ALABAMA WATER WATCH
ANNUAL REPORT

- 2016 -

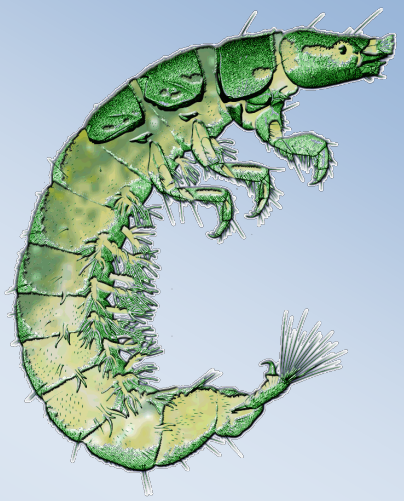
Alabama Water Watch
Water Resources Center
Auburn University, AL

January 2017

ALABAMA WATER WATCH 2016 ANNUAL REPORT

by Eric Reutebuch, Sergio Ruiz-Córdova, and Mona Domínguez

It's not a shrimp… it's a Water Spirit!



The AWW logo is an aquatic insect called a CADDISFLY. This particular caddisfly is named *Hydropsyche,* and is an important member of stream communities throughout Alabama.

The name ***Hydro*psyche*** means ***Water * Spirit***.

It is, therefore, a fitting symbol of the growing spirit of involvement, enthusiasm and concern for Alabama's water resources that citizens have *shown through Alabama Water Watch*

AUBURN UNIVERSITY
ALABAMA AGRICULTURAL EXPERIMENT STATION
WATER RESOURCES CENTER

extension
ALABAMA A&M & AUBURN UNIVERSITIES

The Alabama Water Watch Program is part of the Auburn University Water Resources Center in the Alabama Agriculture Experiment Station (AAES) and receives support from AAES and the Alabama Cooperative Extension System.

Cover photo: Some of the many AWW activities of 2016: Auburn High School students in the AU Arboretum getting trained in water chemistry monitoring (top); Hana Barres training new monitors at Camp Fletcher (center); and AWW '*State of the Lake Address*' at Smith Lake sponsored by Smith Lake Civic Association (bottom).

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1. EXECUTIVE SUMMARY

1. Alabama Water Watch (AWW) is a statewide program dedicated to promote community-based watershed stewardship through developing citizen volunteer monitoring of Alabama's lakes, streams and coastal waters. The AWW Program, formerly in the Auburn University (AU) Department of Fisheries, became part of the AU Water Resources Center and relocated to the CASIC Building in the Auburn Research Park in 2013. AWW is funded primarily by the Alabama Agricultural Experiment Station (AAES) and the Alabama Cooperative Extension System (ACES). Other funding is obtained through securing grants from governmental and private sector funding sources. This report covers activities from January 2016 through December 2016.

2. AWW conducted 101 training sessions with a total of 870 certifications; about 60% were conducted by or with a citizen trainer. Thirty-nine water chemistry workshops (331 people), 27 bacteriological workshops (292 people), four *Exploring Our Living Streams* workshops (67 people), 15 recertification sessions (61 people), four trainer refresher workshops (26 people), and 4 trainer internships were completed in 2016.

3. Since 1993, Alabama Water Watch has received 85,518 water quality data forms from citizen monitors in all of the major basins in Alabama. Over 2,300 cumulative sites on 820* waterbodies have been monitored statewide and all data reside on the AWW statewide database.

4. Sixty-three groups (313 active monitors) collected and submitted water quality data from all 10 major river basins in 2016. Ten new groups joined AWW in 2016. A total of 2,927 data records was received at the AWW office in 2016.

5. Two data interpretation sessions were held in 2016 - one with Smith Lake Civic Association and one with Smith Lake Environmental Preservation Committee. AWW responded to 12 official requests for data from organizations including ADEM, GSA, NRCS, Auburn University, Mobile Bay NEP, Mobile Baykeeper, Jacksonville State University, Florida Oceanographic Society, Panhandle Watershed Alliance (FL)Lee County Highway Dept., cities of Auburn and Opelika, as well as various AWW groups and individual monitors.

6. AWW staff attended AWW monitoring group meetings, such as those of Save Our Saugahatchee, AU Coast Guard Auxiliary, Bream Fishermen Association, and Lake Watch of Lake Martin. AWW personnel participated in numerous conferences, including the Environmental Education Association of Alabama Annual Conference, the Alabama Water Resources Conference, the River Network River Rally and our AWW Annual Conference.

7. Program Accomplishments and Initiatives for 2016 included the publication of 16 articles on the AWW web blog, and others in other media, and participation in numerous environmental education events. Almost 2,400 people were subscribed to the AWW list-serve and received the *AWWareness* blog regularly. AWW collaborated with the College of Agriculture's Office of Communications to produce a promotional video, and produced an infographic poster featuring Alabama's rich aquatic biodiversity. Several proposals were submitted to various agencies to help support the statewide citizen water monitoring program and environmental education activities that have made AWW a model for other states and countries.

*820 waterbodies is down from the 842 reported in the 2015 AWW Annual Report since 842 was an overestimate because of some duplicate entries in the database.

2. AWW PERSONNEL AT AUBURN UNIVERSITY

All personnel listed have duties as staff of the AU Water Resources Center along with their work with the AWW Program.

Eric Reutebuch, M.S.

Program Director (January 1996 - present) - Eric has a M.S. in Fisheries from Auburn University. He began working with AWW on a part-time basis in 1996 and transitioned to full-time in 2006. He assumed the position of AWW Associate Director in July 2013 upon Bill Deutsch's retirement, and became Director in 2014. He coordinates AWW Program activities, serves as the co-PI on a USDA-AFRI Project and an AL-WRRI Project, writes articles and publications showcasing AWW groups, and conducts data interpretations with AWW groups.

Sergio S. Ruiz-Córdova, M.S.

Database Coordinator; Global Water Watch Associate Director (1993- present) - Sergio has a B.S. in Marine Biology and a M.S. in Aquatic Ecology from Auburn University. He joined AWW and GWW part-time and began full-time in 2001. He assumed the position of GWW Associate Director in July 2013 upon Bill Deutsch's retirement. His work with AWW involves programming and maintaining the statewide database and creating data reports and conducting water monitoring workshops statewide. He coordinates activities with GWW in several other countries.

Rita Grub, B.S.

AWW Office and Workshop Manager (April 2008 – September 2016) - Rita has a B.S. in Business Administration from Auburn University. Her work primarily involves working with AWW monitors and trainers coordinating workshops and certifications. Rita also serves as an AWW trainer and office manager for AWW, keeping up with monitor/group communications and other office duties. She also supervises the processing of AWW monitor data and new site locations. Sadly, Rita left AWW in September 2016 for another job ☹.

Mona S. Domínguez, M.C.P.

Volunteer Monitor and 4-H AWW Program Coordinator (July 2009 – present) – Mona has a B.A. in Anthropology from Sewanee - The University of the South and received her Master's in Community Planning from Auburn University. She coordinates AWW youth education activities. In addition, Mona works on the Global Water Watch and has a half-time appointment working with youth program development with the ACES 4H Program.

William Deutsch, Ph.D.

Founder and long-time Program Director (retired; October 1992 – June 2013) - Bill was a Research Fellow in the AU Department of Fisheries and Allied Aquacultures since 1990. In addition to continuing in his part-time support of the AWW Program, he works through Global Water Watch promoting community-based watershed monitoring and environmental stewardship internationally, in the Philippines, Ecuador, Brazil, China, Thailand, Mexico, Argentina and Kenya.

Samantha Daniell

Student Intern - Samantha is currently a senior at Auburn University studying Ecological Engineering. Her main priority is website management, with hopes to become involved with outreach in the future. Samantha is part of Auburn's Accelerated Bachelor's/Master's Program to continue her education after undergrad. She then hopes to obtain a job that involves conservation and awareness.

Sydney Smith

Student Intern - Sydney is currently a senior at Auburn University in Environmental Science. She began volunteering as a water quality monitor with AWW in 2014 and became a citizen trainer in 2015. Her work with AWW involves communicating and coordinating with volunteer monitors and trainers, preparing for workshops and helping the other program staff where needed. In her future career, Sydney would love to work in environmental education and watershed protection.

3. CITIZEN TRAINING

One hundred and one training sessions were conducted during the report period (Table 1). About 60% of these workshops were conducted by or with AWW citizen trainers (Tables 2 & 3), and 870 AWW certifications were awarded in 2016.

AWW volunteer trainers participating a Trainer-Refresher Workshop (and showing off the new AWW aquatic biodiversity infographic poster) at the Birmingham Botanical Gardens in April 2016.

Table 1. Workshops conducted and AWW certifications issued in 2016.

