Final Report 319 (h)
Grant 19-1400
NPS Pollution Prevention Through Direct Outreach and Digital Media

University of Arkansas System Division of Agriculture
Cooperative Extension Service Washington County
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New life for old lines

Kristina Jones (left), volunteer and community programs coordinator for Fayetteville's Parks and Recreation Department, and Meghan Post, county extension agent and water quality agent for the University of Arkansas System's Division of Agriculture's Cooperative Extension Service, mount a container for waste monofilament fishing line Tuesday at the dock near the Environmental Science Center at Lake Fayetteville. The fishing line is collected from several similar stations in the county and sent to a manufacturer in Iowa for recycling into new line. Go to nwaonline.com/210307Daily/ for today's photo gallery.
(NWA Democrat-Gazette/Andy Shupe)

Top: **Democratic Gazette article on Adopt-A-Bin fishing line recycling project featuring community partner, Kristina Jones**
Bottom left: **Community volunteers posing in front of the finished rain garden installation at Arkansas Arts Academy in Rogers, Arkansas.**
Bottom right: **Rain garden at Arkansas Arts Academy, 2 months after installation**

Introduction of Watershed Area

According to the ADEQ 2018 draft 303(d) list, there are a series of Category 4a, Category 5 and Ecologically Sensitive Waters in the Beaver Reservoir and the Illinois River Watersheds impaired by nutrients, sediment, bacteria, and urban sources (www.adeq.state.ar.us). The Ozark Plateau/Boston Mountain ecoregion is diverse with some heavily sloped areas, karst geology, and a variety of soil types. Washington and Benton counties have the top two agricultural gate receipts across the Arkansas due to the poultry and cattle production. The boundary between the two watersheds runs along the I-49/Highway 71 corridor.

Beaver Lake is the drinking water source for more than 500,000 Arkansans in the Ozark Highlands on the headwaters of the White River. The Beaver Lake watershed is 1,192 square miles in area, and primarily includes portions of Benton, Carroll, Madison, and Washington Counties along with 17 incorporated municipalities. Much of the watershed is forested and rural pasture lands, but urban development from the western boundary of the watershed is rapidly increasing. The upper end of the lake is impacted by turbidity from sediment and algae which affects drinking water quality, recreation, and aquatic habitat (Beaver Lake Watershed Protection Strategy, 2012). Several headwater streams, including the West Fork of the White River, continue to be impaired by surface erosion and nutrient concerns.

The half of the Upper Illinois River Watershed potion in Arkansas lies in Benton and Washington counties. The river flows north and west, crossing into Oklahoma 5 miles south of Siloam Springs, Arkansas near Watts, Oklahoma. The watershed is characterized by rapidly growing urban centers from south Fayetteville to Rogers and Bentonville, in the headwaters, with more rural areas to the west along the Oklahoma border. The Illinois River and its tributaries have designated uses including fisheries, primary and secondary contact recreation, drinking water supply, and agricultural. However, portions have been cited as not meeting these designated uses because of impairment from bacteria, sediment, and/or nutrients (IRWP Management Plan, 2014).

As stated in ADEQ's 2018 4b determinations, the Illinois River and Beaver Lake Watersheds both have management plans in place with several assessment units' places in Category 4b list, namely for pathogens and turbidity. These Watershed Management Plans and their implementation demonstrate the ongoing commitment of the watershed partners (Beaver Watershed Alliance; Beaver Water District; Illinois River Watershed Partnership; UACES) to implement and encourage BMPs, identify appropriate milestones, and promote long-term sustainability of the region.

Problem/Needs Addressed

Northwest Arkansas has experienced tremendous urban growth. From 2000-2010 alone, urban land use increased 72% (from 108 to 187 square miles) accompanying a 71% increase in population. On May 28, 2014, the NWA Metropolitan Statistical Area reached one half million people and continues to add approximately 27 new urban and suburban residents every day. The Urban Institute's Mapping America's Futures project predicts a 58% increase in population between 2000 and 2030, and the U.S. Census Bureau put the Fayetteville-Springdale-Rogers MSA as the 24th fastest growing metro area in the United States from 2018-2019.

The pace of growth in the region is increasing impervious surfaces and altering land use once largely dominated by forest and pasture. Specifically, the pressure of encroaching urban spaces into rural lands presents significant environmental challenges. Existing and reduced green spaces and rural lands can no longer offset this rapidly changing landscape and its impacts on water quality. With the influx of new residents who may not be aware of the region's natural resources and the lack of understanding among the existing population, those impacts affect economics, recreation, and designated uses of waterbodies. The goal to sustain water quality standards and reduce NPS pollutants entering waterways is greater than ever. If not properly managed, the resulting NPS pollution carried by urban runoff is a significant threat to the water quality of receiving streams, pervious green spaces, urban forests, clean water resources, and the long-term sustainability and resilience of the region.

