habitat: MT



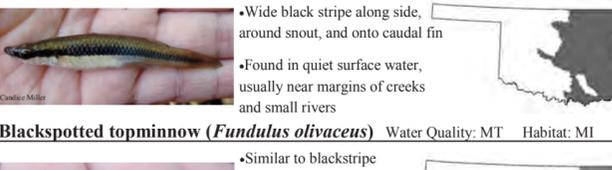
- Narrow but typically conspicuous dusky band extends from the snout to end of caudal peduncle, terminating in a more intensely black spot at the caudal base
- Large eyes
- Slim minnow with blunt snout
- Crowded scales before dorsal fin
- Found in clear rocky streams

Cardinal shiner (*Luxilus cardinalis*) Water Quality: I Habitat: I



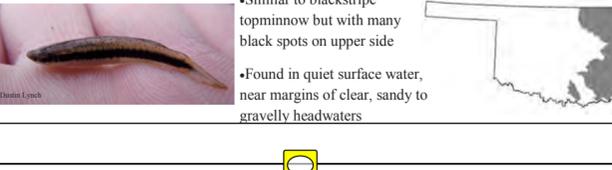
- Moderately deep-bodied, slightly compressed shiner
- Prominent black stripe on sides extends through snout
- Large terminal mouth
- Blue nose and deep red fins and underside of head and belly on breeding males
- Found in rocky runs, riffles, and flowing pools of creeks and small to medium rivers

Blackstripe topminnow (*Fundulus notatus*) Water Quality: MT Habitat: MI



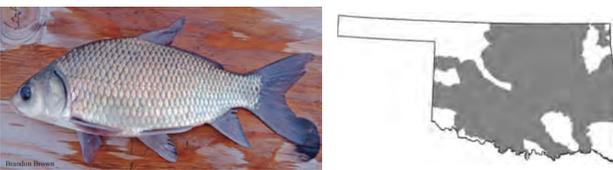
- Wide black stripe along side, around snout, and onto caudal fin
- Found in quiet surface water, usually near margins of creeks and small rivers

Blackspotted topminnow (*Fundulus olivaceus*) Water Quality: MT Habitat: MI



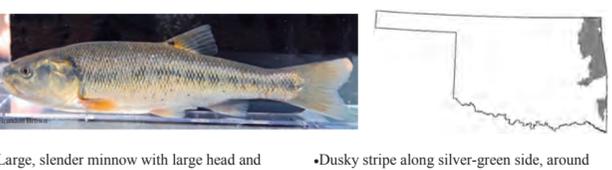
- Similar to blackstripe topminnow but with many black spots on upper side
- Found in quiet surface water, near margins of clear, sandy to gravelly headwaters

Smallmouth buffalo (*Ictiobus bubalus*) Water Quality: MT Habitat: MT



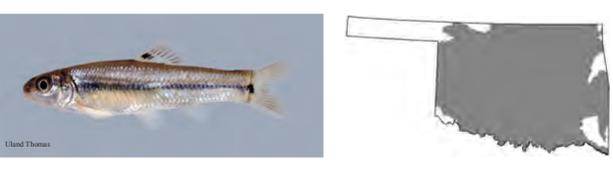
- Deep-bodied sucker with small, horizontal mouth
- Bottom, rear-margin of operculum, semicircular
- Strongly striated upper lip
- Large, dark eye
- Found in pools, backwaters, and main channels of small to large rivers; lakes

Creek chub (*Semotilus atromaculatus*) Water Quality: MI Habitat: MI



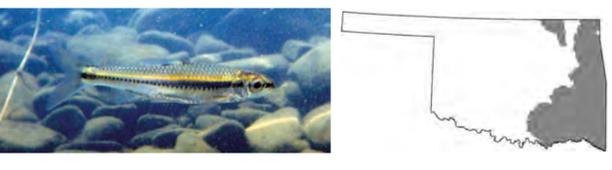
- Large, slender minnow with large head and mouth
- Black spot at the base of the dorsal fin and caudal fin
- Terminal mouth appears to have mustache
- Dusky stripe along silver-green side, around snout, and onto upper lip
- Found in pools of headwaters, creeks, and small rivers

Bullhead minnow (*Pimephales vigilax*) Water Quality: T Habitat: T



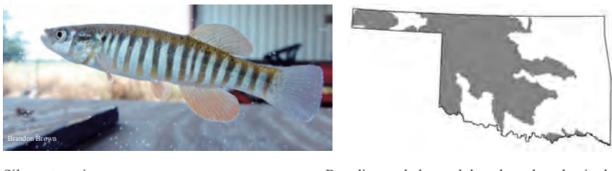
- Large conspicuous black spot at the anterior edge of the dorsal fin
- Crowded scales before dorsal fin
- Large eyes
- Scales darkly outlined
- Found in quiet pools and runs over sand, silt, or gravel, in small to large rivers

Bigeye shiner (*Notropis boops*) Water Quality: MI Habitat: I



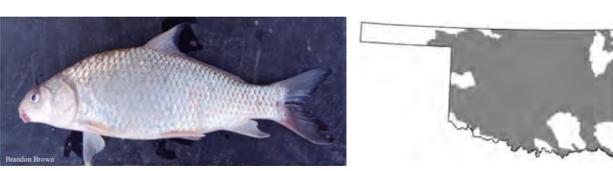
- Slim, compressed shiner with large eye
- Large, oblique, nearly terminal mouth
- Clear stripe above black stripe along silver side and around snout
- Clear fins
- Found in flowing, usually clear and rocky pools of creeks and small to medium rivers

Plains killifish (*Camptostoma anomalum*) Water Quality: MT Habitat: MT



- Silvery topminnow
- 12 or more narrow, vertical bars on sides
- Deep caudal peduncle
- Yellow pectoral fins
- Breeding male has red dorsal, anal, and paired fins
- Found in shallow sandy runs, pools, and backwaters of headwaters, creeks, and small to medium rivers

River carpsucker (*Carpiodes carpio*) Water Quality: T Habitat: T



- Deep-bodied sucker
- Nipple-like projection in lower lip
- Small, conical head with short snout
- Fairly short 1st dorsal ray
- Found in pools and backwaters of creeks and small to large rivers; lakes

Sand shiner (*Notropis stramineus*) Water Quality: MT Habitat: MI



- Fairly robust shiner with relatively large eyes
- Dark stripe on midline of back narrow but expanding into well-defined wedge-spot at front of dorsal fin
- 139nd small to large rivers; lakes
- Faintly outlined scales on back and upper sides
- Found in sand to gravel runs and pools of creeks and small to large rivers; lakes

Fathead minnow (*Pimephales promelas*) Water Quality: T Habitat: T



- Small head with terminal mouth
- Moderately deep, robust body
- Crowded scales in front of dorsal fin
- Dark olive coloration
- Dusky stripe along side and back
- Incomplete lateral line
- Found in muddy pools of headwater creeks, and small rivers; ponds

Ozark minnow (*Notropis nubilus*) Water Quality: I Habitat: I



- Slim minnow with relatively small head
- Small, subterminal mouth with pigmented lips
- Small black spot at dorsal fin origin
- Dark-edged scales
- Dusky stripe along silver side
- Found in rocky and sandy runs and flowing pools, often near riffles, or clear fast-flowing small to medium rivers

Find out how altering development rules in your community can:

- Improve the appeal of your community
- Increase property values
- Lower costs for developers
- Preserve or create natural areas for recreation and environmental benefits