Workshop Type	No. Workshops	No. Certifications
Water Chemistry Monitoring	39	331
Water Chemistry Recertification	14	59
Bacteriological Monitoring	27	292
Bacteriological Recertification	1	2
Exploring Our Living Streams	4	67
Stream Biomonitoring	6	87
Trainer Refresher - Water Chemistry	2	16
Trainer Refresher - Bacteriological	2	10
Water Chemistry Training of Trainer	1	1
Water Chemistry Trainer Intern I / II	3	3
Bacteriological Training of Trainer	1	1
Bacteriological Trainer Intern I / II	1	1
Total	101	870*

*The total number of citizen monitors was 565, note that some attended more than one workshop and therefore received multiple certifications.

2016 was a good year for the AWW Program based on number of trainings conducted and certifications awarded thanks in large part to our dedicated volunteer trainers:

- Thirty-nine Water Chemistry Monitoring workshops certified a total of 331 citizens.
- Fourteen Water Chemistry Monitoring Recertification sessions were conducted to update 59 citizen monitors as active certified monitors.
- Twenty-seven Bacteriological Monitoring workshops were conducted in which 292 certifications were issued.
- One Bacteriological Monitoring Recertification session was conducted to update 2 citizen monitors as active certified monitors.
- Four *Exploring Our Living Streams* were conducted certifying 67 in EOLS.
- Six Stream Biomonitoring workshops certified a total of 87 citizens.
- Two *Trainer Refresher for Water Chemistry Monitoring* workshops were conducted to refresh 16 Water Chemistry Monitoring trainers.
- Two *Trainer Refresher for Bacteriological Monitoring* workshops were conducted to refresh 10 Bacteriological Monitoring trainers.
- Three Water Chemistry Trainer Internships were conducted.
- One Bacteriological Trainer Internships was conducted.

AWW monitor Carl Badger monitoring water chemistry at his site on Halawakee Creek, a tributary to the Chattahoochee River that flows through eastern Lee County.

Twenty-five trainers conducted the 101 training sessions in 2016 (note, several workshops were taught by a team of two trainers; see Table 2 below). Of these, five are full-time or part-time AWW staff: Eric Reutebuch, Sergio Ruiz-Córdova, Mona Dominguez, Rita Grub and Bill Deutsch. The other 20 are AWW-certified citizen volunteer trainers.

Table 2. AWW Trainers and number of workshops conducted (as lead trainer, or assisting) in 2016. Asterisks indicate trainers who are AWW staff.

No.	AWW Trainer	Number of Workshops
1	Hana Berres	4
2	Marshall Carter	3
3	Deborah Cearley	1
4	Bill Deutsch*	6
5	Mona Dominguez*	24
6	Mimi Fearn	4
7	Gene Grimes	2
8	Rita Grub*	11
9	Whitney Henson	4
10	Francine Hutchinson	3
11	John S. Kulbitskas	3
12	Christian Miller	2
13	Jean Ann Moon	6
14	Stephen Morros	2
15	Judy Palfrey	1
16	Florence Peters	4
17	Eric Reutebuch*	9
18	Linda Ruethemann	3
19	Sergio RuizCórdova*	16
20	Mike Shelton	8
21	Homer Singleton	2
22	Sydney Smith	10
23	Isabella Trussell	4
24	Susan (Soos) Weber	2
25	Jim Woodrow	1

In 2016, AWW had 38 trainers certified for water chemistry monitor training, bacteriological monitor training, and stream biomonitor training, and, again, five are AWW staff, while the other 33 are certified volunteer trainers (see Table 3).

Table 3. AWW trainers in 2016 (C = water chemistry, B = bacteriological, S = stream biomonitoring). Asterisks indicate trainers who are AWW staff.		
No.	**Trainer**	**Type**
1	Larry Barkey	C
2	Hana Berres	B,C
3	Chip Blanton	B,C
4	Bill Boozer	B,C
5	Dick Bronson	B,C
6	Marshall Carter	B,C
7	Deborah Cearley	B,C
8	Bill Deutsch*	B, C, S
9	Mona S. Dominguez*	B, C, S
10	Mimi Fearn	B,C
11	Michael Freeman	B,C
12	Gene Grimes	B,C
13	Dorothy Grimes	B,C
14	Rita Grub*	B,C
15	Whitney Henson	B,C
16	Patti Hurley	B,C
17	Francine Hutchinson	B,C
18	Cade Kistler	B, C
19	John S. Kulbitskas	C
20	Christian Miller	B, C
21	Jean Ann Moon	C
22	Stephen Morros	B,C
23	Michael Mullen	B, C, S
24	Judy Palfrey	B,C
25	Jade Patolo	B,C
26	Florence Peters	B,C
27	Eric Reutebuch*	B,C
28	Linda Ruethemann	B,C
29	Sergio S. RuizCórdova*	B, C, S
30	Wendy Seesock	B,C
31	Mike Shelton	B,C
32	Homer Singleton	B,C
33	Sydney Smith	B,C
34	Taylor Steele	B, C, S
35	Isabella Trussell	B,C
36	Stephen Tsikalas	B,C
37	Susan Weber	B,C
38	Jim Woodrow	B,C

Mona Dominguez and Soos Weber conducting a Water Chemistry Monitoring Workshop in November 2016 in Huntsville, Alabama.

4. AWW CITIZEN GROUPS, DATA AND RESOURCE DISTRIBUTION

Sixty-three groups collected and submitted water quality data from watersheds throughout the state within the report period (Table 4). Ten new groups formed in 2016:

- *Fowl River Area Civic Association*
- *Phenix City Engineering Department*
- *Mobile Baykeeper*
- *SIFAT (Servants in Faith and Technology)*
- *4-H AWW Baldwin County*
- *Citronelle High School*
- *Moores Creek Watershed Management Plan*
- *ADEM-NPS*
- *Friends of Lake Eufaula*
- *4-H Limestone County*

Welcome to the AWW team!

A combined total of 2,927 data records were received at the AWW Office during 2016. Since 1993, Alabama Water Watch has received 85,518 water quality data records (68,548 water chemistry and 16,658 bacteriological data records) from citizen monitors in watersheds throughout

Alabama. 2,380 cumulative sites on 820 waterbodies have been monitored statewide and all data reside on the AWW statewide database.

AWW Program Indicator	Cumulative Numbers
Total Water Quality Records	85,518
Total Water Chemistry Records	68,548
Total Bacteriological Records	16,658
Total Stream Bioassessment Records	312
Total Monitors Certified	7,373
Total Sites Monitored	2,380
Total Training Sessions	2,086
Total Waterbodies Monitored	820
Total Monitoring Groups	308

AWW cumulative statistics – 1992-2016

Though there were significant transitions (most notable, acquiring our new AU Water Resources Center Director, Dr. Puneet Srivastava, the loss of Rita, our AWW office manager and monitor/trainer coordinator, and the launch of the new AWW database), the past year was a productive year with lots of progress and achievements; including:

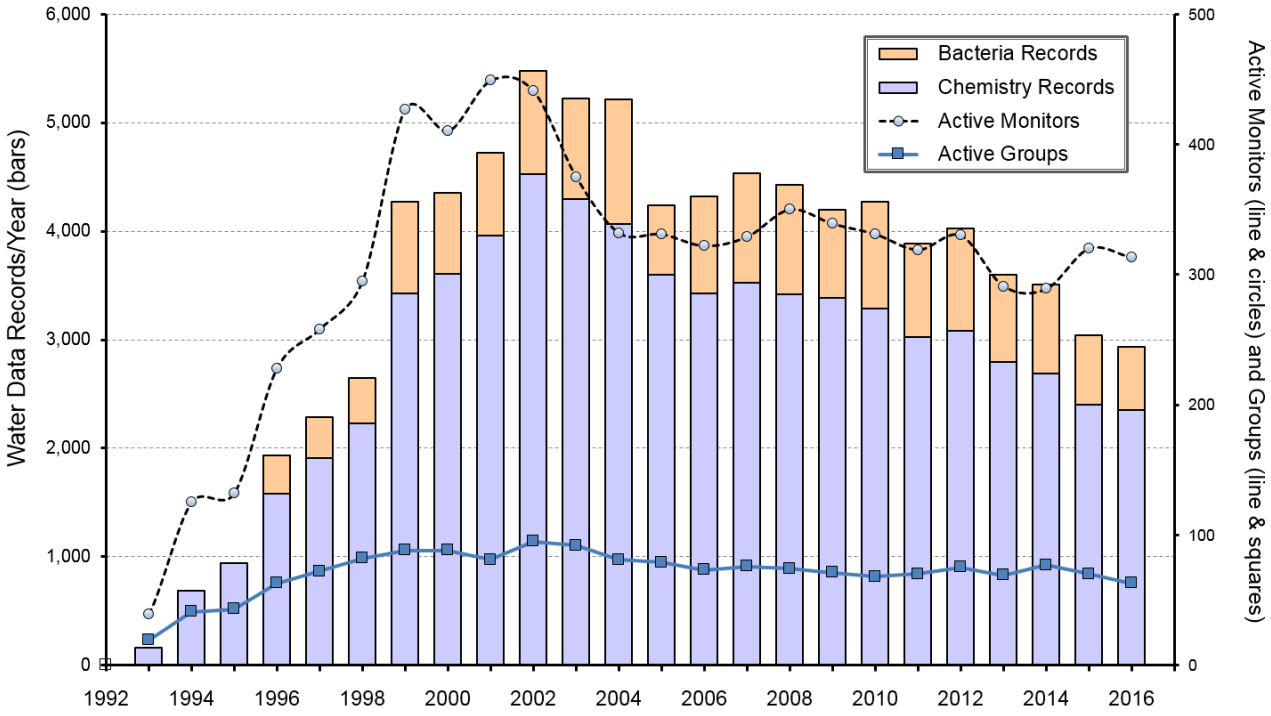
- 85,518 cumulative water quality records (water chemistry, bacteriological, and stream biomonitoring records) taken and entered into AWW's online database;
- 2,380 sites monitored, many on streams not monitored by other state agencies;
- *E. coli* monitoring and postings from some of Alabama's most treasured and most utilized waterbodies (e.g., the Cahaba River, Lake Martin, Wolf Bay, the Choctawhatchee River, etc.);
- volunteer bacteriological monitoring of public-use waters that has now surpassed the number of monitoring sites done by the state (based on postings at www.theswimguide.org: volunteer-monitored sites (freshwater sites) = 57*; while state-monitored sites (marine sites), = 24; and,
- more than 1,500 young Alabamians learned about this state's aquatic treasures and how to preserve and protect them, thanks to support from the Alabama Cooperative Extension System and the work of Mona through 4-H AWW.