The goals of this project were to develop new video podcasts, conduct stakeholder outreach, provide technical assistance on BMP installation, and demonstrate successful LID/BMP techniques to increase nonpoint source pollution awareness within the Illinois River and Beaver Lake Watersheds. Success was measured based on the completion of the following tasks:

- NPS video podcasts
- Stakeholder participation and feedback in public education and outreach efforts including:
    - BMP education workshops
    - site visits conducted
    - installation of BMPs and their proximity to receiving streams
- Technology transfer of successful methods for education and outreach

Through these efforts, UACES has increased adoption of BMP practices, increased understanding of LID and BMP practices, and contributed to the improvement of impaired waterways within the Beaver and Illinois River. Experience has shown that watershed professionals, planners, and decision makers must actively target stakeholders through engagement activities, one-on-one consultation, innovative and modern outreach methods, and by example of leadership. Partnering with the following stakeholders/community groups helped aid in the success of programming by direct volunteer involvement and education, promotion, trash pickup, and continued education on programs such as BMP installations:

Apple Seeds Teaching Farm
Arkansas Arts Academy Elementary School
Arkansas Game and Fish Commission
Backcountry Hunters and Anglers of Arkansas
Beaver Watershed Alliance
Beaver Water District
Bella Vista Fly Tyers
Benton County Master Gardeners
Boston Mountain Solid Waste
UA Bumpers College
Central Junior High School
City of Fayetteville
City of Rogers Parks and Recreation
Benton & Washington County EHC
Fayetteville High School
Greenland 4-H Club
Illinois River Watershed Partnership
Har-Ber High School
Jacobs Engineering
Keep America Beautiful
Keep Arkansas Beautiful
Lake Fayetteville Environmental Study Center
Lake Fayetteville Watershed Partnership
Living Lands & Waters
Northwest Arkansas Bassmasters
NWA Council
Ozark Chapter Wild Ones
Ozark Green Roofs
Prairie Grove Middle School
SWA Stormwater Education Program
Shiloh Museum
UARK Sustainability in Business grad student group
University of Arkansas student groups (Brothers Under Christ Fraternity, UARK Sierra & Recyclebacks)
Washington County 4-H Teen Leaders
Willis Shaw Elementary School
White River Nursery
Wonderful Waterways

NPS Video Podcasts and Social Media

Project staff developed 15 video podcasts and disseminated on the YouTube channel **Cleanwater@UAEX** as well as the Facebook page **@Mpost.UADA.waterquality.** Videos were developed by creating storyboards and scripts. Educational videos contain content such as highlighting specific waterways in Northwest Arkansas , home erosion control, how to build a rain barrel, fishing line recycling, watersheds and NPS pollution prevention. Videos were also shared on Facebook and with community members when requested. Viewing statistics were collected and recorded once a month for videos posted on the YouTube channel. Two webinar recordings were added to the channel for

continued reference and engagement. The table below explains how many videos of each theme were created and posted on YouTube.

Video Themes	# of videos created
Waterway Specific (Woke Water Wisdom)	5
Home Erosion Control	5
Rain Barrel	2
Watersheds	2
Fishing line recycling	1
NPS Pollution Prevention	1
Recorded webinars	2
Total	18

Videos were referenced to teachers to use in their curriculum, and inspired community partners such as Shiloh Museum to ask for assistance in adding watershed education to their "Shiloh Saturday" video series (https://www.youtube.com/watch?v=Lt96WEYWej8). Their video was shared on their YouTube channel as well as their Facebook page. The "Home Erosion Control" video series is a great tool to reference at site visits for clients experiencing erosion on their property. The **Cleanwater@UAEX** YouTube channel averaged 204 views per month for the duration of the grant. Some videos, like the "What is a MS4" NPS pollution series, were short enough to post on the Facebook page **@Mpost.UADA.waterquality** and reached 512 people, and had 49 reactions, comments and shares. Facebook, YouTube, and Instagram are valuable and cost-efficient means to promote programs and spread educational messaging.