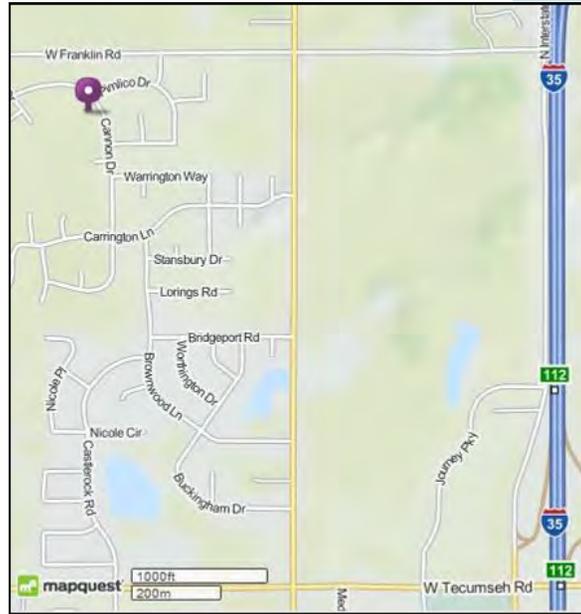


Learn about:

- Tools to evaluate and alter your current codes
- Low impact development techniques
- Successful implementation in various communities
- Rules that will require changes in the near future



Workshop Location:



Carrington Lakes Clubhouse
4324 Cannon Drive
Norman, OK 73072

For more information, contact:

Judith Wilkins, Oklahoma Conservation Commission
judith.wilkins@conservation.ok.gov, 405-522-4732

Kevin Gustavson, Oklahoma Conservation Commission
kevin.gustavson@conservation.ok.gov, 918-801-2150

This publication is issued by the Oklahoma Conservation Commission as authorized by Mike Thralls, Executive Director. One hundred copies were printed by OCC and distributed at a cost of \$.07 each with funding from a U.S. Environmental Protection Agency grant. Copies have been deposited with the Publications Clearinghouse of the Oklahoma State Department of Libraries [74 O.S. 2001 § 3105 (B)]. All programs and services of the OCC and the Oklahoma Conservation Districts are offered on a nondiscriminatory basis without regard to race, ~~140~~ national origin, gender, religion, marital status, or disability.

Planning and Building Better Communities

Monday December 9, 2013
8:30am - 4pm

Carrington Lakes Clubhouse
4324 Cannon Drive
Norman, OK 73072



Planning for Multiple Benefits

Sponsors:
Oklahoma Conservation Commission
US EPA Region 6

Workshop Agenda

Registration 8:30 to 9:00 a.m.

- 9:00 Keynote Address: Mayor Rosenthal
- 9:20 Planning Better Communities:
Overview and Ordinance Review
- 10:15 BREAK
- 10:30 New Ordinances in Fayetteville, AR
- 11:15 Assessing the Ecosystem Services and
Benefits of Trees
- 12:00 LUNCH
Presentation: Value of Urban Streams
- 1:00 Low Impact Development Techniques
- 2:00 BREAK
- 2:15 New Ordinances in Norman, OK
- 2:45 Building Better Communities in
Norman
- 3:30 Onsite Fieldtrip:
Rain Gardens and Greenbelt
- 4:00 Adjourn



Workshop Presenters



Mayor Cindy Rosenthal, City of Norman, OK



Kevin Gustavson, Ph.D., Urban Development Specialist, Oklahoma Conservation Commission and Adjunct Professor, Environmental Science Graduate Program, Oklahoma State University.



Sarah Lewis, Ph.D., Former City Council Member, Fayetteville, AR and Working Group Director, The Sustainability Consortium



Patti Erwin, Urban Forestry Coordinator, Arkansas Forestry Commission



Cheryl Cheadle, Oklahoma Blue Thumb Coordinator, Oklahoma Conservation Commission



Jason R. Vogel, Ph.D., P.E., Assistant Professor and Low Impact Development Specialist, Biosystems and Agricultural Engineering, Oklahoma State University.



Shawn O'Leary, Director of Public Works, City of Norman, OK



Reid Coffman, Ph.D., College of Architecture and Environmental Design, Kent State University, OH



Richard McKown, Managing Partner, Green Earth Land Design, LLC



Registration By Mail

Name: _____

Organization: _____

E-mail: _____

Phone: _____

Workshop Cost: \$25, includes lunch

Special food requirement: _____

Please detach form and send with check or Purchase Order to:

Oklahoma Blue Thumb Association
4545 N. Lincoln Blvd., Suite 11A
Oklahoma City, OK 73105

Registration DUE: Tuesday, November 26

Please encourage others in your community to attend!

This Workshop will benefit:

- ◆ City Administrators, City Councilors
- ◆ City and Regional Planners
- ◆ Public Works Officials
- ◆ Fire and Health Officials
- ◆ Site Plan Reviewers
- ◆ Stormwater Managers
- ◆ Urban Foresters
- ◆ Developers
- ◆ Builders
- ◆ Chamber of Commerce
- ◆ Real Estate Lenders

Living in Town

Protecting streams and rivers

This publication came to exist because Blue Thumb staff members frequently saw examples of abused waterways in various areas of the state. Blue Thumb is a water quality education program that supports volunteers who monitor streams and help educate the public about stream and river protection.

A stream reflects the activities that take place within its watershed, which is an area of land where the water under it and draining off of it goes into one stream. Everyone lives in a watershed, so what you do on the land effects a waterbody near you.

Pollutants and non-sustainable land uses can leave a stream shallow, hot, full of sediment and algae, and with eroding banks. A degraded stream does not make for good drinking water, it cannot be a home to fish, and unstable banks and flash floods can even render the stream a hazard. One landowner's actions can cause problems for both upstream and downstream neighbors.

If you find this publication helpful and you would like to know more, see what Blue Thumb has to offer; visit www.bluethumbok.com.

Cheryl Cheadle
cheryl.cheadle@conservation.ok.gov
918-398-1804

Kim Shaw
kim.shaw@conservation.ok.gov
405-522-4738

Candice Miller
candice.miller@conservation.ok.gov
701-659-0008

Jeri Fleming
jeri.fleming@conservation.ok.gov
405-334-6343



Living in Town

Protecting streams and rivers

Living in an urban area has many benefits. Generally you are close to work, school, shopping and lots of different entertainment opportunities. One of those entertainment opportunities might be spending time in a park enjoying the outdoors. Maybe that park has a stream running through it and you remember playing in just such a stream as a child. The question now is, would you let your child play in that same stream?



The more urban an area the greater impact on the streams that run through it. However, there are lots of things that can be done to improve our urban streams. For example, the stream above has



eroding banks and no vegetation. In contrast the stream to the left is also in an urban park, but its banks are not eroding and vegetation is making a comeback. Look inside to discover how you can help your community improve its water quality and make your park visit more enjoyable.

Living in Town

Being a good steward

Think of all the neighborhoods that exist across our great country! Many of people don't realize what they do to their yard and what they let leak onto driveways and roads has an effect on their community's waterways. How you manage your yard make for a healthier environment for all creatures.

Additionally, how a city manages its land will have an effect on the environment as well. when they spray herbicides and pesticides near streams they are affecting the aquatic life in that stream. By mowing all the way to the edge of the bank reduces shade, the ability of grass to obsorbe pollutants and can can increase erosion.

Some things you can do in your yard include:

- 🐾 Leave riparian zones (the land bordering a waterbody) undisturbed
 - 🐾 Read the directions before applying fertilizers, pesticides or herbicides to your lawn.
- 🐾 Plant your yard with native plants for wildlife and pollinators
- 🐾 Build a rain garden to help reduce runoff from your yard
- 🐾 Visit your local conservation district for information on rain barrels and rain gardens
- 🐾 Visit your county's OSU Extension office
- 🐾 Find groups that encourage proper land management
- 🐾 **Become a Blue Thumb volunteer!**

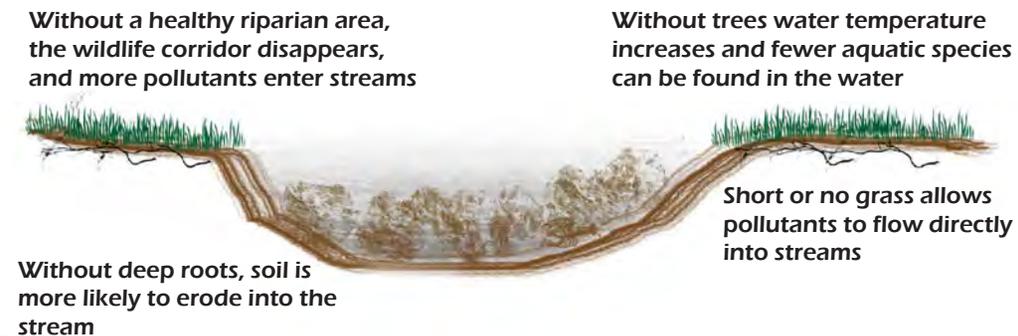
Living in Town

Why the riparian area matters

A healthy riparian area provides many benefits to both the aquatic and terrestrial areas around a stream. When you maintain a healthy riparian area it provides beneficial services to your upstream and downstream neighbors as well.