* Some of these freshwater bacteriological monitoring sites are monitored by Riverkeepers using the Idexx© bacteriological monitoring method, not the Coliscan® Easygel method.

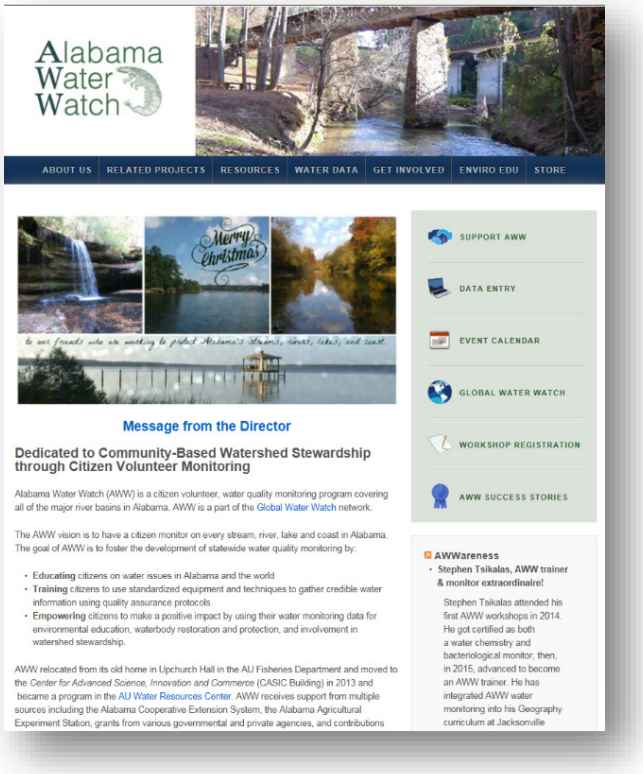
Table 4. Citizen groups that submitted data to AWW from January 1, 2016 to December 31, 2016 listed by major watershed (*asterisk indicates groups that were active in more than one watershed).

No.	Alabama [01]	No.	Tallapoosa [07]
1	Autauga Creek Improvement Committee	30	Alabama Water Watch Friends
		31	City of Opelika
		32	Coast Guard Auxiliary/Montgomery
	Cahaba [02]	33	E Cubed
2	4-H AWW Bibb County	34	Engineers Without Borders AU
3	BBG-Girls Scout Troop 31017	35	Environmental Awareness Organization
4	Friends of Shades Creek	36	Friends of Chewacla-Uphapee Watershed
5	University of Montevallo Environmental Club	37	Friends of Hodnett Creek
		38	Lake Watch of Lake Martin
		39	Lake Wedowee Property Owners Assoc.
	Chattahoochee [03]	40	Mill Creek WMP
6	4-H AWW Chambers County	41	Save Our Saugahatchee
7	Friends of Lake Eufaula	42	SIFAT
8	Harding Water Watch		
9	Mill Creek Watershed Management Plan		
10	Moore's Creek Watershed Management Plan		**Tennessee [08]**
11	Phenix City Engineering Department	43	Albertville High School Geology Class
		44	Flint Creek Citizens
		45	Geraldine High School FFA
	Coastal Plain [04]	46	Guntersville High School FFA
12	Coastal Plain Streams Water Watch	47	Huntsville Senior Environment Corps
13	Ono Island Canal Owners Association	48	Limestone County RSVP
14	Wolf Bay Watershed Watch	49	Marshall County RSVP *
		50	North Sand Mountain School
		51	Sardis High School FFA
	Coosa [05]	52	Scott Branch Water Watch
15	Fort Payne FFA		
16	Friends of Terrapin Creek		
17	Jacksonville River Monitors		**Tombigbee [09]**
18	Lake Jordan HOBO	53	4-H AWW Washington County
19	Lake Mitchell HOBO	54	ADEM-NPS
20	Lay Lake HOBO		
21	Logan Martin Lake Protection Assoc.		
22	Weiss Lake Improvement Association		**Black Warrior [10]**
		55	Blount County SWCD
		56	Friends of Locust Fork River
	Mobile [06]		Friends of Shades Creek *
23	4-H AWW Baldwin County		Marshall County RSVP *
24	Citronelle High School	57	Sassafras Center for Arts and Environment
25	City of Daphne	58	Smith Lake Civic Association
26	Dog River Clearwater Revival	59	Smith Lake Environmental Preservation Committee
27	Fowl River Area Civic Association	60	University of Alabama Environmental History Program
28	Mobile Baykeeper	61	Watercress Darter Water Qual. Mon. Program
29	Weeks Bay Water Watch	62	Winston Co. Smith Lake Advocacy Inc.
		63	Woodland Hills Foundation

A summary of the water chemistry data records and bacteria data records submitted annually and the number of active monitors and number of active AWW groups is presented in the figure below for 1992 through 2016.



AWW received requests for various materials and information. All requests, 12 official requests for AWW data and/or guidance, were accommodated. Additional requests for data, sample site information, the new AWW infographic poster, publications and brochures were received from citizens (Alabama and out of state), educators, AWW monitoring groups, universities and government agencies. Items requested included copies of the Bacteriological Monitoring, Chemistry Monitoring and Stream Biomonitoring manuals, copies of the *Exploring Our Living Streams* curriculum, volumes from the *Citizen Guide to Alabama Rivers* series, volumes from the AWW Waterbody Report series, copies of *Community-Based Water Monitoring – A Practical Model for Global Watershed Stewardship* and various brochures and pamphlets. Numerous AWW publications were distributed during conferences, group meetings, workshops and other events.



Publications are available in digital form from the AWW website at www.alabamawaterwatch.org under RESOURCES.

Requests for information and guidance on volunteer water quality monitoring and for citizen water quality data were received and accommodated in a timely matter. All requested AWW data were submitted to ADEM. ADEM utilizes AWW data to prioritize their field sampling efforts, as well as in their TMDL and 303(d) List development. Additionally, special data sets and information were submitted to several organizations and governmental entities, including:

- Alabama Department of Environmental
- Geological Survey of Alabama
- Auburn University
- Mobile Bay National Estuary Program
- Lee County Highway Department
- City of Auburn
- City of Opelika
- Natural Resources Conservation Service
- Mobile Baykeeper
- Jacksonville State University
- Florida Oceanographic Society
- Panhandle Watershed Alliance (FL)

AWW water monitoring data are available online and can be accessed via the internet. Scores of monitors, along with others throughout the state, review and explore their water chemistry and bacteriological data using the AWW online database and associated data visualization tools (graphs and maps). AWW staff also use these features to work with monitors in data quality assurance, as well as for preparing data interpretation presentations for various citizen monitoring groups on waterbodies throughout Alabama.

5. CONFERENCES AND OUTREACH PRESENTATIONS

Numerous meetings and outreach events were held during this report period in which AWW staff represented the program by expanding partnerships, promoting public relations, and supporting AWW groups.

Data interpretation sessions are meetings where AWW personnel and citizen monitors present, discuss and interpret water quality results obtained by an AWW group (or groups) monitoring their local waterbody. The sessions serve as a summary of years of monitoring effort and put the group's work into a larger context. Citizens are able to share information about sites in their watershed and discuss future monitoring plans. Two data interpretation sessions were presented during 2016, one with Smith Lake Civic Association near Jasper, AL, and another with Smith Lake Environmental Protection Committee in Dodge City, AL.

