National Water Quality Initiative Watershed Forum Report

Little Beaver Creek watershed – Stephens County, Oklahoma

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The Natural Resources Social Science Lab studies how human interactions with the environment impact natural resources. Our research, teaching, and engagement activities focus on how to best motivate farmers, stakeholders, and citizens of all kinds to participate in more environmentally friendly behaviors and practices. For more information, please go to https://www.purdue.edu/fnr/prokopy

Recommended Citation:

Usher, E. M., Church, S. P., and Prokopy, L.S. (2018). *National Water Quality Initiative Watershed Forum Report – Little Beaver Creek watershed, Stephens County, Oklahoma.* West Lafayette: Purdue University.

Acknowledgments

This report was made possible with funding from the United States Department of Agriculture-Natural Resources Conservation Service. We thank the Stephens County Conservation District, Oklahoma Conservation Commission staff and local NRCS staff for helping with local logistics and giving us a watershed tour.

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Acronyms

BMP	Best Management Practice
CP	Consensus priority
CTIC	Conservation Technology Information Center
DOT	Department of Transportation
DP	Distinguishing priority
EPA	United States Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
NRCS	Natural Resources Conservation Service
NRSS	Natural Resources Social Science
NWQI	National Water Quality Initiative
OCC	Oklahoma Conservation Commission
PN	Priority number
PV	Priority value
SCCD	Stephens County Conservation District
TMDL	Total Maximum Daily Load

Executive Summary

The Conservation Technology Information Center contracted the Natural Resources Social Science (NRSS) Lab at Purdue University to inform improvements to Natural Resources Conservation Service's (NRCS) ability to implement small watershed projects and effectively communicate watershed related information. The NRSS team hosted a forum with local stakeholders from the Little Beaver Creek watershed in Stephens County, Oklahoma to gather input on watershed project design, marketing, delivery, and implementation associated with the National Water Quality Initiative (NWQI), an NRCS supported small watershed initiative. Additionally, the NRSS team interviewed representatives from state and federal agency partners working with NRCS to improve watershed health. The following document provides recommendations based on data gathered from the watershed forum and interviews with agency partners.

Forum

The Little Beaver Creek watershed forum included three activities that focused on 1) watershed priorities, 2) resource needs, and 3) successful watershed outreach and education.

Watershed priorities

Participants ranked priorities related to successful watershed management and explained their rationale for priority decisions. Using factor analysis in PQMethod software (v. 2.35) and qualitative analysis in MS Excel, forum participants identified three distinct priority narratives, including 1) Biological Integrity, 2) Producer Priorities, and 3) Education

Resource needs

Participants listed resources needed for successful watershed management, discussed their rationale for each need, and then assembled resources into broad categories of needs. Through analysis in NVivo (v. 12), the researchers identified six broad categories of resources needed for successful watershed management including: 1) Funding, 2) Producer Assistance, 3) Public Interest, 4) Outreach and Education, and 5) Measurement

Successful watershed outreach and education

Participants engaged in a facilitated discussion related to recipients, content, and delivery of watershed outreach and education. Through analysis in NVivo (v. 12), the researchers identified the need to promote public awareness of the value of agricultural as well as successful watershed improvements and the on-farm benefits of BMP adoption.

Interviews

An NRSS researcher conducted interviews with representatives from Oklahoma Conservation Commission (OCC) and the United States Environmental Protection Agency (EPA) Region 6 to gather information about the role of partnering agencies in the NWQI, strengths and challenges associated with the NWQI and elements of successful watershed management and outreach. The OCC representative reported a strong working relationship but suggested increasing staff resources across the state. The EPA Region 6 representative indicated that NWQI provides an effective framework to promote interagency collaboration, but believed a more in-depth planning process is needed for successful watershed management.