An unhealthy, or completely missing riparian area causes many problems in a stream. Additionally, when you remove all vegetation from your bank, it can have negative effect on your upstream and downstream neighbors.



Blue Thumb mini-academies are offered to the students of teachers who have completed a Blue Thumb training. Sometimes teachers like the opportunity to have the students taught by Blue Thumb staff and it serves as a refresher for them as well. Mini-academies have been an excellent way to increase student interest and improve the quality of data received. Each mini-academy has a personality of its own, but essentially the students learn the testing procedures. Where more time is scheduled, students also go to the stream to gather sample water and make observations.

If you want for us to go through monitoring with your students, contact us. We will have to schedule appropriate time.

cheryl.cheadle@conservation.ok.gov 918-398-1804

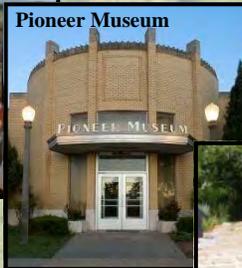




Beaver River



Beaver Dunes SP



Pioneer Museum



Boiling Springs SP



Chain Ranch



Canton Lake &



Stream Monitoring



Cheddar Ranch



No-till Farming



Riparian Exclusion



Lake Overholser

"We have all attended workshops in which we sit and listen and fill our heads with abstractions. However, this workshop plugged us into the system. We walked away forever thinking differently about our environment."

"Oklahoma is a land of great geographic and environmental diversity. The North Canadian River Watershed Workshop highlighted both the macro and micro view of the watershed as well as the human impact and responsibility of living within that system. I walked away from this workshop with a unique understanding of how human and natural systems are interrelated."

"You can sit in a classroom watching a PowerPoint presentation about water, watersheds, water quality, etc. and get the basic concepts. But when you stand in the middle of the river, with the sun shining and the birds singing, those concepts take on life and are infused in your soul."

All quotes are from 2011 North Canadian River Watershed Workshop participants.

A River Runs Thru It...



North Canadian River Watershed
Traveling Educator Workshop
June 10-12, 2014

Sponsored by:



WORKSHOP OVERVIEW



The North Canadian River Watershed — A River Runs Thru It

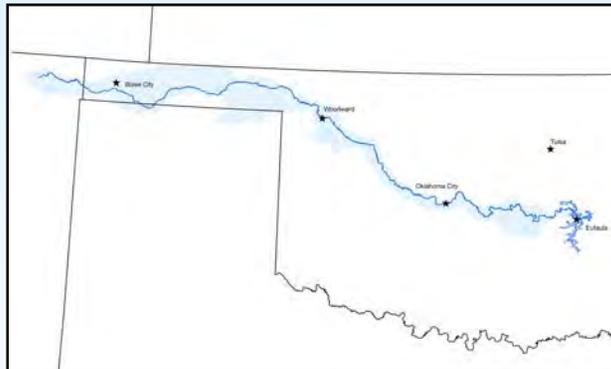
The Oklahoma Conservation Commission, Oklahoma Blue Thumb, and Oklahoma Project WET invite you to attend a three-day summer workshop to explore the North Canadian River Watershed. Our goal is to instill a sense of stewardship and personal ownership in the watershed by creating a greater awareness of how individual actions and choices impact the overall water quality and quantity of the North Canadian River. It is our hope that through this workshop, each educator will take with them the skills, materials and confidence to incorporate watershed stewardship into their classroom.

The workshop will generally consist of :

- ✚ Road trip via charter bus from El Reno, Oklahoma to Beaver, Oklahoma and back (over 500 miles round trip)
- ✚ One day exploring the watershed from Beaver to Woodward
- ✚ One day exploring the watershed from Woodward to Watonga
- ✚ One day exploring the watershed from Watonga to Oklahoma City

BENEFITS OF PARTICIPATION

- ✚ Gain professional instruction in watershed education and methods for incorporating it into a classroom
- ✚ Receive Project WET curriculum and other educational materials
- ✚ Explore exciting field trip locations in Beaver, Woodward, Blaine and Canadian Counties
- ✚ Earn approximately 36 hours of professional development credit



REQUIREMENTS

- ✚ Must be a preK-12 classroom teacher or environmental educator from a school (public or private) or other organization in Oklahoma. (*NOTE: Educators within the North Canadian River Watershed will be given preference.*)
- ✚ Must be able to attend all three days of the workshop from June 10-12, 2014.

WORKSHOP STOPS INCLUDE

- ✚ Beaver River
- ✚ Beaver Dunes State Park
- ✚ Plains Indian and Pioneer Museum
- ✚ Overnight stay in Woodward
- ✚ Boiling Springs State Park
- ✚ Canton Lake & Dam
- ✚ Blue Thumb monitoring site
- ✚ Overnight stay at Roman Nose SP
- ✚ OPTIONAL: Night Sky Viewing at the Cheddar Ranch Observatory
- ✚ Best Management Practices on private lands within the watershed
- ✚ Stinchcomb Wildlife Refuge
- ✚ Lake Overholser

TO APPLY

Registration Fee is \$100

Enrollment is limited to 24 participants.

For an application or questions, please contact Karla Beatty at:
405-521-2384 or
karla.beatty@conservation.ok.gov

Applications will be accepted thru April 10, 2014



*Blue Thumb
Water Pollution
Education
Program*

*Training Date:
Friday and Saturday,
January 24 & 25 2014*

*Training Location:
Cleveland County
Fairgrounds—East
Room 615 E. Robinson
St., Norman OK
73071*

*To Register—call
Kim Shaw
405-627-3787
kim.shaw@
conservation.ok.gov*



Blue Thumb

Training for New Volunteers

Sponsored by—Cleveland County Conservation District & Oklahoma Conservation Commission

Protect Your Streams!

Come to this Blue
Thumb training and learn
about:

- ⇒ stream ecology
- ⇒ pollutants
- ⇒ water testing
- ⇒ watersheds
- ⇒ field collections

Who can become a Volunteer?

- ⇒ Teachers & students
- ⇒ 4-H members & leaders
- ⇒ retired folks
- ⇒ professionals
- ⇒ farmers & ranchers
- ⇒ college students
- ⇒ anyone with an interest in clean water

**Become a water quality monitor!
Do your part for local streams!**

Blue Thumb Volunteer Training

Training is Free ~ Register in Advance

Day One

8:30 a.m. Welcome/Introductions

9:00 Blue Thumb and Streams

9:45 Watersheds/Project WET Activity
(Break during this too)

11:00 Blue Thumb Data Sheet

11:30 LUNCH

12:45 Safety

1:15 Head to the Creek!

We will cover:

- ✓ Macroinvertebrates
- ✓ Fish
- ✓ On-site monitoring activities

Adjourn— around 4:00 p.m.

Day Two

8:30 a.m. Recap of Stream Activity

9:00 Monitoring Training/Test Kit
Maintenance

12:15: LUNCH

1:15 p.m. EnviroScape Watershed Model

1:30 Pollutants Review

2:00 A Tale of Two Streams

2:30 Quality Assurance

3:15 Volunteer Responsibilities

3:30 Teams and Monitoring

About the Blue Thumb Training.....