John Kulbitskas, President of SLCA, introducing Eric Reutebuch, AWW Director, to a full house of nearly 100 for a Smith Lake 'State of the Lake Address' in January 2016.

Several conferences were attended during 2016 where the AWW staff represented the Program either by giving presentations or as attendees. A list of the most significant presentations at conferences by AWW staff is shown in Table 5 below.

Table 5. Presentations at conferences by AWW staff in 2016.

Date / Place	Event	Description
2/27/2016, Camp McDowell, AL	Environmental Education Association of Alabama	Mona Dominguez, Bill Deutsch, along with Stephen Tsikalas and Thomas Eyeler from Jacksonville State University, gave a presentation titled *Water Quality Monitoring and the Science Classroom* at the 2016 EEAA Conference.
5/11/2016, Auburn University, AL	Auburn University Stormwater Symposium	Eric Reutebuch gave a presentation titled *AWW Water Quality Monitoring: Application at the Municipal, County and State Level* at the First Annual Auburn University Stormwater Symposium.
5/22/2016, Mobile, AL	River Network River Rally	Bill Deutsch, Sergio RuizCórdova, Mona Dominguez, Miriam Ramos-Escobedo and Omar Romagnoli gave a presentation titled *Community-Based Approaches to River Monitoring* at the River Network River Rally.
6/8/2016, Auburn University, AL	Annual Meeting of the Alabama Chapter of the Soil and Water Conservation Society	Eric Reutebuch gave a presentation titled *Who's watching the water - Community-based watershed stewardship in Alabama'* at the Annual Meeting of the Alabama Chapter of the Soil and Water Conservation Society.

Table 5. Presentations at conferences by AWW staff in 2016.

6/25/2016 Auburn University, AL	AWW Annual Gathering/Conference	Eric Reutebuch gave a presentation, *AWW Program Updates*; Rita Grub followed with updates on the AWW office staff and AWW trainers; followed by Mona Dominguez with a presentation, *4-H Alabama Water Watch Update*, followed by Sergio Ruiz-Cordova with a presentation, *Water Data and Database Update* at the AWW Annual Gathering/Conference.
9/9/2016, Orange Beach, AL	Alabama Water Resources Conference	Eric Reutebuch and Jenny Powers gave a presentation titled *America's Amazon – The Making of an Infographic Worthy of Alabama's World Class Aquatic Biodiversity* at the Alabama Water Resources Conference.

Eric and Jennie featuring the new infographic at the 2016 AL Water Resources Conference (for details, see *America's Amazon – Alabama the Beautiful* Infographic at http://wp.auburn.edu/aww/aww-infographic-2-0).

How does AWW achieve these things? The Number 1 ingredient: scores of concerned Alabamians who care about their water and watersheds, and who are willing to get involved to preserve and protect them. Ingredient Number 2: a dedicated, experienced, stable staff that is committed to the waters and the volunteer water monitors and trainers throughout the state. Ingredient Number 3: a strong commitment from both the Alabama Cooperative Extension System and the Alabama Agricultural Experiment Station to support the AWW Program and AWW citizen monitors and trainers in their watershed stewardship efforts.

The AWW Annual Gathering/Conference was held at the CASIC Building on June 25, 2016. Participation was robust with 75 AWW monitors, trainers and supporters in attendance, as well as

special guests Dr. Patterson, Director of the Alabama Agricultural Experiment Station and Dr. Brown, Associate Director of the Alabama Cooperative Extension System. Both Dr. Patterson and Dr. Brown voiced their support, praising AWW as a highly effective program that positively impacts the lives of Alabamians.

Dr Patterson, Dean of the College of Agriculture and Director of the Alabama Agricultural Experiment Station System, commending AWW volunteer trainers and monitors on their efforts in protecting the state's waters, and how these efforts complement the mission and efforts of the Agricultural Experiment Station in promoting innovative, sustainable management of Alabama's land and water resources.

As in years past, AWW recognized volunteer monitors, trainers and groups for their outstanding efforts in watershed stewardship during the past year. 2016 winners were:

- AWW Lifetime Achievement Award: **Dick and Mary Ann Bronson**, for over three decades of watershed stewardship including AWW water monitoring, training, formation of Lake Watch of Lake Martin, environmental activism at the local, state and regional level, environmental education with 1000's of school children, and spearheading the effort for the establishment of Treasured Alabama Lake designation for Lake Martin – JOB WELL DONE!

- Mullen Award: **Marty Schulman**, with 77 data records (that's > 1 monitor event per week!), many of which were collected in an effort to protect the habitat of the Watercress Darter, an endangered fish found in only a few springs in the Birmingham area. In addition to sampling, Marty has been helping with water quality educational programs for youth in conjunction with the Village Creek Society.
  - *First runner-up*: **Roger Martin**, Chattahoochee RiverWarden – 66 records
  - *Second runner-up*: **Aren Calton**, Little Lagoon Preservation Society – 60 records

- *Third runner-up*: **Sydney Smith**, Environmental Awareness Organization, SOS, Engineers Without Borders, and Moores Creek Watershed Mgmt Plan – 59 records
- *Fourth runner-up*: **Bill Boozer**, Lake Wedowee Property Owners Association – 54 records.

- Group of the Year Award: **Coastal Plains Streams Water Watch**, with 393 records submitted (that's more than a sampling event every day)!
  - *First runner-up*: RSVP Marshall County – 327 records
  - *Second runner-up*: Wolf Bay Watershed Watch – 216 records
  - *Third runner-up-A* (tie): Logan Martin Lake Protection Association – 182 records
  - *Third runner-up-B* (tie): Save Our Saugahatchee – 182 records.

- Trainer of the Year Award: **Sydney Smith**, for conducting 9 workshops in 2016!
  First runner-up: **Homer Singleton**, Wolf Bay Watershed Watch – 8 workshops
  Second runner-up: **Flo Peters**, Montevallo Presbyterian Church – 7 workshops
  Third runner-up: **Mike Shelton**, Weeks Bay National Estuarine Research Reserve and Weeks Bay Water Watch – 6 workshops
  Fourth runner-up: **Francine Hutchinson**, Friends of Terrapin Creek and Anniston Museum of Natural History – 6 workshops.

New Awards presented in 2016 included:

- Creative Volunteerism Award: **Jennie Powers**, for her creation *America's Amazon – Alabama the Beautiful* infographic poster.

- 4-H AWW Club of the Year Award: **4-H AWW Washington County Club**. The group began in April of 2015, thanks to AWW Volunteer Trainer Flo Peters who encouraged her brother, HB Taylor, to start monitoring with his granddaughters in their hometown of Chatom. The newly hired Washington County 4-H Foundation Regional Extension Agent, Sabra Johnson, supported the efforts to start 4-H AWW in the area. Thanks to the support of Flo, HB, and Sabra this group has been active and growing ever since. They've turned in over 40 data records and have already made a difference in local water quality.

4-H AWW Club of the Year – 4-H AWW Washington County Club

AWW monitors, trainers, supporters and program staff at the 2016 Annual Meeting.

For more information on the AWW Annual Meeting, go to AWW on solid ground thanks to AAES and ACES support, AWW Lifetime Achievement Award presented to Dick and Mary Ann Bronson, and 2016's Award Winning Water Watchers in the *AWWareness* blog, http://wp.auburn.edu/aww/ .

6. ACCOMPLISHMENTS AND INITIATIVES

Grant Proposals (8)

- *Practical Approach to Implementing Farm Bacterial Testing in Support of the FSMA Produce Safety Rule*, $41,913, submitted to: Center for Produce Safety by Puneet Srivastava, Yucheng Feng, Kristin Woods, Sarmistha Singh and Eric Reutebuch in March 2016 (unfunded).

- *Evaluating Practical Approaches for Farm Bacterial Testing in Support of the FSMA Produce Safety Rule*, $50,000, submitted to AAES AgR SEED Program by Puneet Srivastava, Yucheng Feng, Sarmistha Singh and Eric Reutebuch in May 2016 (funded).

- *4-H Alabama Water Watch Program: Using Citizen-Science to Engage Youth in Watershed Restoration and Protection*, $241,553, submitted to: ADEM Clean Water Act Section 319(h) FY2017 Nonpoint Source Watershed Project Funds by Mona Dominguez in July 2016 (pending).

- *Alabama Water Watch Watershed Stewardship Focused on Protection and Restoration of Lakes and Reservoirs in Alabama*, $221,436, submitted to: ADEM Clean Water Act Section 319(h) FY2017 Nonpoint Source Watershed Project Funds by Eric Reutebuch in July 2016 (pending).

- *New Tools in Conservation Biology: Combining Citizen Science and Environmental DNA (eDNA) to Monitor Aquatic Biodiversity*, $1,364,149, submitted to: NASA Research Opportunities in Space and Earth Sciences (ROSES) by Brian Helms, James Godwin, Kenneth Halanych, Michael Barbour, and Eric Reutebuch in July 2016 (pending).

