



**Oklahoma Blue Thumb Final Report: January 1, 2021 – December 31, 2021**

**FY 2021-2022 §319(h) EPA Grant #C9-996100-21 – Project 8**

Oklahoma Conservation Commission Water Quality Division  
2800 North Lincoln Boulevard, Suite 200, Oklahoma City, Oklahoma 73105



*Sanborn-Hazen Creek in Stillwater (Payne County)*



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This report is submitted by the Blue Thumb Program as evidence of work completed in the 2021 calendar year.

## **BLUE THUMB PROGRAM DESCRIPTION**

Blue Thumb provides public education and outreach on behalf of the Oklahoma Conservation Commission's Water Quality Division. Blue Thumb supports a network of citizen scientists who collect monthly water quality data at stream sites across Oklahoma. Blue Thumb also facilitates education and outreach events about nonpoint source pollution across the state. The mission of Blue Thumb is to recruit, train, inspire and empower Oklahomans to engage in behaviors that protect local streams. The 2021 Work Plan identifies the following subtasks:

Subtask 4.1: General Program Maintenance

Subtask 4.2: Education in Priority Watersheds

Subtask 4.3: Groundwater Education/Screening Program

### **SUBTASK 4.1 GENERAL PROGRAM MAINTENANCE**

In 2021, the Blue Thumb Program continued to support citizen scientists across the state as they collected data on local streams. Blue Thumb reached over 7,487 people through virtual and face-to-face education and outreach efforts. We held three two-day trainings, two one-day trainings, one virtual Mini-Academy for Monitoring, and incorporated Project WET training into Riverology 101 workshop. We have continued to strengthen our social media presence on Facebook and Instagram. We also continued publishing a monthly e-newsletter for volunteers. In February, we launched a mobile map application that complements our data collection app by increasing the ease with which volunteers and the public can access Blue Thumb data.

Blue Thumb has continued to be impacted by COVID-19. In 2021, macroinvertebrate collections and pickings, as well as fish collections, proceeded relatively unhindered. We continued to struggle with low registration for trainings, and during COVID peaks, many education events were cancelled. Where possible, we filled the gap with virtual education events. Virtual efforts include a webinar about the map app, development of a two-part fish identification class for Rogers State University, participation in the



*Blue Thumb Staff (from left to right):  
Candice Miller, Cheryl Cheadle,  
Becky Zawalski, Rebecca Bond and  
Kim Shaw.*





CitSci Expo hosted by Oklahoma State University (OSU) and working with the Patience S. Latting Northwest Library in Oklahoma City to host a virtual event for children.

### ***SUPPORTING CITIZEN SCIENTISTS***

Blue Thumb volunteers complete monthly chemical monitoring, quarterly quality assurance (QA) sessions, biannual macroinvertebrate collections, and fish collections and habitat assessments once every four or five years. Monthly monitoring and sample analyses are completed independently. During a monthly sampling run, volunteers record streamside observations, collect and “fix” two dissolved oxygen samples and collect a water sample which the volunteer later tests for orthophosphate as phosphorus, nitrate, nitrite, ammonia, chloride and pH. Typically, volunteers take their water samples indoors to complete analyses. Analyses are completed with Hach test kits. During the recreation season (May 1-September 30) volunteers have the option of collecting and analyzing *E. coli* samples. Biological collections and habitat assessments are completed in cooperation with Blue Thumb staff. In 2021, 133 active volunteers completed monitoring at 83 sites in 29 counties (Figure 1; we would be happy to provide geospatial coordinates upon request). Additionally, Blue Thumb staff supported approximately 150 students who monitor with their teacher or professor. Volunteers and staff completed 124 macroinvertebrate collections and 20 fish collections. In 2021, we were able to resume group subsampling sessions to process macroinvertebrate samples, although a few volunteers did continue to request one-on-one subsampling sessions.