Recommendations

Through a synthesis of data gathered from the three activities of the Little Beaver Creek watershed forum and interviews with agency partners, the NRSS research team developed the following agency-wide recommendations for NRCS and watershed specific recommendations for the Little Beaver Creek watershed. The following agency-wide and watershed specific recommendations aim to improve the successful design, marketing, delivery, and implementation of NRCS supported watershed projects:

<u>NRCS:</u>

1. Continue strong working relationship with OCC.
2. Increase staffing resources in watersheds across the state.

<u>Little Beaver Creek watershed:</u>

1. Increase outreach to non-agricultural community and legislative leadership.
2. Promote on-farm benefits of adopting BMPs.

1 Introduction

1.1 Project overview

The Natural Resources Social Science (NRSS) Lab at Purdue University was contracted by the Conservation Technology Information Center (CTIC) to investigate how to improve the Natural Resources Conservation Service's (NRCS's) ability to 1) implement watershed management projects and 2) effectively communicate information. The NRSS team conducted a forum in Oklahoma's Little Beaver Creek watershed to gather information from local stakeholders on watershed project design, marketing, delivery, and implementation associated with the NRCS's National Water Quality Initiative (NWQI). In addition to the forum, the NRSS research team gathered information from agency partners working with NRCS toward the common goal of improving watershed health.

The forum included three interactive activities with local stakeholders aimed to identify 1) watershed priorities, 2) resource needs, and 3) elements of successful watershed outreach and education. Interviews investigated the regional perspective of agency collaborators regarding NWQI's strengths and weaknesses, as well as successful watershed management, outreach, and education strategies.

This report provides the following information:

- brief overview of the NWQI,
- current conditions in the Little Beaver Creek watershed,
- methods and results from the Little Beaver Creek watershed forum conducted in Stephens County, OK,
- methods and results from interviews conducted with representatives from Oklahoma Conservation Commission (OCC) and the United States Environmental Protection Agency (EPA), and
- reccomendations to improve implementation and outreach efforts for NWQI and other NRCS supported watershed projects.

1.2 Background

1.2.1 National Water Quality Initiative

Created to identify impaired watersheds and address water quality issues in targeted watersheds, the NWQI provides technical and financial assistance to accelerate voluntary adoption of best management practices (BMPs) on agricultural land. The NWQI uses a collaborative approach to watershed management and works with local resource managers, state water quality agencies, EPA, and other partners to improve impaired watersheds across the county. Additionally, the initiative provides monitoring and assessment resources to track water quality improvement over time in targeted watersheds. To receive the NWQI funding, resource managers in selected watersheds develop an area-wide conservation planning document, i.e., "watershed assessment." This document includes watershed characterization, water quality impairment assessment, identification of critical acres, and an outreach plan for agricultural producers in the identified acres. The NWQI also aims to enhance agricultural productivity by improving soil health and reducing erosion, nutrient runoff, and input costs.