- *Meeting Farmers at the Farm: Tailgate Trainings and Individualized Technical Assistance for Small Farmers*, $44,589, submitted to: Southern Extension Risk Management Education by Karen Wynne, Lee McBride, Jayme Oates, and Eric Reutebuch in November 2016 (pending).

- *Integrating Mushroom and Vegetable Production with Free-Range Poultry Production*, $258,073, submitted to: Southern Region SARE Research & Education Grant Program by Puneet Srivastava, Jasmeet Lamba, Ramon Shirk Shange, Ayanava Majumdar, Joseph Kemble, William T. East Jr. and Eric Reutebuch in November 2016 (pending).

- *Strategic Planning and Research in Support of NIDIS Drought Early Warning System for the Southeast*, submitted to: National Integrated Drought Information System, $130,000 by Puneet Srivastava, Chris Martinez, Eric Reutebuch and Subhasis Mitra in November 2016 (pending).

<u>AWW Promotional Video</u>

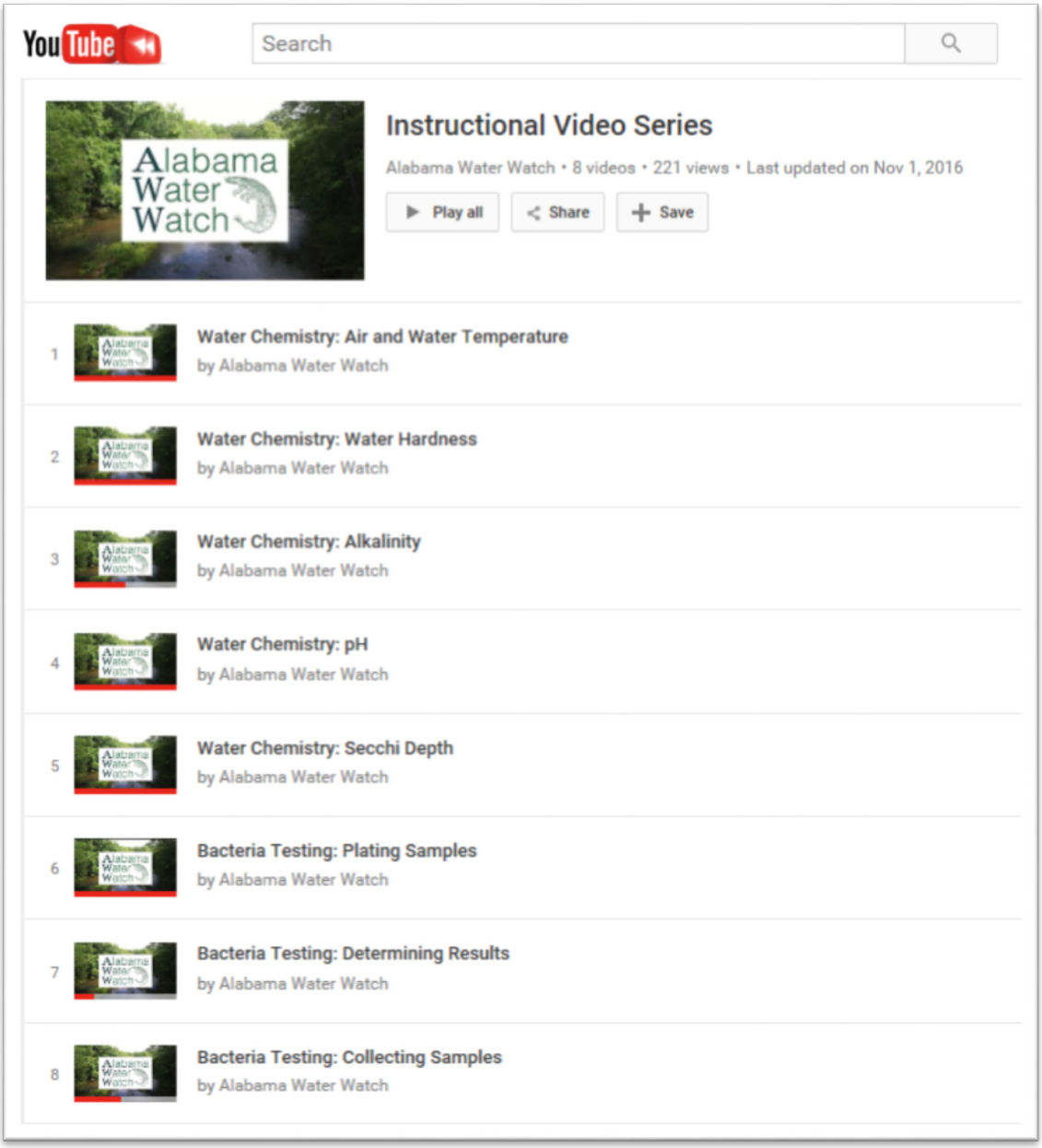
An AWW promotional video was created in collaboration with Josh Woods/AU College of Ag Communications and Marketing. The video was the result of the AWW Program's proposal for *Tiger Giving Day* being selected as the program to be featured from the Alabama Agricultural Experiment Station. Goals of the video and the proposal are to:

1. raise funding to provide AWW monitors with water testing supplies specifically to adopt orphan AWW monitoring sites or new sites, and,
2. to reach out to a broader array of individuals throughout the State who may be interested in joining and/or supporting AWW efforts.

To view the promotional video, go to:
https://www.youtube.com/watch?v=OEwfvVak9ks&feature=youtu.be

AWW Instructional Videos

AWW created a series of YouTube videos demonstrating monitoring techniques. These can be viewed by AWW monitors who need a quick refresher at any time, available on the AWW website at: www.alabamawaterwatch.org/resources/videos/ :



MeOWW

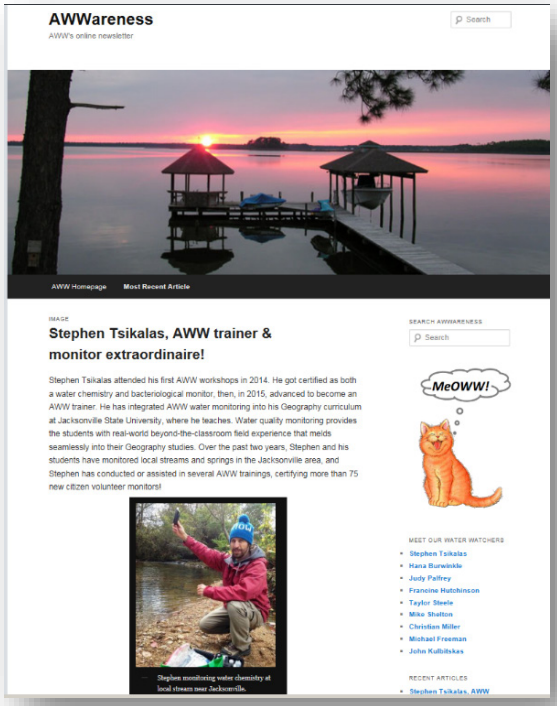
AWW initiated a regular addition to the *AWWareness* blog, Meet Our Water Watchers, or *MeOWW* in 2015. *MeOWW* serves multiple purposes:

- to showcase AWWs unsung champions who have devoted tremendous time, talent and treasure to promote watershed stewardship in Alabama,

- to showcase the water monitoring group efforts of these AWW champions in preserving and protecting local waters, and,
- to provide motivation to other volunteer monitors and groups throughout the state through stories of dedication to watershed stewardship.

MeOWW featured 6 exceptional Water Watchers in 2016:

- **John Kulbitskas**, AWW trainer & monitor extraordinaire!
- **Sydney Smith**, AWW trainer & monitor extraordinaire!
- **Judy Palfrey**, AWW trainer & monitor extraordinaire!
- **Christian Miller**, AWW trainer & supporter extraordinaire!
- **Homer Singleton**, AWW trainer & monitor extraordinaire!
- **Stephen Tsikalas**, AWW trainer & monitor extraordinaire!



Publications

During this report period, the AWW staff wrote or contributed to 16 articles that were posted on the AWW *AWWareness* blog, and numerous others submitted for publication in other media, *Lake Magazine*, and in the *Alabama Fisheries Association Newsletter* (see examples below). Many of these articles highlight the "Success Stories" of AWW groups and monitors. AWW blog articles can be accessed at the AWW website or at this link: http://blog.auburn.edu/aww.