How to Build a Fishing Line Recycling Bin Video

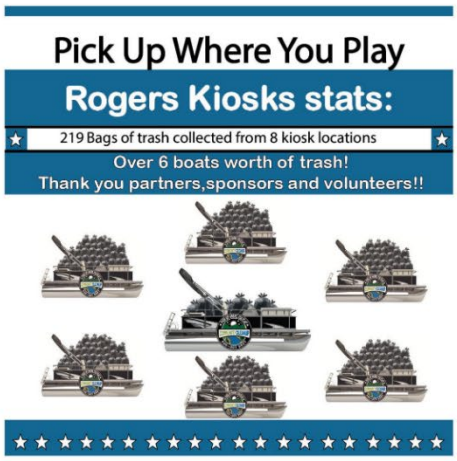
The Instagram page, **@NWAwaterquality**, was the most popular social media tool during this grant period. Reels are short videos that can be edited to feature videos, pictures, music, and wording to send a message. Five reels were created with a total of 18,501 views. The page gained 348 followers during the grant period and proved to be an outstanding avenue to promote programs as community partners involved can be directly tagged and share the marketing material.

Public Education and Outreach Efforts

Event	Number of events	Total Participants	Pounds of Garbage Removed	Pounds of Recycling Collected
Cleanups hosted	10	141	6,080	160
Education events	13	549		
Outreach events	7	124		
Total	30	814		

The table above summarizes the total number of NPS Public Education and Outreach events, and the litter removed from all cleanups. Stream cleanups, urban litter removal, and riparian enhancement have consistently engaged local stakeholders who provide crucial volunteer value, significant community enhancement, and fruitful partnerships with other watershed organizations, municipalities, and the University of Arkansas. These events also presented an educational opportunity for participants to learn more about NPS pollution prevention. The biggest cleanup during the grant season was Pick Up Where You Play, a regional cleanup effort organized by UACES. Together with 15+ community partners, sponsors and 502 volunteers, we removed 11,520 pounds of debris from Northwest Arkansas waterways, trails, and parks.

Promotional Marketing for Pick Up Where You Play



Education events focused on NPS pollution prevention and watershed education using tools such as the Enviroscape and collecting macroinvertebrates to engage students on water quality. Post-workshop surveys showed most participants gained a better understanding of NPS pollution prevention and methods to reduce urban runoff. Education was targeted at K-12 grades.

The photo below shows students at Lake Fayetteville Environmental Study Center learning about how litter affects ecosystems.

Sim Barrow and Fayetteville High School Students at Lake Fayetteville

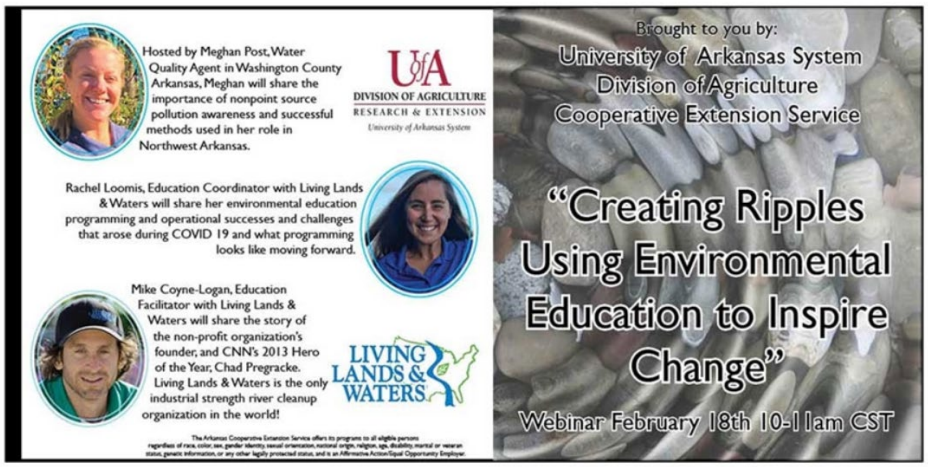
In addition, the green roof at the Lake Fayetteville Environmental Study Center was restored and replanted, and a round mirror was installed so students on the ground can see the roof. A plexiglass display showing a cross-section of the green roof media and plants now hangs inside the study center to help education on green roof composition and function. Finally, a mural was created and installed on the side of the building that depicts nonpoint source pollution prevention actions.

A campaign called “Build Right” is focused on preventing sediment pollution and keeping soil from construction projects on site. This campaign is a mass marketing effort to reach the large construction community of Northwest Arkansas. As land is developed to keep up with this unprecedented growth, the potential of sediment pollution in waterways increases. This audience represents a part of the population that has been historically hard to reach for educational purposes. The strategy is to utilize digital billboards and targeted online advertisements with a branded “Build Right. Keep Soil on Site” campaign that will extend 6 months beyond this grant.

Two “Build Right” billboards are currently up along I-49 with two others on streets in Bentonville and Rogers.