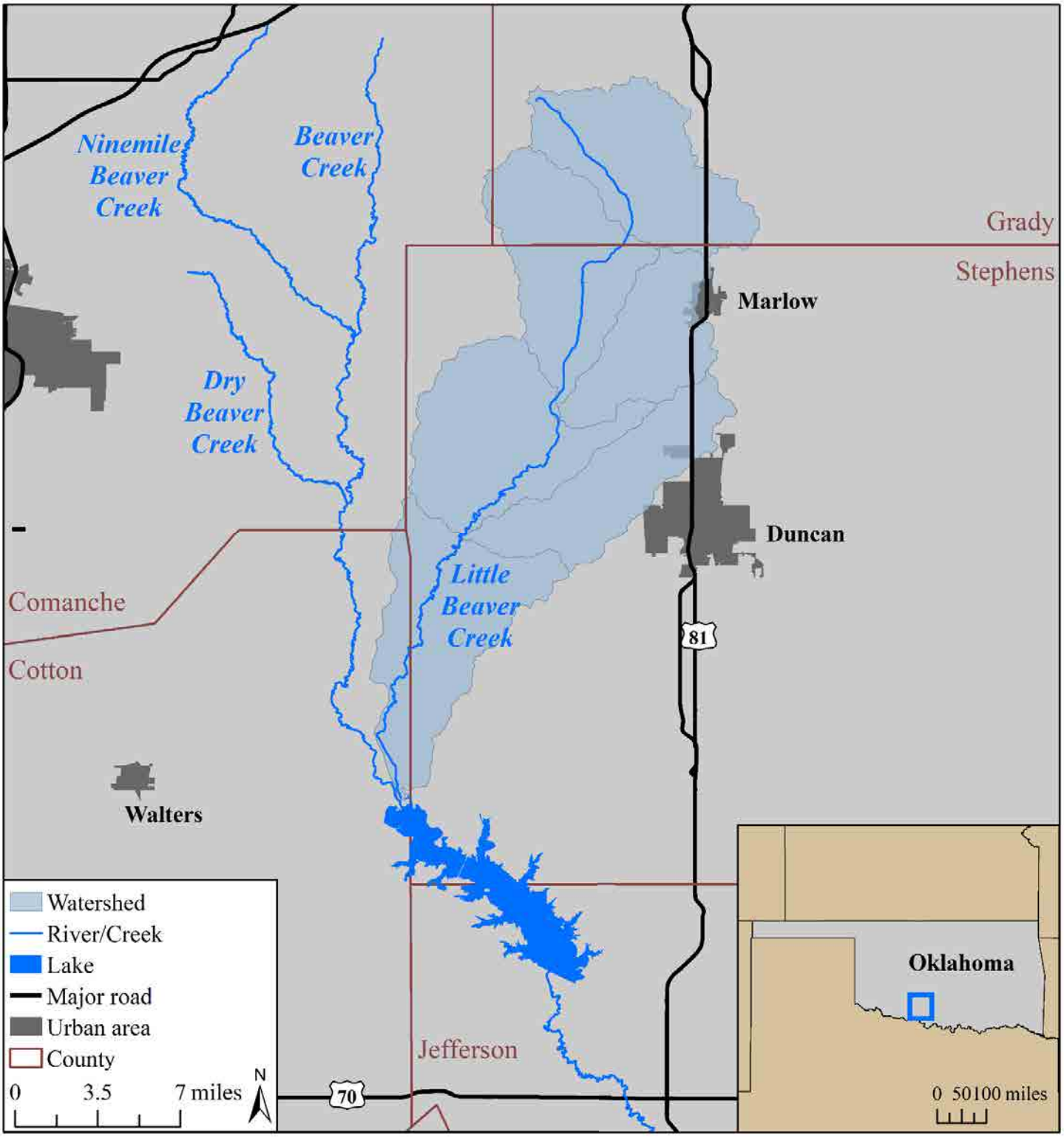
1.2.2 Little Beaver Creek watershed

This report focuses on the Little Beaver Creek watershed, in Stephens County, Oklahoma (Figure 1). The Little Beaver Creek watershed includes six HUC-12 watersheds that encompass 157 square miles and flow into Waurika Lake, the municipal water supply for seven communities in southwest Oklahoma. Pasture and rangeland are the primary land use in the watershed (63%). Four of the six sub-watersheds included in Little Beaver Creek have been an NWQI priority watershed since 2015, while the headwaters of Little Beaver Creek (HUC – 111302080101) and Lower Little Beaver Creek (HUC – 111302080106) were identified as an NWQI priority watershed in 2018. Currently, Little Beaver Creek has a total maximum daily load (TMDL) for bacteria, while Waurika Lake has a TMDL for nutrient loading that identifies the Little Beaver Creek watershed as a major contributor of nutrients and bacteria to the lake.
The following strategies have been identified to address resource concerns in Little Beaver Creek:

- Exclude livestock from streams and riparian areas,
- change grazing management systems to improve range and pasture health,
- change fertility program on pasture lands, and
- implement erosion control structural practices.

The Stephens County Conservation District (SCCD) and local NRCS staff currently manage the NWQI for the Little Beaver Creek watershed.