- *Stephen Tsikalas, AWW trainer & monitor extraordinaire!*
- *Homer Singleton, AWW trainer & monitor extraordinaire!*
- *New AWW Instructional Videos – they're AWW-some!*
- *Au Revoir, Keep It Flowing! A Message from Rita*
- *Christian Miller, AWW trainer & supporter extraordinaire!*
- *Judy Palfrey, AWW trainer & monitor extraordinaire!*
- *2016's Award Winning Water Watchers*
- *AWW Friends and Volunteers Recognized with Spirit of Sustainability Awards*
- *AWW on solid ground thanks to AAES and ACES support*
- *AWW Lifetime Achievement Award presented to Dick and Mary Ann Bronson*
- *Sydney Smith, AWW trainer & monitor extraordinaire!*
- *AWW Infographic 2.0*
- *AWWsome Infographic!*
- *Memoirs of a Water Monitor*
- *AWW emerges on solid ground*
- *Smith Lake folks enthusiastic about lake stewardship!*

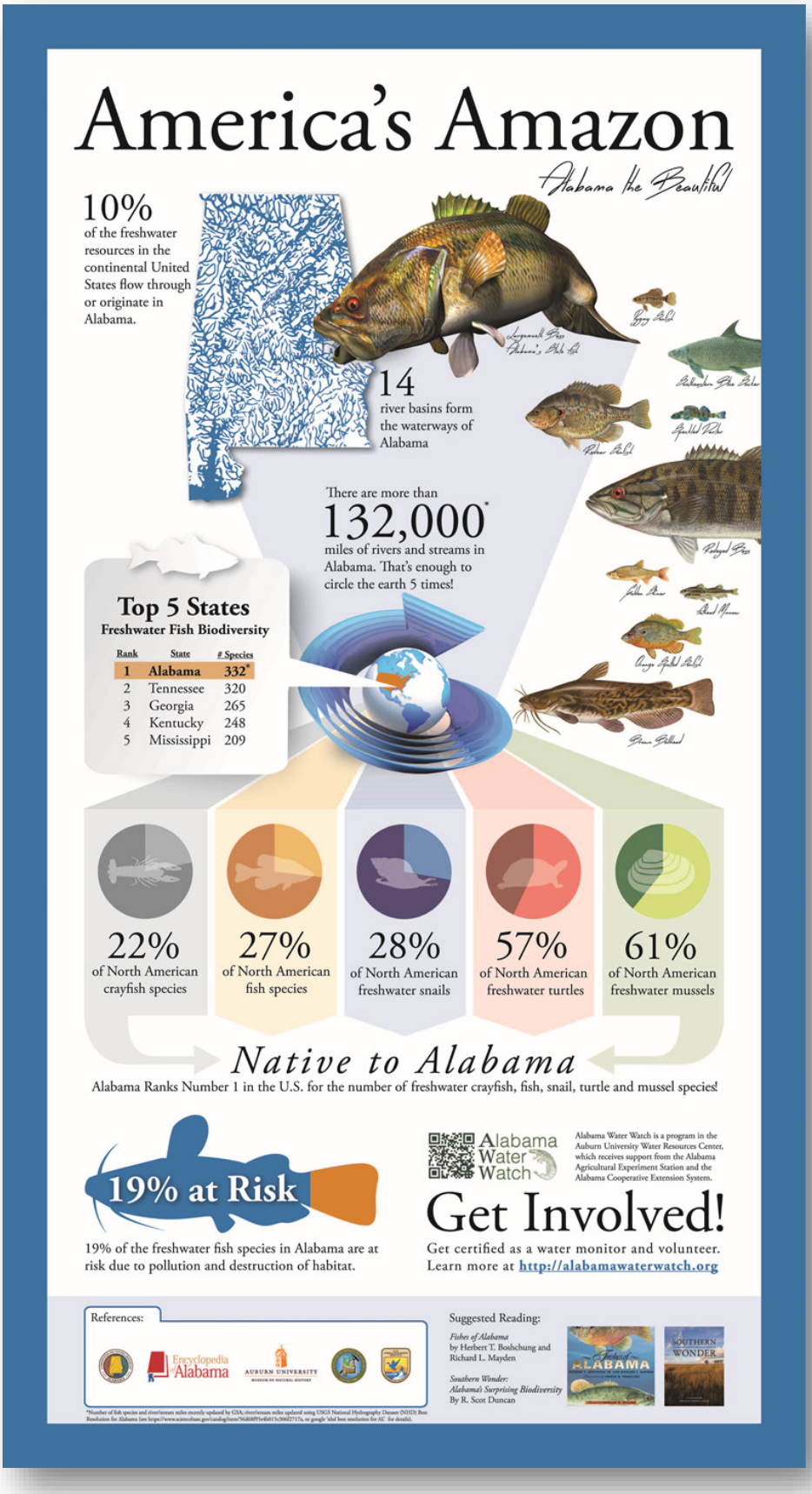
AWW Infographic

AWW developed an infographic poster featuring Alabama's world-class aquatic biodiversity, titled *America's Amazon – Alabama the Beautiful* (see next page). The infographic was designed by Jennie Powers, Information Technology Specialist working for both the Harbert College of Business and the College of Agriculture at AU. The infographic beautifully depicts the abundant aquatic resources of Alabama, its premiere aquatic biodiversity: number one among all 50 states in number of fish species, crayfish species, mussel species, aquatic snail species, and turtle species.

The first iteration of the poster was sent out for review, and received rave reviews. It also generated a statewide dialogue on estimates of Alabama's vast aquatic resources. Some estimates, like the 77,000-plus stream and river miles in the state (dating back to the 1990's), were long overdue for an update. The Geological Survey of Alabama's GIS specialist, Anne Wynn, performed a GIS analysis on new-and-improved GIS data (USGS National Hydrography Dataset (NHD) Best Resolution for Alabama, which yielded a much larger value of 132,000^{+} miles! Longtime GSA biologist and Director of GSA's Water Investigations Program, provided updates on fish species. Paul Johnson, Director of the Alabama Aquatic Biodiversity Center, provided updated information on aquatic mussels and snails. Auburn University's Natural Heritage Program and Museum of Natural History faculty members, James Godwin and Brian Helms provided updated information on crayfish and turtles. Thanks to their expert contributions, the infographic was updated with the most current information on Alabama's vast array of aquatic resources.

The infographic also conveys the fact that these species are at risk, and one way to help preserve and protect them is by joining the ranks of AWW. Along with presenting on the development of the infographic and the new aquatic resources information that it conveys at the 2016 Alabama Water Resources Conference, the AWW Office printed a dozen posters and disseminated a limited number of posters to state parks, environmental education centers, and Extension offices. The Alabama Museum of Natural History in Tuscaloosa, AL created a beautiful display showcasing the AWW infographic (pictured at right).

The infographic is being used in schools to teach youth about the aquatic treasures inhabiting their local streams and rivers, and that some of these creatures are so unique and rare that they may exist in only a few locations in Alabama, and nowhere else in the world. Ms. Cook, pictured to the left, is teaching students from Leinkauf Elementary in Mobile using the infographic featured at the Dauphin Island Sea Lab.

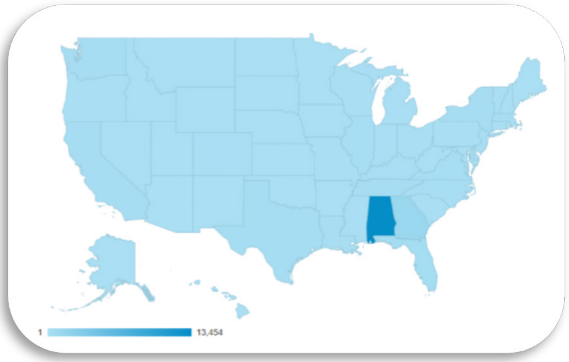

America's Amazon
Alabama the Beautiful
10%
of the freshwater resources in the continental United States flow through or originate in Alabama.
14
river basins form the waterways of Alabama
There are more than
132,000*
miles of rivers and streams in Alabama. That's enough to circle the earth 5 times!
Top 5 States
Freshwater Fish Biodiversity
Rank State # Species
1 Alabama 332*
2 Tennessee 320
3 Georgia 265
4 Kentucky 248
5 Mississippi 209
22%
of North American crayfish species
27%
of North American fish species
28%
of North American freshwater snails
57%
of North American freshwater turtles
61%
of North American freshwater mussels
Native to Alabama
Alabama Ranks Number 1 in the U.S. for the number of freshwater crayfish, fish, snail, turtle and mussel species!
19% at Risk
19% of the freshwater fish species in Alabama are at risk due to pollution and destruction of habitat.
Alabama Water Watch
Alabama Water Watch is a program in the Auburn University Water Resources Center, which receives support from the Alabama Agricultural Experiment Station and the Alabama Cooperative Extension System.
Get Involved!
Get certified as a water monitor and volunteer.
Learn more at http://alabamawaterwatch.org
References:
Encyclopedia of Alabama
AUBURN UNIVERSITY
Suggested Reading:
Fishes of Alabama
by Herbert T. Boshchung and Richard L. Mayden
Southern Wonder:
Alabama's Surprising Biodiversity
By R. Scot Duncan
SOUTHERN WONDER

AWW Website

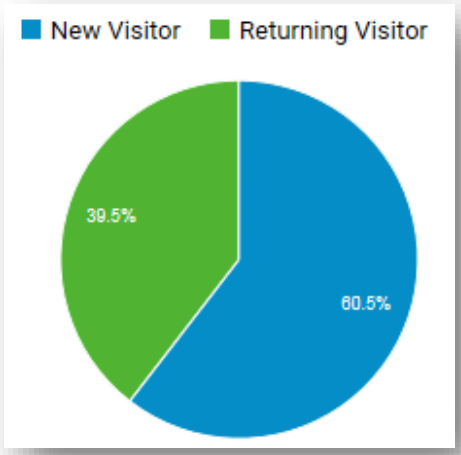
The AWW website continues to be a resource for monitors, interested citizens and agencies. The AWW website has received thousands of visits since it was posted on the internet in August 1998. The *Water Data* section of the AWW website has been an extremely useful tool for monitors and citizens throughout Alabama, and people in other states and over 80 other countries (see www.alabamawaterwatch.org and click *Water Data*). Visitors to the *Water Data* webpages can view data from groups, sites, watersheds and waterbodies. Interactive Google™ maps show monitoring sites by river basin, and allow the public to locate sites and view water data within their areas of interest. Charts, graphs and tables provide multiple ways to view data.