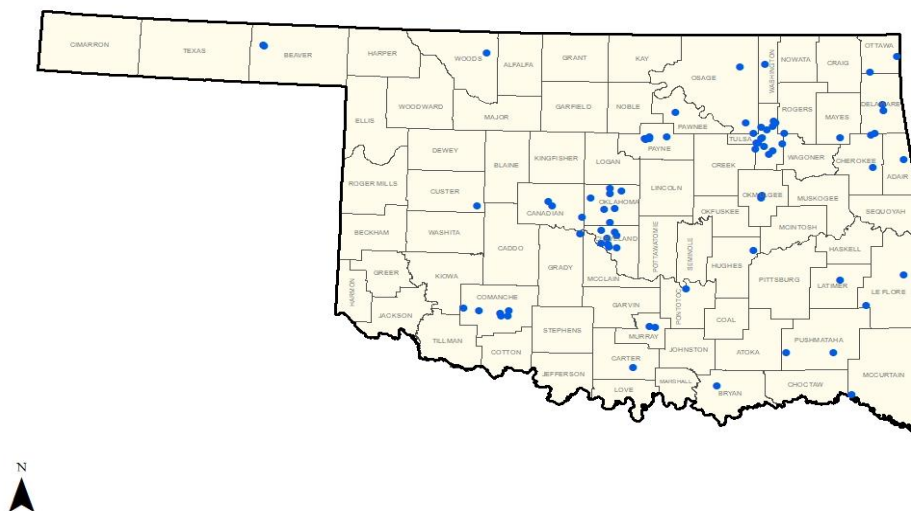


Figure 1: 2021 Active Sites



*Volunteers process macroinvertebrate samples at a bug picking event in Norman*



*Volunteers seine for fish in Spunky Creek in Tulsa*

The Blue Thumb Program recruited approximately 34 new volunteers who will monitor individually or in teams. New volunteers attended one of the following two-day trainings:

- Stillwater Training, April 10-11 (21 attendees)
- Oklahoma City Training, June 12-13 (2 one-day participants and 16 two-day participants)
- Claremore Training, November 6-7 (18 attendees)

In addition, the following trainings were scheduled and advertised, but cancelled due to low registration:

- Poteau Training, August 28-29
- Alva Training, September 11-12

We have several volunteers who teach in public schools, vocational schools or on college campuses. These teachers conduct stream monitoring with groups of students. We offer Mini-Academies for Monitoring to teach new groups of students how to complete the chemical analyses. Requests for Mini-Academies for Monitoring have been down since the start of the pandemic. On April 20, we held a virtual Mini-Academy for Monitoring for OSU students who monitor with the Environmental Club.





One of the ways the Blue Thumb Program supports citizen scientists is by encouraging volunteers to write interpretations of their data upon receipt of a data package. A data package includes chemical, biological and habitat data. Data packages are assembled by the QA Officer, Kim Shaw, upon receipt of fish data from the taxonomist. Kim typically offers data interpretation workshops to volunteers in the fall. Due to COVID, we did not offer data interpretation workshops, but Kim worked one-on-one with volunteers interested in developing a report. In 2021, we received five volunteer-written data interpretations.



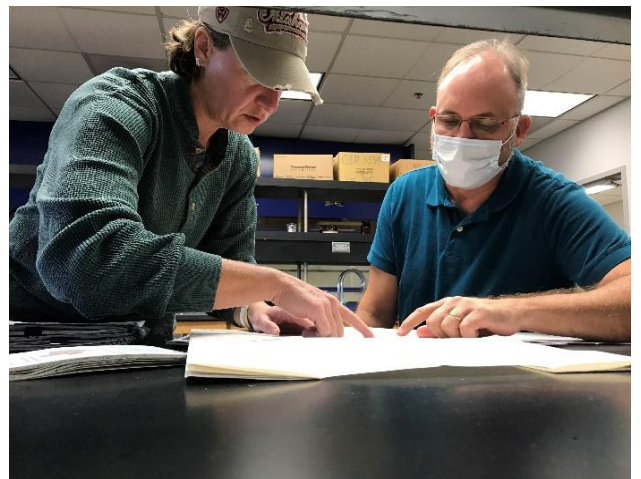
*Blue Thumb Training in Stillwater*



*Blue Thumb Training in Claremore*



*Blue Thumb Training in Oklahoma City*



*Kim assists a volunteer with a data report*



## ***SUPPORTING VOLUNTEER EDUCATORS***

In 2021 we continued to focus on developing volunteer educators who are willing and able to represent Blue Thumb at educational events. One of the ways we support volunteer educators is by offering stand-alone Project WET Trainings. We hosted two Project WET Trainings in 2021:

- One-day Project WET Training in Strother, May 7 (8 teachers)
- Project WET Training during Riverology 101 Workshop in Langley, July 13-15 (14 teachers)

We scheduled a third Project WET Training in Ada on August 25, but it was cancelled due to low registration.

We also supported volunteer educators through a Full Circle Citizenship Workshop that was held in Central High on October 6. There were 13 attendees. During a Full Circle Citizenship Workshop, participants learn about the interface between soil health and water quality and effective ways to share this information with others. They also received focused education about the Little Beaver Creek watershed, the watershed in which the training was held.



*Riverology 101 in Langley*



*Creek experience during Full Circle  
Citizenship Workshop in Central High*





*Project WET Training in Strother*

We planned to offer a two-day Outdoor Education Workshop to volunteers and Project WET, WILD and Learning Tree facilitators in October. The Outdoor Education Workshop was postponed due to COVID. We hope to offer the workshop in the fall of 2022.