Outreach also included staffed educational booths emphasized the importance of picking up pet waste for nonpoint source pollution prevention. Booths were set up at popular spots like Lake Fayetteville and a dog park in Rogers. Dog owners were encouraged to sign a pledge stating they will pick up their pet’s waste and were given useful prizes like pet waste pick up bag holders. Another booth focused on a game called Water Quality Baggo, where members of the public were engaged with the opportunity to play baggo. Once participants answered certain questions such as, “Where does litter belong?”, prizes were given out and promotional advertisements for upcoming programs were discussed. Challenges experienced with the COVID-19 pandemic forced staff to pivot and create opportunities for socially-distanced events for the safety of participants. Multiple education events were conducted virtually to follow COVID protocols. A few cleanup events created pick-up supply stations for participants to socially distance and given specific areas to drive or walk to pick up litter.

Teaching about NPS pollution prevention “in the classroom” using the EnviroScape watershed model using Zoom.



Online webinar sharing the importance of nonpoint source pollution awareness and successful education and engagement methods used in Northwest Arkansas.

BMP Education Workshops

Three BMP education workshops were held on the topics of rain barrels and rain gardens. 34 Participants at the rain barrel workshops built rain barrels, and 32 participants in the virtual the rain garden workshop were sent a gift certificate to be spent on a native plant at a local nursery. Virtual workshops were also uploaded to the **CleanWater@UAEX** YouTube channel.

Site Visits

Fifty property management assessments were conducted after invitation from stakeholders and residents. Landowners often seek assistance from the Extension office regarding drainage issues, pond BMPs, erosion control, and lawn/yard management. These one-on-one consultations are an opportunity to educate the landowners and managers on simple BMPs to prevent NPS pollution. While the survey was sent to each landowner visited, the results represent the 12 that responded. Participants were asked if they had implemented any specific BMPs and their responses are summarized below. In total, 20 BMPs were installed following site visits with an additional 24 planned to be installed.

Photo 6. Site Visit Participant Survey Results

#	Field	Yes	No	No, but I plan to	Total
1	Rain barrel	22.22% 2	55.56% 5	22.22% 2	9
2	Redirected downspout	33.33% 3	33.33% 3	33.33% 3	9
3	Rain garden	20.00% 2	50.00% 5	30.00% 3	10
4	Water cistern	0.00% 0	100.00% 9	0.00% 0	9
5	Dry well/ Catch basin	11.11% 1	77.78% 7	11.11% 1	9
6	Dry creek bed	20.00% 2	50.00% 5	30.00% 3	10
7	Berms/Bioswale	20.00% 2	50.00% 5	30.00% 3	10
8	Disconnecting impervious surfaces	0.00% 0	100.00% 9	0.00% 0	9
9	Terracing/Retaining wall	18.18% 2	63.64% 7	18.18% 2	11
10	Native plantings	45.45% 5	9.09% 1	45.45% 5	11
11	Soil testing	0.00% 0	77.78% 7	22.22% 2	9
12	Fishing line recycling bin	10.00% 1	90.00% 9	0.00% 0	10

Showing rows 1 - 12 of 12

Installation of BMPs and Proximity of Receiving Streams

Nine fishing line recycling bins were placed in popular fishing locations adjacent to the following bodies of water: Bob Kidd Lake, Lake Elmdale, Lake Fayetteville, Lake Sequoyah, Lake Keith, and Lake Wilson for the Adopt-A-Bin project. Community volunteers "adopted" a bin and agreed to maintain the bins once a month and report back to project staff. All bins placed have been in use by fishermen. Line was collected and mailed to Berkley Recycling in Iowa for upcycling. Over two pounds of line was sent to Berkley during the project timeframe. Design changed on the recycling bins mid-project to prevent garbage from being able to be placed inside. Volunteers saw significantly less garbage mixed with line after that.

Adopt-A-Bin Recycling Bin

Fishing Line Collected

A rain garden was installed at Arkansas Arts Academy Elementary School. The site is in the headwaters of Osage Creek watershed which is a sub-watershed of the Illinois River. Ms. Cerna reached out to UAEX with help planning watershed curriculum early in the project, and educational sessions were held with her students on watershed education. The rain garden idea blossomed post workshop, and plans were under way. Students were involved in the garden installation from start to finish and take great pride in it. Ms. Cerna elicited the help of Benton County Master Gardeners, who perform routine garden maintenance and education to the students. The garden now serves as an outdoor, interdisciplinary learning space and has been utilized by reading, math, science, and history teachers. Students plan to paint the two rain barrels that collect and disperse rain into garden.