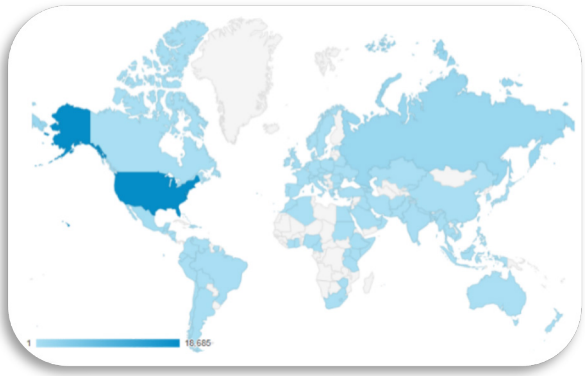
Website Analytics: The WordPress-based AWW website, www.alabamawaterwatch.org, went live on August 25, 2015. The site was visited by a wide array of people from across the globe in the past year (Jan 1 – Dec 31, 2016). Here is a summary of these visits:

- 61,437 page views (over 3,000/month),
- Viewed by 50 of 50 states (see graphic at right),
- Viewed by 112 countries worldwide (below),
- 23,274 sessions by 14,240 unique users,
- average visit of 2.7 minutes,
- 60.5% of visits were new visitors.



Domestic visits to the AWW website





Global visits to the AWW website

7. RELATED PROJECTS & INITIATIVES

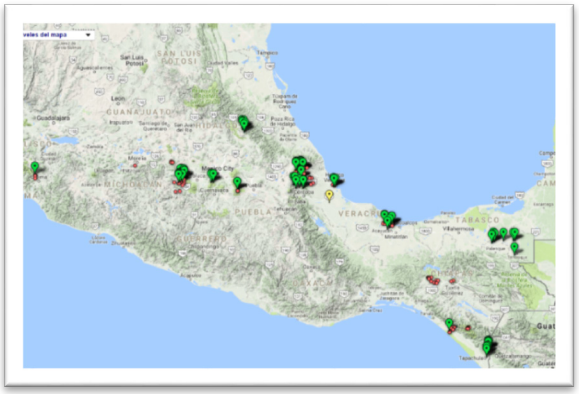
Several related projects allow the AWW program to expand its efforts by providing the means to educate citizens about watershed stewardship, encouraging and enabling them to participate in watershed management and other projects designed to protect their local water resources. Numerous meetings and activities were held during this report period; many of these were funded by other projects in which AWW staff represented the program. These activities developed valuable partnerships, enhanced public relations, and supported numerous groups while promoting community-based watershed stewardship. Below is a brief description of these projects.

A. Global Water Watch (GWW)

Global Water Watch (GWW) fosters Community-Based, Science-Based Watershed Stewardship (CBWS), through the development of long-term citizen volunteer monitoring of surface waters for determining the condition and trends of water quality and quantity, and for the improvement of both public health and watershed health. CBWS is a participatory process of linking community groups to low-cost and reliable appropriate technologies to obtain credible data, which appropriately analyzed, is transformed to local knowledge that can be used throughout the world via translation to local dialects for implementing environmental education programs, understanding, protecting, restoring and managing watersheds. This information has the potential to enhance planning and action by local grassroots organizations and natural resource agencies.

GWW website at www.globalwaterwatch.org.

The GWW Program has been coordinated from Auburn University (AU) for more than 20 years, and is based in the AU Water Resources Center (www.aaes.auburn.edu/water). Monitoring protocols are documented in Quality Assurance/Quality Control Plans approved by the USEPA for citizen water testing (water chemistry and bacteriological monitoring). Following the AWW model and beyond Alabama, GWW has certified about 1,300 citizen monitors who have submitted more than 8,000 water quality and quantity data records from about 500 sites on 200 waterbodies. Intensive training and monitoring activities were conducted in Mexico as part of a large, 5-yr project funded by the World Bank, whose representatives conducted a field visit to this site and were very pleased with the GWW work. Data are stored in a customized, online database, which can be accessed by monitors, educators and the general public to analyze, graph, map, share and retrieve summarized data in a variety of ways. GWW projects have led to improved public health, positive impacts on local and national water legislation, and local, regional and national environmental awards.



GWW-Mexico water quality sample sites

GWW-CBWS activities integrate with fisheries, agriculture, animal production, food security, forestry, education, water resource management, health, and other actions; while addressing crosscutting themes of sustainability, integration,

private-sector engagement and role of gender. Currently, active community-based water monitoring programs are being implemented in several countries throughout the world, including: Argentina, Bolivia, Kenya, Mexico, Peru, and the state of Washington in the USA. To learn more about the GWW program visit www.globalwaterwatch.org.

B. 4-H Alabama Water Watch Program

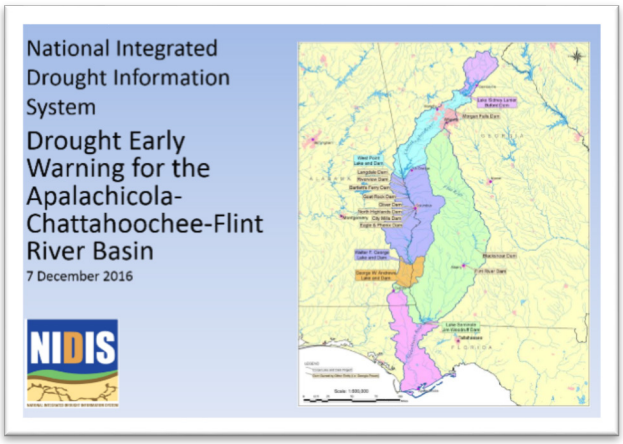
The 4-H Alabama Water Watch Program (4-H AWW) is the statewide youth volunteer water quality monitoring program created through a partnership between Alabama Water Watch and Alabama 4-H, the youth development program for the Alabama Cooperative Extension System (ACES). Qualified volunteers and educators lead students in credible data collection and watershed stewardship activities.

4-H AWW teaches Aubie about the importance of watershed stewardship during an outreach event hosted by the AU School of Forestry.

4-H AWW increases environmental literacy by building capacity in volunteers and educators to provide youth with an increased awareness and understanding of watershed issues and tools that cultivate the critical thinking skills students need to identify and solve problems related to water quality. As students engage in water monitoring activities they are able to interpret the health of local waterbodies, and then to make decisions and offer solutions that will contribute to the maintenance and restoration of the local watershed. With this goal in mind, the 4-H AWW Program accomplished the following outcomes in 2016:

- 65 educators including teachers, 4-H staff, and volunteers were trained to utilize the *Exploring Our Living Streams* curriculum during three workshops,
- 1,500^{+} youth were reached through 4-H AWW outreach and education activities,
- 105 youth were certified as 4-H AWW water quality monitors,
- 75 data records were submitted to the AWW database by 4-H AWW groups,
- A new edition of the *Exploring Our Living Streams* curriculum which, in addition to the original stream biomonitoring modules, includes new modules related to water chemistry monitoring and data analysis, was developed and printed,
- The online AWW Citizen Science Data Simulation tool was developed to provide a way for volunteers, including students, to learn to enter, analyze, and interpret water data,
- The 4-H AWW Program received support from the EPA Office of Environmental Education, for the two-year project ($91,000) ***Increasing Environmental Literacy and Watershed Stewardship through Youth-Focused Citizen Science***.
- The partnership between 4-H AWW Program and the EPA Gulf of Mexico Program Office continues to grow.

C. NIDIS Project



The AU Water Resources Center is working with the National Integrated Drought Information System (NIDIS) to better inform and prepare Alabama and the Southeast for the many challenges of periodic droughts. Drought research and outreach efforts are highlighted by hosting a monthly drought webinar (which is increased to twice a month during drought conditions). The webinar focuses on weather, climate, surface and groundwater conditions and forecasts in the Apalachicola-Chattahoochee-Flint River Basin in Alabama, Georgia and Florida, though the information extends over much of the Southeast. A summary is compiled following each webinar and shared with more than 300 stakeholders throughout the southeast. Drought webinars are posted on the AU Water Resources Center webpage under the *EXTENSION/OUTREACH* menu (see http://aaes.auburn.edu/wrc/extension-outreach/drought/).