Figure 1. Little Beaver Creek watershed map



2 Methods

This section provides brief methods for forum and interviews conducted by NRSS lab and approved by Purdue University Institutional Review Board. Further method detail can be found in Appendices A, B, C and D.

2.1 Stakeholder Forum

2.1.1 Development

The NRSS research team worked with SCCD staff to gather a contextual understanding of the watershed and developed a list of diverse stakeholders to invite to the forum. SCCD emailed forum invitations approximately one month before the forum, then sent a reminder two weeks before the forum. The reminder included information about the forum and a brief survey, developed by the NRSS team. The survey gathered insight on the respondents' stakeholder type (e.g., producer, landowner, community member, SCCD staff) as well as their awareness of and involvement in local watershed management. Survey recipients were also asked to describe their priorities for successful watershed management and identify resources needed for a successful watershed management project in two open-ended questions. Survey development methods and analysis conducted are included in Appendix A.

The Little Beaver Creek watershed forum was conducted on May 10th, 2018 from 10:00 am to 3:00 pm (Table 1)

Table 1. Forum activities and objectives

Activity	Objective
Introduction	An NRSS facilitator oriented the participants to the project team, project objectives, forum goals, and the forum's agenda.
Identify watershed priorities	Participants ranked priority statements for watershed management then discussed the rationale for their ranking.
Lunch	Participants were provided food and an opportunity to network with fellow participants.
Identify resource needs	Participants listed resource needs for watershed management then organized them into broad categories.
Identify elements of successful outreach and education	Participants discussed elements needed for successful outreach and education in their watershed.
Conclusion	An NRSS facilitator thanked participants for their attendance.

2.1.2 Data Collection

The following section describes the methods for forum activities where data was collected.

Introduction

The NRSS facilitator introduced participants to the project and the project team. The project team included two NRSS lab staff, two CTIC staff, three WaterComm staff, and one NRCS staff. The facilitator then provided an overview of the forum agenda and a broad summary of watershed management and NWQI. Contact information including, name, email/mailing address were collected but not used for any analysis.