"Middle School is a difficult time for students. There are so many adjustments, and the pandemic has left so many gaps in learning that having the opportunity to research, prepare material for presentation, and working with younger students has been academically and emotionally beneficial to these students."

-LaVona Cerna

The green roof is getting revitalized on the storage shed at Lake Fayetteville Environmental Study Center. The location of the shed is adjacent to Lake Fayetteville and annually hosts approximately 1,500 students in 4th-10th grade from Fayetteville and Springdale school systems. The green roof/shed is in the backyard of the study center, creating an easily accessible addition to environmental curriculum. Additions to the green roof such as a large, convex mirror on the top, roof thermometers, a phenology diagram, a cross section model of a green roof, educational signage, and a large (10' by 10') painted mural on the side of the shed will aid in student understanding of BMPs and their importance in watershed management.

Lastly, two riparian restoration events took place in the Beaver Lake Watershed with community partner Beaver Watershed Alliance. Native riparian plants were planted adjacent to Clifty Creek and at a previous invasive species removal event location at the city park, Mt. Kessler in Fayetteville.

Volunteer and In-Kind Donation	
Quarter & Fiscal Year	Amount
Q2, FY 2020	$2,917.33
Q3, FY 2020	$56.39
Q4, FY 2020	$727.77
Q1, FY 2021	$165.53
Q2, FY 2021	$6,394.46
Q3, FY 2021	$4,986.48
Q4, FY 2021	$15,294.45
Q1, FY 2022	$7,727.21
Q2, FY 2022	$4,185.92
Total	**$42,455.54**
Goal	$38,334

Technology Transfer

Technology Tranfser	
Groups	# of Participants
NWA Bassmasters	35
NWA Master Naturalists	45
Bella Vista Fly Tyers	35
BHAA	7
Wa. Co. 4-H Teen Leaders	10
Living Lands & Waters	51
UARK Sustainability in Business	13
Total	196

Project staff developed and presented on outreach and education methods executed for the 319(h)-grant including successful techniques and challenges of fostering partnerships, engaging stakeholders, video/social media development, BMP implementation, and participation/measurable impacts to local and national conservation groups & professional organizations. The goal was to engage other organizations, design professionals, public entities, and land-use decision makers to help share and embrace the benefits of BMPs, LID, and NPS pollution prevention tools as well as garner volunteers for current projects. Presentations inspired a few volunteers for the Adopt-A-Bin project as well as rally volunteers to attend litter cleanup efforts.

Challenges and Conclusions

The biggest challenge was navigating the COVID 19 pandemic while continuing to spread the educational messaging. Volunteerism was relatively low during 2020 and didn't pick up until spring of 2021. It forced project staff to get creative on how to successfully work with volunteers while following CDC guidelines.

Throughout the COVID 19 pandemic, successful connections with community members were made via social media, educational webinars, and contactless workshops & litter cleanups. The regional litter cleanup initiative, Pick Up Where You Play, saw the greatest volunteer turnout, and created the largest opportunity for in-kind donations. Additionally, the digital billboard created an opportunity to reach the general public and construction workers who are responsible for the installation and maintenance of BMPs.

Social media continues to have a significant role in NPS outreach and education, especially through the pandemic. Additionally, visual demonstration and media really does engage the public and can be a significant supplement to outreach events, especially regarding connecting volunteers, residents, and stakeholders to land-use activities impacting water quality, such as the "Build Right" campaign.

BMP demonstrations are a success and will continue to educate the public past the grant period. The Adopt-A-Bin project volunteers are eager to continue maintenance of the bins. The 9 bins will remain while there are volunteers committed to the project. An indoor fishing line recycling bin was created at the request of teacher Sim Barrow at the Lake Fayetteville Environmental Study Center. It provides Sim with a teaching tool and a place to visually store the fishing line pollution his students pick up on their nature walks. The rain garden at Arkansas Arts Academy will continue to be maintenance by Benton County Master Gardeners and students and will be used as an educational tool for many years to come.

Strong partnerships and cooperating agencies made the project successful. The public interest and the visible nature of these water quality demonstrations have been an innovative tool to engage urban stakeholders regarding land-use impacts on water quality of receiving streams. Strong social media response, local media interest, increased volunteer engagement, and expansion of relationships with partners and local businesses increased the visibility of NPS pollution prevention in urban Northwest Arkansas.

Naturally, the education gap still exists. Much of the public is difficult to reach or encounter on a one-on-one basis. However, demonstration sites at Arkansas Arts Academy and various public lands continues to influence stakeholders on the connectedness of the landscape and the affect the built environment can have on the natural resources that they themselves depend on, be it drinking water or recreation.