Other project efforts focus on the various components of the NIDIS Drought Early Warning System (DEWS) including education and outreach and drought preparedness. The AU Water Resources Center is actively working to broaden its NIDIS drought information network to provide water resources managers, policy makers, and the public the best information available to prepare for periodic drought impacts. Dr. Srivastava, pictured at left, is providing information on NIDIS and the drought to stakeholders in Apalachicola, FL.

D. EPA Environmental Education Project

Increasing Environmental Literacy and Watershed Stewardship through Youth-Focused Citizen Science, is a 2-year project funded by the EPA Office of Environmental Education with the goal of building capacity within the 4-H Alabama Water Watch Program (4-H AWW) to provide educators with the training, materials, and support needed to increase environmental literacy for youth (ages 9 – 18) and engage them in watershed stewardship through water monitoring.

In 2016, several major project objectives were accomplished:

1) Development of 4-H AWW Exploring Our Living Streams: An Introduction to Watershed Stewardship, Stream Biomonitoring, and Water Chemistry Monitoring curriculum was completed in May 2016. This curriculum guides educators as they provide students with hands-on citizen science experiences focused on conducting water chemistry analysis and biomonitoring in their local communities. An online Citizen Science Data Simulation (CSDS) was developed to be used alongside or separately from the EOLS curriculum. The AWW CSDS provides interactive activities that teach how to enter data, create simple graphs, and analyze and interpret water data collected by volunteer monitors. The CSDS is published on the AWW website https://web.auburn.edu/aww/csds/.

2) Sixty-five educators were trained to utilize the curriculum during four workshops facilitated in partnership with environmental centers throughout the state.

3) AWW Staff has provided support to participating educators as they implement the curriculum by helping them access monitoring materials, managing the AWW website and database, and assisting educators with student trainings.

E. USDA/ Agriculture and Food Research Initiative (AFRI)

AWW staffer sampling a farm stream for bacteria.

The USDA/AFRI project, titled *A Systems Approach to Identifying and Filling Gaps in and Between Knowledge and Practice in Production and Distribution of Local and Regional Foods for a More Secure Food Supply Chain*, is an innovative five-year project based at Auburn University aimed at ensuring the quality and safety of locally and regionally produced meat. This USDA-funded project is led by a multidisciplinary team of professors and extension specialists at AU and Tuskegee who specialize in animal sciences, agriculture economics, food safety, supply chain analysis, marketing, sociology, business, and environmental sciences. The project goal is to identify consumer perceptions about locally/regionally produced foods and compare that to the perceptions of the farmers/producers. The information will then be evaluated to develop guidelines and practices aimed toward improving food safety and build teaching modules to deliver the information to farm operators.

The first phase of the project consists of data collection—on-site, environmental bacterial sampling of troughs, barns and equipment as well as microbial sampling of streams located on or near each

farm to evaluate water quality. This phase of the project has been completed, and data compilation and analyses are underway, as well as educational material development.

F. Alabama Water Resources Research Institute Project

The Alabama Water Resources Research Institute (WRRI)-funded project, titled *Identification of pollution sources on agricultural farms and evaluation of new fecal indicators for surface water quality monitoring*, paired AWW staff with AU researchers to evaluate water quality on livestock farms. Luxin Wang, microbiological researcher at AU, and Eric Reutebuch, Director of the Alabama Water Watch Program, received a one-year grant from the Alabama WRRI to sample farms in east Alabama.

Dr. Wang, Patty Tyler, graduate students and AWW staffers sampling a farm stream for bacteria.

A recent study conducted by Wang and Reutebuch (unpublished) found that the *E. coli* concentrations downstream of cattle farms were significantly higher than the *E. coli* concentrations upstream of the farms. These results indicated that on-farm management and good agricultural practices need to be improved in order to lower the fecal contamination of surface water. The genus *Bacteroides* has been suggested as an alternative fecal indicator to replace *E. coli* or fecal coliforms because they make up a significant portion of the fecal bacterial population. Most importantly, *Bacteroides* are host specific and can be used as to track the contamination sources. **Objective 1** of this research was to identify water contamination sources by collecting and analyzing surface water samples (upstream and downstream) from different farms and detecting host specific *Bacteroides* groups via real-time PCR assays.

Because of concerns with using *E. coli* as the indicator organisms, several other genera have been proposed for use as an alternative indicator for fecal contamination of surface waters. One of them is *Enterococcus*. An epidemiological study performed by U.S. EPA demonstrated a direct relationship between increase in density of *E. coli* and *Enterococci* in surface waters, and an increase in swimmer-associated gastroenteritis. For freshwater, the current single-sample advisory limits are 235 CFU/100 ml for *E. coli* and 61 CFU/100 ml for *Enterococci* (U.S. EPA, 2000). Another recent study conducted by Wang and Reutebuch (unpublished) found that the concentrations of *Enterococci* present in recreational waters were higher than *E. coli*, which suggested that *Enterococcus* may serve as a better indicator microorganism for monitoring fecal contamination in fresh waters, and possibly a better indicator for AWW volunteer monitors to use. Because the higher the concentration of the indicator microorganisms, hence, the better the chance of recovering them, *Enterococcus* might possibly improve AWW bacterial enumeration reliability.

Objective 2 was to investigate the development of a water monitoring protocol that is credible and easy-to-use for AWW water quality monitoring groups using *Enterococci* as the indicator microorganism. We also investigated the feasibility and reliability of volunteer monitors using *Bacteriodes* as an indicator of fecal contamination. Field sampling was completed in 2016.

Results indicated no differences among the three *E. coli* enumeration methods. Therefore, the Coliscan® Easygel method (agar plate method used by AWW) was used to evaluate the impact of sampling times and sample types on the enumeration of *E. coli*. Field sampling results showed that both the sampling times and sample types may impact the enumeration results, regardless of the indicator microorganisms used. When samples were collected in the afternoon, the surface water samples contained more indicator microorganisms than samples collected in the morning. Sediments contained more indicator microorganisms than the surface water and impacted the surface water monitoring results. The comparison of four *Enterococci* enumeration protocols showed that while the Easygel Card™ method had the lowest cost ($1 per sample), the USEPA qPCR Method 1611 ranked the highest among all tested methods based on the shorter processing time needed (~ 4 hours) and the widest detection range (2.47-8.47 log CFU/mL for surface water and 2.47-8.47 log CFU/g for sediment). Because of this, different DNA extraction methods were tested and compared to prepare samples for the qPCR protocol. Results showed that, for surface water samples, the PrepMan® boiling procedure can substitute for the DNA extraction procedure used by the USEPA qPCR Method 1611, however, for sediment samples, the PowerSoil® DNA Isolation Kit cannot be replaced by the PrepMan® boiling procedure. The results also showed that the USEPA qPCR Method 1611 is an efficient method for enumerating *Enterococcus* both in surface water and sediment.

G. Produce Safety Initiative

The AU Water Resources Center has engaged in multiple initiatives in 2016 in the area of produce safety. The primary emphasis of this effort is to provide assistance to produce farmers in Alabama and the Southeast, particularly in the area of farm water quality testing. In accordance with the Food Safety Modernization Act (FSMA), the Food and Drug Administration (FDA) established new regulations that set forth standards for produce safety known as the Produce Safety Rule (PSR). In the PSR Rule, FDA details new standards for the growing, harvesting, packing, and holding of produce* for human consumption which minimize contamination of produce and human health hazards (*restricted to produce consumed in its fresh form).

Initiatives included:

1. Pursuing grant funding to validate either the Coliscan® Easygel method currently used by AWW, per FDA's stipulations, or validate a similar method that farmers and citizen monitors can use to monitor *E. coli* in surface waters (see: 6. ACCOMPLISHMENTS AND INITIATIVES - Grant Proposals). The AU Water Resources Center believes that there is potential for farmers conducting on-farm monitoring using the AWW Bacteriological Monitoring protocol, or a variant of it.
2. Staff (E. Reutebuch) participated in a 2-day Produce Safety Alliance Grower Training/Training of Trainer Training conducted by Produce Safety Alliance (PSA) trainers Kristin Woods and Don Stoeckel. Upon completion of the training, Reutebuch became a certified PSA Grower Training trainer. This training is required by FSMA-PSR for produce farmers.

In conclusion, here are a few of the many reasons why we do what we do:

* The Vermillion Darter (*Etheostoma chermocki*), a federally threatened species, is limited in distribution to upper Turkey Creek, a tributary to the Locust Fork of the Black Warrior River system in Jefferson County, Alabama. Existing populations appear isolated in the Birmingham-Big Canoe Valley section of the Alabama Valley and Ridge physiographic province.