Blue Thumb is a nonpoint source water pollution education program that uses volunteers to:

- ✓ monitor streams
- ✓ screen groundwater
- ✓ and educate the public about pollution prevention.

Blue Thumb is sponsored by Oklahoma's Conservation Districts and the Oklahoma Conservation Commission.

Attire:

Dress for comfort. Day One has an outdoor component—please be prepared to be in a creek. If you have waders, bring them. We have some that can be loaned. It is recommended to have a change of clothes and different shoes, and to bring a towel.

Additional items you may want to bring to Blue Thumb training, especially for the field....

- ✓ Drinking water
- ✓ Hat
- ✓ Towel

- ✓ Sunscreen
- ✓ Jacket

Blue Thumb Contact information:

*Cheryl Cheadle 918-398-1804
cheryl.cheadle@conservation.ok.gov*

*Kim Shaw, 405-522-4738
kim.shaw@conservation.ok.gov*



Learn to be a Steward
of our
Streams and Rivers!



*Blue Thumb is an education program of the Water Quality
Division of the Oklahoma Conservation Commission.*



OKLAHOMA CITY UNIVERSITY
EARTH DAY 2014:
FOCUS ON WATER
OCU McDaniel University Center

3:00-6:00pm Information Tables and Activities

6:00-7:30pm Panel Discussion “Watering Oklahoma”

Al Sutherland, Oklahoma Mesonet

Shanon Phillips, Oklahoma Conservation Commission Water Quality Division

Cheryl Cheadle, Blue Thumb Water Quality Educational Program

Nathan Kuhnert, Environmental, Health and Safety at Devon Energy

Tom Elkins, Cherokee Nation Environmental Programs

Cedric Bond, OCU History Major

7:30pm Al Sutherland, “Drought Decisions and Mesonet Drought Tools.”

Sponsored By:

Beta Beta Beta

Alpha Chi

OCU SGA

Rafter H Operating, LLC

Belle Isle Restaurant & Brewery

Oklahoma Mattress Company

Weed Family Home Rentals

Big Truck Tacos

OKC Boathouse Foundation

Saint's Bar & Lounge

The Red Cup

Raising Cane's Chicken Fingers

All events are free to the public!



Blue Thumb

Water Quality Education Program

Clean, healthy streams benefit your City!

The Oklahoma Conservation Commission's Blue Thumb Program can help your city:

- Save money with natural stream corridor management*
- Offer citizens green space to enjoy*
- Appeal to new business and industry*
- Meet Clean Water Act requirements*

Web site -- phone number



Protecting Streams: The Riparian Area

The land that borders a stream is known as a riparian area, it plays a vital role in the health of streams and rivers. The trees, shrubs, grasses and flowers that make up the riparian area serve as pollutant filters, bank stabilizers, habitat providers, wildlife highways and water coolers. When we make changes to the riparian area it has a negative impact on the stream and wildlife.

Importance of Trees

Provide shade which helps lower water temperature

Provide habitat for terrestrial animals

Leaves and branches that fall into streams provide food and habitat for aquatic creatures

Tree roots help hold soil in place resulting in reduced erosion

Importance of shrubs, grasses and flowers

Provide habitat for animals

Roots help hold soil in place resulting in reduced erosion

Serve as filters for pollutants carried by stormwater runoff

Slows the flow of water to allow water to soak into the ground reducing flooding

Protects wildlife as it passes through by providing food and cover

A Healthy Riparian System



An unhealthy Riparian System

Without a healthy riparian area, the wildlife corridor disappears, and more pollutants enter streams

Without deep roots, soil is more likely to erode into the stream

Without trees water temperature increases and fewer aquatic species can be found in the water

Short or no grass allows pollutants to flow directly into streams



Blue Thumb Education Program

www.bluethumbok.com

918-398-1804

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Living on the Land

Protecting streams and rivers

A stream reflects the activities that take place within its watershed, which is an area of land where the water under it and draining off of it goes into one stream. Everyone lives in a watershed, so what you do on the land effects a waterbody near you.

Pollutants and non-sustainable land uses can leave a stream shallow, hot, full of sediment and algae, and with eroding banks. A degraded stream does not make for good drinking water, it cannot be a home to fish, and unstable banks and flash floods can even make the stream a hazard. One landowner's actions can cause problems for both upstream and downstream neighbors.

As Blue Thumb staff members travel the state they frequently see examples of abused waterbodies. This publication was developed to help landowners better understand the impacts they have on Oklahoma's streams and rivers, and provide information on ways they can help protect water resources.

Blue Thumb is a water quality education program that supports volunteers who monitor streams and help educate the public about stream and river protection. If you find this publication helpful and you would like to know more visit www.bluethumbok.com, or contact a Blue Thumb staff member.

Cheryl Cheadle
cheryl.cheadle@conservation.ok.gov
918-398-1804

Kim Shaw
kim.shaw@conservation.ok.gov
405-522-4738

Candice Miller
candice.miller@conservation.ok.gov
701-659-0008

Jeri Fleming
jeri.fleming@conservation.ok.gov
405-334-6343



Living on the Land

Protecting streams and rivers

Living in a rural setting has many benefits; privacy, space and the chance to enjoy the natural resources on your property. However, with these benefits comes the responsibility of being a good neighbor and a good steward of those natural resources.

One of the most important things you can do for yourself, your neighbors and everyone living downstream of you is to *protect any streams or rivers that flow through your*



property. You have a choice, your stream or river can be raw and eroding (top picture) or it can function properly and offer habitat (left picture). Look inside to discover how you can be a good steward.



www.bluethumbok.com
www.facebook.com/BlueThumbOK

Living on the Land

Being a good steward

Whether you are new to the country or have been here awhile, keep in mind what it means to be a steward of the land.

◆ Leave riparian zones undisturbed (the land bordering a waterbody)

- ◆ Leave at least a 30' buffer between the water's edge and your farming, grazing or other land disturbing practices
- ◆ Fence cattle and horses out of the creek and provide alternative water sources for them

◆ Do not overgraze

- ◆ Consider implementing a rotational grazing regime
- ◆ Don't exceed the land's carrying capacity

◆ Learn about no-till farming

◆ Keep ATVs in upland areas and on designated trails

◆ Leave areas in native plants for wildlife and pollinators

- ◆ Native grasses have deep fibrous roots that can help prevent erosion, both in the field and along a streambank

◆ Get involved in conservation planning

- ◆ Visit your local conservation district
- ◆ Visit your county's OSU Extension office
- ◆ Find groups that encourage proper land management

◆ Become a Blue Thumb volunteer!



Living on the Land

Why the riparian area matters

A healthy riparian area provides many benefits to both the aquatic and terrestrial areas around a stream. When you maintain a healthy riparian area it provides beneficial services to your upstream and downstream neighbors.



An unhealthy, or completely missing riparian area causes many problems in a stream. When you remove all vegetation from your bank, it can have negative effects on your upstream and downstream neighbors.





Blue Thumb macroinvertebrate collections and stream site quality assurance sessions heading your way!

Hello LeFlore County area Blue Thumb volunteers!

It is time for winter fun at your stream. Candice and I will be contacting you about making your **macroinvertebrate collections** from your streams. While we are out, we will also help you through a **stream site quality assurance session**. Once the dates are set, you will receive information about the times.



We will be on each site no more than one hour, unless you arrange with us for something else.



Waders or at least galoshes are needed. We will have a few pair of these with us. You will need to bring to your site everything you would take to site if you were going to do your actual monitoring.

It is very important that you watch your emails and be a part of this monitoring work. Students are encouraged to attend. Get in touch with us! It is our goal that our winter travels will help you to become established on a stream of your choice. Do not hesitate to call or email if you have any confusion.