### ***EDUCATION AND OUTREACH***

Blue Thumb offers education and outreach about nonpoint source pollution and water quality statewide and year-round. We use a variety of experiences including natural resource days, outdoor classrooms, workshops, camps, creek walks and presentations to teach Oklahomans about nonpoint source pollution and what they can do to help. Although we were able to offer more face-to-face education in 2021 than in 2020, requests for face-to-face education continued to be significantly fewer than normal. Many face-to-face events were cancelled during COVID peaks. To supplement our face-to-face interactions, we continued to rely heavily on virtual education and outreach. Virtual education included webinars, presentations, a virtual CitSci Expo and the creation of 26 short educational videos that are available on our website, YouTube channel and/or Facebook pages. We reached over 7,487 people through face-to-face and virtual education and outreach efforts. Some of the highlights of our 2021 educational efforts are listed below:

- Developed three videos and three educational brochures for the Lake Thunderbird Watershed Alliance





- Developed a brochure, a two-page flyer and six Facebook posts about riparian area management for the City of Norman
- Supported the Citizen Science in Higher Education in Oklahoma Faculty Learning Community
- Lake McMurtry Spring Celebration in Stillwater, April 17
- Ag Day on Lincoln, May 13
- Adventure Camp at Lake McMurtry in Stillwater, June 10, July 1 and July 8
- Journey to the Bottom of the Creek Day Camp in Tahlequah, July 9
- Chickasaw Environmental Camp in Ada, July 16
- Riverfield Day School Science Camp in Tulsa, July 29
- Chickasaw FemSTEM Camp in Ada, July 30
- Norman Area Home Educators Back-to-School Event in Norman, August 12



*Kingfisher County Conservation District  
Natural Resource Day*



*Howe Elementary School Natural  
Resource Day*



*Journey to the Bottom of the Creek Day  
Camp in Tahlequah*



*Oklahoma County Conservation District  
Outdoor Classroom*



*Okfuskee County Conservation District  
Natural Resource Day*



*"Jenks Wild" event at Jenks Middle  
School*





*Haskell County Conservation District Fishing Clinic*

### ***PRESENTATIONS AT CONFERENCES***

In 2021, Cheryl offered a presentation at the annual meeting (virtual) of the Interior Highlands Mollusk Conservation Group on March 16. Candice worked with the Justice, Equity, Diversity and Inclusion (JEDI) Committee of the North American Lake Management Society (NALMS) to plan a workshop, a speaker track and an outdoor education experience for attendees of NALMS 2021, which was scheduled to take place in Oklahoma City in November. Due to high COVID numbers, the conference pivoted to a virtual platform, so we were unable to offer the planned presentations, workshop and outdoor experience. Blue Thumb staff and Blue Thumb volunteers also usually present at the Oklahoma Clean Lakes and Watersheds Association (OCLWA) conference in April. The OCLWA conference was cancelled due to COVID.

### ***OTHER PRESENTATIONS***

In addition to Cheryl's presentation for the Interior Highlands Mollusk Conservation Group, staff offered presentations to the following groups:

- Citizen Science in Higher Education in Oklahoma Faculty Learning Community, March 24
- OSU Environmental Science Club, April 19
- Broken Arrow Homeowners Association Workgroup, April 24



- An interview with Studio Tulsa, June 8
- Tulsa Garden Center, June 26
- Human Community Network, August 5
- Tulsa Master Gardeners, September 1
- Tulsa Garden Team, September 14
- Mid America Tech Center, September 14

#### **SUBTASK 4.2 EDUCATION IN PRIORITY WATERSHEDS**

The Blue Thumb Program recognizes two types of priority watersheds. The first type is watersheds identified in the *2014 State of Oklahoma Unified Watershed Assessment (UWA)*. In the UWA, waterbodies are ranked according to three sets of variables: severity of threat or impairment, impact of threat or impairment on human health, and restoration potential. The document identifies 50 high priority watersheds in the eastern half of the state and 50 in the western half. These watersheds are known as Category I watersheds. During 2021, Blue Thumb worked in three Category I watersheds: the Illinois River watershed, the Waurika Lake-Beaver Creek watershed and the Lake Wister watershed. The collaboration with the Illinois River Watershed Partnership (IRWP) was extensive and included collecting data three times at 12 sites in the watershed, for a total of 14 sampling days. In the Little Beaver watershed, we hosted a Full Circle Citizenship Workshop to educate stakeholders about the connections between soil health and water quality, particularly regarding sediment. In the Lake Wister watershed, we collaborated with the Poteau Valley Improvement Authority to develop a watershed-based plan for Lake Wister. The plan was submitted to the Oklahoma Secretary of Energy and Environment on August 30, 2021.