WHAT YOU NEED TO DO:

- ◇ Know where you want to monitor, or be prepared to ask for help to select a place
- ◇ Watch for an email with dates and times
- ◇ Respond to email so that we will know we can expect your participation
- ◇ Know where your test kit is and what components need to come to the stream
- ◇ Thank you,

Contact Candice with questions: 701-659-0008



Possible dates.....which works best?
February 19, 20, 21 OR
March 4, 5, 6
2014
Watch your emails!

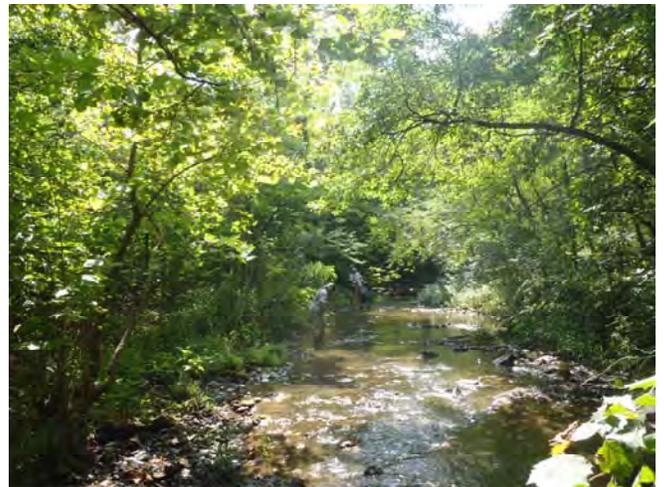


Boulders, Branches, Brush, and Water Stream Dynamics and Restoration

A **free mini-symposium** for Tulsa Area Blue Thumb volunteers and friends is taking place at the City of Tulsa's compound at **4818 South Elwood on November 3**. Attend to learn how streams change, how they are impacted and how natural channel design can restore them to a more natural state. The symposium is being held in conjunction with the quarterly Blue Thumb quality assurance session and macroinvertebrate subsampling. The location is just north of I44 near the west bank of the Arkansas River.

The symposium is being offered at 3:00 p.m. and 6:30 p.m. to accommodate volunteers' schedules.

A related stream restoration tour will take place in Tahlequah at 10:00 a.m. on November 7. The tour is optional, but is an excellent companion field trip to the symposium. Those attending the tour will purchase a lunch ticket for \$10. Tickets will be sold only during the QA sessions and only cash will be accepted. An attempt will be made to car pool from Tulsa to Tahlequah on November 7.



Please call to save your seat at the mini-symposium!

Monday, November 3, 3:00 p.m. or 6:30 p.m.

918-398-1804 or cheryl.cheadle@conservation.ok.gov

Presentations:

What do Pinball Games and Streambank Restoration have in Common?

Gina Levesque, Conservation Reserve Enhancement Program Coordinator
Oklahoma Conservation Commission

Oh No! Here Comes the Law!

Jeri Fleming, Blue Thumb Communications Coordinator
Oklahoma Conservation Commission

Mini-symposium will take less than two hours.



*Blue Thumb Water Quality
Education Program*

Training Date:

October 10 & 11, 2014
Begins at 6:00 p.m. Friday
evening and runs 8:30 a.m.
to 4:30 p.m. Saturday

Training Location:

OSU Tulsa - Main
Hall Building
Room 2113
700 N. Greenwood
Ave. Tulsa, OK
(link to map on back)

To Register—call or
email:

Cheryl Cheadle
918-398-1804
cheryl.cheadle@
conservation.ok.gov

Blue Thumb

Training for New Volunteers

Sponsored by—Tulsa County Conservation and the Oklahoma Conservation Commission



Protect Your Streams!

Come to this Blue
Thumb training and learn
about:

- ⇒ stream ecology
- ⇒ pollutants
- ⇒ water testing
- ⇒ watersheds
- ⇒ field collections

Who can become a Volunteer?

- ⇒ Teachers & students
- ⇒ 4-H members & leaders
- ⇒ retired folks
- ⇒ professionals
- ⇒ farmers & ranchers
- ⇒ college students
- ⇒ anyone with an interest in clean water

**Become a water quality monitor!
Do your part for local streams!**

Blue Thumb Volunteer Training

Training is Free ~ Register by October 7 please

Friday, October 10:

6:00 p.m. Welcome/Introductions

6:30 Blue Thumb Program

7:00 To Seek a Creek...An introduction to moving water

7:30 Watersheds/Project WET Activity
(Break during this too)

8:30 EnviroScape

9:00 Blue Thumb Data Sheet

9:30 Volunteer Responsibilities

9:45 Quality Assurance

Saturday, October 11

8:30 Safety

8:45 Head to the Creek!

We will cover:

- ✓ Macroinvertebrates
- ✓ Fish
- ✓ On-site monitoring activities

LUNCH

1:00 p.m. Recap of Stream Activity

1:15 Monitoring Training and Test Kit Maintenance

4:00 Understanding Data

4:30 Test Kits and Monitorint

About the Blue Thumb Training.....

Blue Thumb is a nonpoint source water quality education program that uses volunteers to:

- ✓ monitor streams
- ✓ screen groundwater
- ✓ and educate the public about pollution prevention.

Blue Thumb is sponsored by Oklahoma's Conservation Districts and the Oklahoma Conservation Commission.

Attire:

Dress for comfort. Day two has an outdoor component—please be prepared to be in a creek. During summer trainings, we go into the creek in close-toed shoes and old shorts. It is recommended to have a change of clothes and different shoes, and to bring a towel.

This training is in the autumn, so we will have to just check weather to see if it is a shorts and sneakers day or a day for waders. If you have your own waders, bring them. Blue Thumb has some waders for loan.

Additional items you may want to bring to Blue Thumb training, especially for the field....

- ✓ Drinking water
- ✓ Hat
- ✓ Towel
- ✓ Sunscreen
- ✓ Bug repellent

Blue Thumb Contact information:

*Cheryl Cheadle 918-398-1804
cheryl.cheadle@conservation.ok.gov*

*Kim Shaw, 405-522-4738
kim.shaw@conservation.ok.gov*

http://www.osu-tulsa.okstate.edu/news/campusmap_large.jpg Link to Map

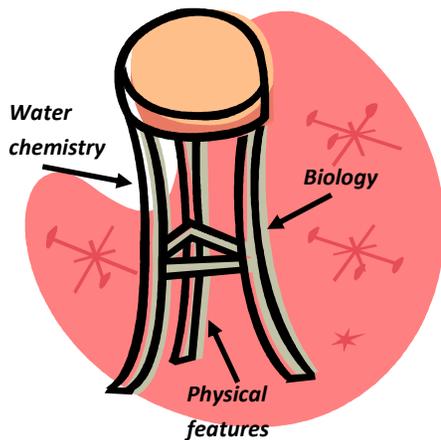


Blue Thumb

Volunteer Monitoring

Blue Thumb volunteers have been active in Oklahoma for 20 years. These dedicated volunteers spend time outdoors learning the condition of streams they care about. This is accomplished through the gathering of chemical, biological, and physical data.

Consider a three legged stool—a simple structure, typically light weight, easy to grab, yet sturdy and dependable. Picture each leg of the stool as being a portion of the Blue Thumb monitoring process. . .



- Our three legged stool supports the person who sits upon it because each leg is equally strong.
- Stream condition as determined by Blue Thumb data has a valuable story to tell, because each separate monitoring effort adds to the credibility of the conclusions.

If you went to the doctor for a physical...

...your condition would be judged based on your height, weight, blood pressure, temperature, and other medical tests, as well as how you say you are feeling.

It is a similar process with streams.

- ◆ *Water chemistry* is important and can only be determined by running tests on the actual stream water. Volunteer teams do this monthly.
- ◆ Everything needs a home. During a *habitat assessment*—and to some degree during other visits to the stream—measurements are taken and observations are made about habitat that result in a stream score.
- ◆ *Biological collections* are, figuratively, the meat and potatoes of the stream monitoring experience. When a healthy community of benthic macroinvertebrates (especially larval insects) is found, and where sensitive fish as well as tolerant fish live, the stream is healthy.
- ◆ If the observed biological collections are less than ideal, the water chemistry and the habitat information can be important pieces to the puzzle of “why.”



Volunteers make site observations and perform water testing each month.



Benthic macroinvertebrates (larval insects, snails, crawdads, worms) are collected from Blue Thumb streams twice each year during winter and summer.



Fish are collected every four or five years. Fish collections are a wonderful way to learn about your stream. Blue Thumb staff is always present during biological collections and habitat assessments.

Habitat assessments are completed during the same site visit as is the fish collection. A series of measurements and observations take place at 20 meter intervals over a 400 meter stretch of the stream. This is close to 1/4 mile.



How deep is the water? How much shade covers the water surface? Is there woody debris for fish to hide under? These are a few of the questions that are answered during a habitat assessment.



*Responsible Care
for Oklahoma's
Natural Resources*



We all leave our print. . . .

.. .but there are so many ways we can reduce our print! Listed below are some ways to care for streams and rivers.

- Use lawn chemicals conservatively and always pay attention to label instructions
- Don't apply chemicals when rain is predicted
- Keep vehicles and heavy equipment in good repair to eliminate oil and antifreeze leaks
- Do not allow development and/or farming to infringe upon riparian areas—leave vegetation along every stream
- Practice no-till farming to reduce soil erosion and to conserve precious soil moisture
- Pick up pet waste to reduce the opportunity for bacteria and nutrients to be washed into neighborhood streams

Less obvious are some of the things we can all do to make even a greater difference. . .

- Purchase locally grown foods when possible—this supports your community and provides you with fresher foods
- Plan automobile trips and errands to maximize efficiency—try bicycling or walking for errands, too
- Donate old things to a charity—don't fill the landfill with items somebody can use
- Use a mulching mower or compost grass clippings
- Use native plants—they offer food to birds and butterflies and get along well with our precipitation and pests
- Adjust thermostats to use less energy
- Spend time outside—you will be inspired to help our earth more when you spend time outdoors
- Take a child outside—children naturally love nature, but they have to be outdoors to learn the valuable lessons nature can teach

Remember—there are many generations of people who will come after us, and they deserve clean drinking water, a place to go fishing, and opportunities to hike in the back country.



A blob of snail eggs on a rock might just make a typical summer day a little less typical if you are a five year old boy exploring a local creek!



Visiting the creek in the summer with a Blue Thumb crew is likely to offer a chance to look at fish, a chance to look at bugs, and a chance to do whatever is fun and cooling!

Children who have good memories of time spent outside in a natural setting are likely to become the adults who work for the good of the earth.

Registration Form

Registration fee includes meals, snacks and
OBTA one year membership!

Name: _____

Phone: _____

Email: _____

- A) Full conference registration \$45
(Current OBTA members \$30)
- B) Friday only \$25
(Current OBTA members \$15)
- C) Saturday only \$25
(Current OBTA members \$15)
- D) Kayak rental Friday \$10

My monitoring team will set up an exhibit:
yes no

Arcadia Lake Camping - (405) 216-7470
Hotel: Super 8 Hotel Frontier City, 11935 S I-35
Service Rd, Oklahoma City, OK 73149 (405) 478-
8288 (mention Blue Thumb Conference for the
rate of \$49.99 per night, breakfast included)

I would like to register ____ people for
conference option ____ for \$_____. I would like
to reserve ____ kayaks on Friday for an additional
\$10 each.

Total Due \$_____

I am a current OBTA member: Yes No

Return your registration form no later than
September 8, 2014 with your check made out to
OBTA (sorry we cannot accept credit cards) to:

Jeri Fleming
Oklahoma Conservation Commission
4545 N. Lincoln Blvd. Ste 11A
Oklahoma City, OK 73105

Questions call Jeri at 405-334-6343



**Come to the Thumbs UP! Celebration and
Conference and discover the value of
volunteerism!**

The Oklahoma Blue Thumb water quality
education program supports volunteers who
perform stream monitoring, groundwater
screening, and nonpoint source pollution
prevention education. Attending conferences
such as this strengthens volunteers and friends
of Blue Thumb as they go forth to protect our
streams and rivers.

Our agenda should be appealing not only to
adults, but also middle-school through college
age students. For special student rates, please
contact Cheryl Cheadle at 918-398-1804 or
cheryl.cheadle@conservation.ok.gov.



Thumbs Up! for Blue Thumb Volunteers!

Conference and Celebration

September 19 ~ 20, 2014

Lake Arcadia Wildlife
Conservation Education Center
N. Midwest Blvd.
Edmond, Oklahoma 73007



Thumbs Up! for Blue Thumb Volunteers!

The Celebration Continues!

Last November, we celebrated the beginning of volunteer stream monitoring 20 years ago with an event at the Oklahoma Aquarium on November 9. The celebration continues as we acknowledge the time, work and commitment of our many volunteers who are at work in central Oklahoma. Data collection began in the Oklahoma City area in 1994!

Join us for both a volunteer conference and a celebration of the power of volunteers to make a difference!

Volunteers—Tell Your Story!!

If you have been monitoring with Blue Thumb for at least a year, you and your team qualify to set up a Blue Thumb Exhibit! Take time to showcase your stream and your efforts to protect it. Who knows, another volunteer might get some great ideas from you!

Exhibit set up will be between 1:00 and 2:00 p.m. on Friday, with the exhibit showcase taking place between 2:00 and 6:30.

Volunteers staying for the following day's activities are encouraged to leave their exhibits in place.

There is no additional cost to setting up an exhibit, but we must know in advance.

Be sure to call, email, or to check the exhibit box on the registration.



Conference Overview

Friday, September 19

1:00 to 6:00 p.m.—Registration

2:00 to 4:00 kayaking (\$10 each)

2:00 to 6:30—Volunteer Exhibits

2:00 to 3:30—What Can Blue Thumb Do for You?

(Workshop for conservation district staff and directors.)

6:30 p.m. Welcome and Mingling

7:00 Dinner and Recognition (meal provided)

7:45 “Changes and Challenges: Being a Stream in the 21st Century”



Saturday, September 20

8:00 to 8:30 a.m. Registration

7:45 to 8:45 Choice of Nature Hike or Bird Watching, or neither

9:15 Rainfall Simulator

10:45 Street Cars, Rivers, and Pork Barrel: How Unplanned Development Changed Oklahoma History

11:45 Lunch and Winners of the Video Contest! (meal provided)

1:00 Bob has a Blue Thumb

1:45 Technology Alert!

2:15 BREAK

2:30 On Being a Steward....The Heart of Protection

4:00 p.m. Oklahoma Blue Thumb Association general membership meeting and election of board members

Thumbs Up! for Blue Thumb Volunteers!

Oklahoma Blue Thumb Association (OBTA)

The Oklahoma Blue Thumb Association is a tax-exempt non-profit association that was organized in 2013 to help support the Blue Thumb program and its volunteers. Its mission is to promote clean and healthy water ecosystems in Oklahoma, with an emphasis on fishable and Wadeable streams and rivers, through education, stewardship, and public outreach.

The OBTA will hold its first annual general membership meeting for 2014-2015 at the end of the conference. The purpose of the meeting is to elect board members and to share its goals and vision with its members. Additionally, the board would like to hear from you, its members to gain insight on what members want and need from their organization. If you are not already a member, you will become one with your paid conference registration, so plan to attend!

Directions to Lake Arcadia Wildlife Conservation Education Center - From I-35 take E. Memorial Road exit and head east to N. Midwest Blvd, turn left (north) and follow road to end and turn right at the gate.





Happy Holidays from Blue Thumb!

December 2014

Dear Volunteers and Friends of Blue Thumb:

The sun is setting on another year, and it is time again to say "thank you." Thank you for monitoring, for talking to neighbors, for helping with an education event, for writing a book, for wearing a Blue Thumb t-shirt and responding to the question: "What is Blue Thumb?"