*IRWP sampling event in April*



*IRWP sampling event in November*

Blue Thumb considers watersheds in which the local community is mobilized to act as “priority watersheds” even if these watersheds are not identified as Category I watersheds in the [UWA](#). The residents of the Crow Creek watershed are engaged and have worked with Rebecca Bond to develop a watershed-based plan. The WBP was accepted by EPA on January 11, 2021. We participated in the following meetings and events in the Crow Creek watershed:

- Crow Creek Community meeting, May 14
- Meeting at Crow Creek Meadow, June 16
- Crow Creek Watershed Festival at Zink Park, July 17
- Crow Creek Community meeting, August 6
- Crow Creek Community meeting, September 1
- Crow Creek Community meeting, September 27
- Trash for Treat at Zink Park, October 30

In addition to the meetings and events detailed above, Cheryl has worked with stakeholders to develop signage for Crow Creek Meadow that will be installed in 2022.



*Trash for Treat at Zink Park*



*Crow Creek Watershed Festival*





### SUBTASK 4.3 GROUNDWATER EDUCATION/SCREENING PROGRAM

During a groundwater screening event, our Quality Assurance Officer, Kim Shaw, supervises volunteers as they analyze groundwater samples for alkalinity, sulfate, chloride, nitrate and pH with Hach test kits. Following a groundwater screening, well owners receive their results as well as educational information about wellhead protection. If their results suggest the need for additional testing, they are encouraged to contact the Oklahoma Department of Environmental Quality (ODEQ). We held the following groundwater screening events in 2021:

- Groundwater Screening Event at Harper County Conservation District, March 31
- Groundwater Screening Event at Central North Canadian River Conservation District, November 15

Results from the groundwater screenings are available upon request.



*Groundwater Screening Event in Buffalo*



*Groundwater Screening Event in Geary*

### BLUE THUMB MEASURES OF SUCCESS

This section contains an assessment of the measures of success documented in the FY 2021 Blue Thumb Workplan.

#### 1. Complete all subtasks and submit deliverables on time.

All subtasks were completed and deliverables were submitted on time.



**2. Work with volunteers to support the completion of at least five data interpretations.**

Blue Thumb volunteers submitted five data interpretations in 2021. After completion of the quality assurance review, the data interpretations will be made available online.

**3. Increase actively monitored sites by at least two new sites, preferably in areas that do not currently have active Blue Thumb sites.**

In 2020, we had 86 actively monitored sites. In 2021, we had 83 actively monitored sites. Although our total number of actively monitored sites is down slightly from 2020, approximately 19 sites were monitored in 2021 that were not monitored in 2020.

**4. Maintain rigorous QA processes; where possible, align QA procedures with those of the Rotating Basin program.**

We have continued to maintain the rigorous QA procedures documented in our QAPP. The most recent revision was approved September 8, 2021 (QTRAK # 21-430). In addition to maintaining our routine QA procedures, we have continued working with the Rotating Basin program to align QA processes where appropriate. In 2021, Dan Dvoretz, the Technical Programs Director, worked with staff to clearly document QA procedures in an internal QA Guidance Document. Dan also created a QA folder for each employee involved in monitoring. Certifications relevant to monitoring are stored in each employee's QA folder.

**5. Continue developing the capacity of volunteers to represent Blue Thumb at education events.**

We have continued developing the capacity of volunteers to represent Blue Thumb at education events through Blue Thumb Trainings, Project WET Trainings, and one-on-one support from the Volunteer Coordinator.





**TABLE 1: COMPLETION OF SUBTASKS**

<b>Subtask #</b>	<b>Outputs Identified in Work Plan</b>	<b>Completed Outputs</b>
4.1.a	Hold at least four new volunteer training sessions across the state to cultivate new groups and maintain and support existing groups	Held three two-day trainings, two one-day trainings, one virtual Mini-Academy for Monitoring, and incorporated Project WET training into Riverology 101 workshop
4.1.b	Prepare data packages for sites with new fish data; facilitate completion of volunteer data interpretations	Kim Shaw prepared 9 data packages in 2021. Five volunteers submitted data interpretations.
4.1.c	Prepare and submit Semi-Annual Reports	Submitted in July 2021 and January 2022
4.1.d	Update and/or recertify Blue Thumb QAPP	Approved September 8, 2021
4.1.e	Present at a minimum of two conferences (staff or Blue Thumb volunteers)	Staff presented at one conference. Staff were scheduled to present and offer workshops at a second conference, but the conference was held virtually, and the presentations and workshops were cancelled.
4.1.f	Prepare and submit Blue Thumb Annual Report summarizing program activities for 2021	Submitted February 2021
4.2.a	Participate in or hold an average of at least five education events per month during the project period	We held or participated in approximately 74 face-to-face education events; we also presented at approximately 19 virtual events and published 26 educational videos.
4.3	Facilitate at least two groundwater screenings at conservation districts	Facilitated groundwater screenings in two conservation districts