Do you consider yourself one of the environmental good guys—someone who rides in on the white horse to save the day? If you are a Blue Thumb volunteer you are, in a way, doing just that by working to protect our streams and rivers. Can we do more? The answer for most of us is yes. We can get a little braver, set a stronger example, take more action and speak more words. We can all be the steward that helps protect our one and only planet Earth. Because if not us, then who?

When the subject of global climate change came up a few years ago, with it came suggestions for how we can slow global warming. Now the message is "how can we live with the effects of global climate change?" Now is the time to work towards improving our environment. Because if not now, then when, and the when could be too late.

As you read this newsletter, you will find that extra emphasis on education will take place in three watersheds in 2015. The volunteers in these watersheds are asked to carry a heavier load and volunteers from outside these watersheds can add to the success of these efforts by jumping in and working with us.

You may want to take some of the ideas from these watershed activities and put them to work in your own watershed. Additional watersheds will be added to this mix after this first year. Are you willing to be the point person in your neighborhood, in your watershed, in your community, or even in your region of the state to say "let's come together for the good of the Earth?" Can you be the voice that brings people together, and spreads the message of caring for our Earth to your neighbors?

When contemplating what it takes for an individual to care for streams and rivers it seems to take two things, education and inspiration. What actions help, and what actions hurt; that is the education of it. Added to this must be the inspiration, the place inside of us all where knowledge and caring coming together so that we understand the value of protecting our flowing waters and our lakes. Education plus inspiration. Let's work together to help those around us develop a conservation ethic that places real value on our streams and rivers, our forests and our prairies, and our wild animals? Be a Blue Thumb volunteer that leads the way in your community.

Best wishes,

Cheryl

Kim

Candice

Jeri

Your Blue Thumb Team

Watershed Education in 2015

Planning is underway to take education to a new level within the watersheds of three Blue Thumb streams in 2015. The watersheds of **Crow Creek** (Tulsa County), **Medicine Creek** (Comanche County) and **Pennington Creek** (Johnston County) are targeted to receive additional work and funding to 1) teach watershed residents how to reduce nonpoint source pollution and 2) foster a conservation ethic that will help watershed residents understand the value of protecting their local stream.



Crow Creek, in metropolitan Tulsa has been monitored for close to twenty years by Blue Thumb volunteers. The stream’s watershed is an urban area: heavily developed, with homes, businesses, streets, highways, schools, museums, and parks all existing within the very populous watershed.

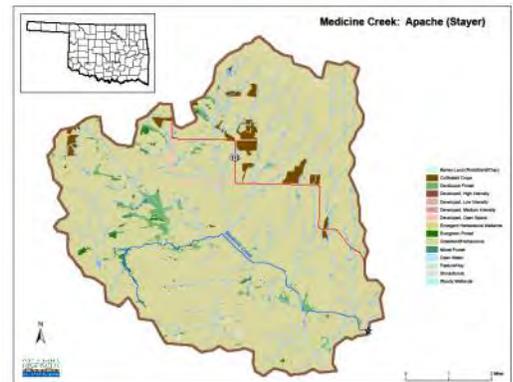
Crow Creek scores well in habitat components throughout the 400 meters of the stream that is considered the monitoring site, but the biological communities are not what they could be. Blue Thumb collections of fish and benthic macroinvertebrates show a stream with low numbers of individuals and lack of diversity in species.

Volunteer Graham Brannin, long-time monitor of the stream, played in Crow Creek as a child and still lives within the watershed, thus is well suited to be in a leadership role for the educational efforts in this watershed.

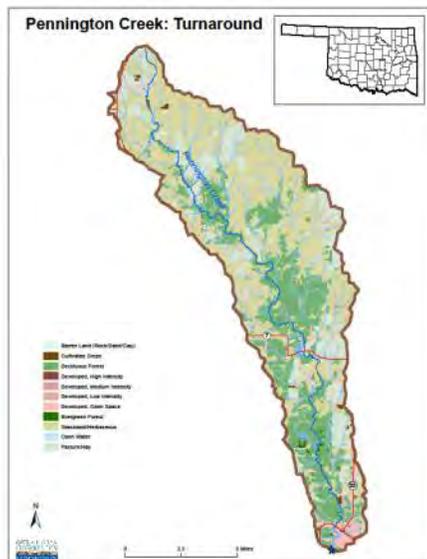
Medicine Creek flows partly through the beautiful Wichita Mountains National Wildlife Refuge but mainly through private land in Comanche County in southwest Oklahoma. The stream has yielded reasonably good fish collections and, like many Oklahoma streams, during times of low rainfall it tends to be either nearly dry or have very low flow.

Medicine Creek sometimes has issues with carrying too much sediment, and high bacteria levels. Medicine Creek is dammed to make Lake Lawtonka, which sometimes suffers from excess algae.

Carol Stayer, a longtime resident of Comanche County, monitors Medicine Creek as it flows across her back yard. Carol’s long term interest in the stream



and a dozen years of Blue Thumb data make this watershed a natural to receive an extra heavy dose of education.



Pennington Creek in Johnston County has recently been featured as a “success” story due to a reduction in the levels of Enterococcus bacteria. Landowners, with the support of the Johnston County Conservation District, United States Department of Agriculture, and nonpoint source funding from the US Environmental Protection Agency, took action to install practices and management programs that minimized cattle actually in the stream.

With Pennington Creek being in a good place already, watershed education efforts will focus on protection and helping the stream become an important “high quality water” for the state of Oklahoma. Area residents Justin Roach and Lewis Parkhill monitor different sites on Pennington Creek and will take the lead in the education efforts and will involve the City of Tishomingo and the Tishomingo National Wildlife Refuge.

You too can live more SUSTAINABLY!

Be a part of something big, take responsibility for your health, and use the bit of land upon which you sit to GROW your food!

Our partner, the USDA Natural Resources Conservation Service, has a program in which NRCS offers assistance and even some funding to establish a greenhouse, which they are, in their official federal-speak, calling a "seasonal high tunnel."

Learn more about this chance to grow your own food by contacting your local conservation district. All district phone numbers are in the back of your 2015 Blue Thumb calendar.

From Wetlands to Watersheds: Oklahoma Clean Lakes and Watersheds Conference 2015

Blue Thumb is joining with the Oklahoma Clean Lakes and Watersheds Association to make the 2015 OCLWA annual conference the most valuable conference offered yet to volunteers! The conference will be held on April 8 & 9, 2015, in Stillwater.

There will be special pricing for volunteers and a track of sessions that will be of particular interest to volunteers.

Blue Thumb will be able to offer several scholarships that will help pay the way for volunteers to attend. You can learn more about this opportunity by going to the OCLWA website at <http://www.oclwa.org/>. Contact Cheryl if you already know you want to attend.

Environmental Education Expo

The annual Environmental Education Expo will be held at the National Weather Center in Norman on Friday, February 6, 2015. This year's theme is "Weather and Climate—Making the Connection to Environmental Education."

Blue Thumb volunteers can apply to receive a \$20 scholarship, which will pay half the registration fee. If you are a student or a senior citizen, Blue Thumb will pay \$15 of the \$25 reduced fee. Please contact Cheryl at Blue Thumb if you want to attend a really good education event at a really good price.

What's new on the website? Lots!

We have added a volunteer voices page with a few videos of our volunteers talking about why they love Blue Thumb. The link to that page is <http://www.bluethumbok.com/volunteer-voices.html>.

We have moved all of our volunteer-written data reports to the Blue Thumb website. You can find the reports, categorized by county, at <http://www.bluethumbok.com/data-quality-and-interpretation.html>. Explore the page and learn something new about a Blue Thumb stream!

Two PowerPoint presentations are now available on the site at <http://www.bluethumbok.com/presentations.html>. The presentations are for you to use when you give talks about Blue Thumb.

Several of our handouts are also available at <http://www.bluethumbok.com/downloadable-handouts.html>. Print these off and hand out at events or to your neighbors!

You can also find field forms, information about nonpoint source pollution and our catalog of services on the site. If you have ideas of other things we can add, contact Jeri Fleming.

First Blue Thumb Training of 2015

University of Central Oklahoma, Edmond, January 30 and 31, 2015. To register or for more information contact Kim Shaw.

Upcoming Events

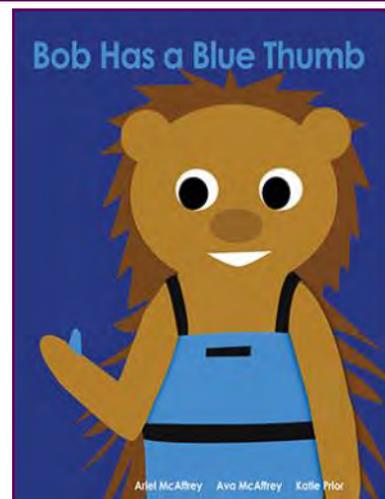
Tulsa Area Blue Thumb Meet & Greet
Jan. 6, 2015 3:00—7:00 Tulsa County Conservation District Office, Tulsa, OK. Contact Cheryl for questions

Water Quality Seminar—Introduction to Healthy Streams
Jan. 20, 2015 6:00 p.m. Wes Watkins Technology Center, Shawnee, OK. Contact Andrea Jones—405-379-2570

Conservation Day at the Capitol March 23, 2015

**Winter quality assurance sessions and bug collections!
Jan. and Feb. 2015**

Congratulations to Ariel, Ava and Katie on being named the Environmental Best of the Best from Keep Oklahoma Beautiful!



Tools of the Trade

If you are a Blue Thumb volunteer who actively monitors a stream, then you are equipped with a Blue Thumb test kit. Your test kit contains the tools you need to perform chemical monitoring on a monthly basis.

Blue Thumb has MORE tools available to you for the purpose of educating the residents who live, work, and play within your watershed. Two come to mind immediately: The EnviroScape and the Groundwater model. Use these tools to help citizens understand their role in pollution, pollution prevention, and the relationship between surface water and groundwater.

Contact a Blue Thumb staff member to learn about upcoming workshops where you will learn how to check out, set up, use, clean up, and return these models. But most of all, learn how you can help people to "get it!" where our water is concerned.



Blue Thumb Mini-Academies

If you are a teacher and monitor a stream, you and your students are eligible for a Blue Thumb mini-academy. All you have to do is contact a Blue Thumb staff member and one of us will come to your school and provide an abbreviated introduction to monitoring to your students.

Students and teachers who complete a mini-academy tend to get off to a better start in monitoring and submitting data. Is there a mini-academy in your future??



EnvironMentor

Beth Landon at Oklahoma City University revived the Environmentor in 2012 to provide Oklahoma citizens information on all things environmental. The EnvironMentor has interesting articles, a calendar of environmental events, online library of newsletters at

<http://www.okcu.edu/environmentor/> and a Facebook page at <https://www.facebook.com/TheEnvironMentor>.

Bringing in the Data

If you have a Blue Thumb test kit and have been assigned a site you should be performing monthly monitoring (even if your creek is dry!).

If you are monitoring but not submitting data, please email it or snail mail it to Kim. If your creek is dry, you should still fill out the first page of the data sheet and send it to Kim. The data is useless if it never becomes an official part of your stream's profile.

If you have a kit but you are not monitoring, please return your test kit to your local conservation district, with your name taped to the lid. Or, better yet begin monitoring again!

Oklahoma Blue Thumb Association

The Oklahoma Blue Thumb Association is a membership organization for people who care about the Blue Thumb program and Oklahoma's water resources. If you haven't joined it is only \$10 per year or \$150 for a lifetime membership. All donations and membership fees are used to help Blue Thumb volunteers and support educational events. Check out their Facebook page at <https://www.facebook.com/OKBTA>.

Your Blue Thumb Staff

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BLUE THUMB ACCOMPLISHMENTS VERSION 2014



1,610
Adults reached during exhibits,
presentations, conferences

2,089
Children reached during festivals and
natural resource days

918
Data collections
done by volunteers

Nearly 1 Million!
People who learned about reducing
water pollution through Blue Thumb
media (articles, radio, Facebook,
website, calendars, brochures, "Bob has
a Blue Thumb," etc.)

137
Macroinvertebrate
collections

97
Students who completed
Blue Thumb mini-academies

79
Adults who completed
Blue Thumb Training

10,000
Number of visits to
www.bluethumbok.com

8
Number of COUNTRIES
that have someone that
likes Blue Thumb!

419
Number of likes on
www.facebook.com/BlueThumbOK





BLUE THUMB FISH COLLECTIONS 2014



GREAT PLAINS ECO-REGION

Each year Blue Thumb conducts fish collections in one Oklahoma eco-region.

Ever wonder why Blue Thumb conducts fish collections? It's to help you and Oklahoma decision makers gain a better understanding of the health of your stream.

A habitat assessment is completed on the same reach of stream that fish are collected from. The assessment provides information about cover, substrate, and underwater habitat.

Fish collections offer the best introduction to your stream—where the big fish hide, where the minnows are found and can even tell you who lives along the banks of your stream and what activities are taking place.

The following streams had fish collections done in 2014.

Canadian County:

Fourmile Creek
Sixmile Creek

Cleveland County:

Little River

Custer County:

Little Deep Creek

Comanche County:

Jimmy Creek
Medicine Creek

(The above two creeks were unable to have fish collections on them for two years due to drought and thus no flow)

Wolf Creek

Kay County:

Spring Creek

Oklahoma County:

Bishop Creek
Bluff Creek

Chisholm Creek
Crutch Creek (two sites)
Deer Creek
Guy James Creek
Spring Creek (two sites)

Payne County:

Boomer Creek
Feather Creek
Sanborn-Hazen Lake Creek
Stillwater Creek

The following streams also had fish collections done this summer as they couldn't be done last year for various reasons.

Creek County:

Rock Creek

Osage County:

Sand Creek

Ottawa County:

Tar Creek

1
Number of fish found on the
Guy James fish collection
It was a long day!

2
Number of pairs of
sunglasses lost by Jeri
during fish collections

22
Number of
2014 Fish collections

All of them
Number of spiders
Candice is afraid of

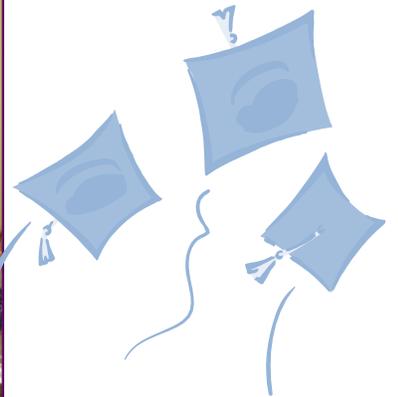
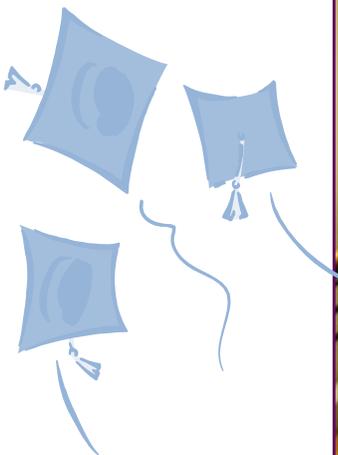
2
Number of times we
actually saw Kim fall in
the creek!

44
Number of times intern J.T.
refused to stick his hand in a
scary looking place during
fish collections

17.5 minutes
Average number of
minutes between Jeri's
falls on Stillwater Creek
fish collection



BLUE THUMB CLASSES OF 2014





BLUE THUMB FUN IN THE CREEK 2014