Identify Watershed Priorities

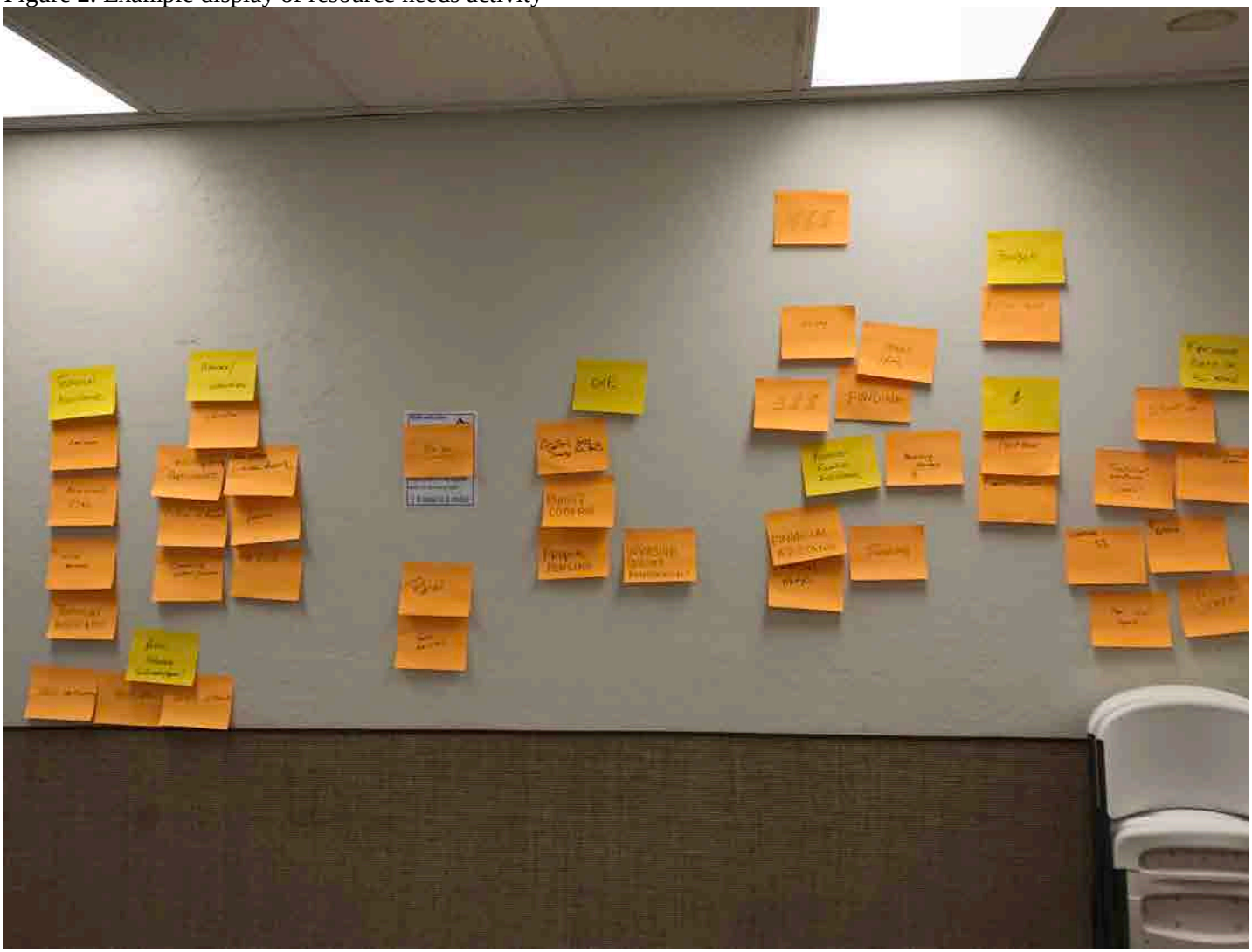
Forum participants engaged in a ranking exercise based on Q Methodology (Brown 1993) to identify watershed priorities from 36 predetermined priority statements (see Appendix B, Table B-1 for list of statements). The 36 statements were developed to represent a wide range of watershed priorities. Facilitators instructed forum participants to record the order of their watershed priorities from most disagree (-5) to most agree (5) on a provided datasheet (Appendix B, Figure B-3). Participants also reported demographic information, including their primary role in the watershed (i.e., stakeholder type), conservation practices currently in use on their property, years of experience with watershed management, years lived in the Little Beaver Creek watershed as well as their birth year and gender. The datasheets were collected by the research team and were input into PQMethod software (v. 2.35) at a later date.

Then, in an open discussion with all forum participants lasting approximately 15 minutes, the facilitator asked volunteers to share their rationale for selecting their top watershed priorities. Participants were then assigned to three small groups. NRSS researchers assigned predetermined groups to integrate different stakeholder types within each group. In the small groups, participants shared their highest and lowest watershed priorities and their ranking rationale. Members of CTIC facilitated two small group discussions, a NRSS researcher facilitated one, and WaterComm staff took notes of the discussion. Large and small group discussions were noted and recorded. TranscribeMe, an audio transcription service, was used to transcribe audio recordings.

Identify Resource Needs

Forum participants listed resources needed to achieve successful watershed management. Researchers provided each group with 10 examples of resource needs derived from the survey (Appendix A). Participants wrote resources needed for successful watershed management on 5x7 inch sticky notes. Participants displayed each written resource need (including the 10 provided by the facilitators) in front of their small group. The small group facilitator prompted participants (see Appendix C for facilitator guide) to explain their rationale for resource needs they contributed, then collectively assembled resource needs into broad categories. The facilitator then documented the broad categories and displayed them on a different colored sticky note (Figure 2). After the forum, NRSS team collected all 5x7 sticky notes from each group. Group discussions were noted and recorded. Audio recordings were transcribed by TranscribeMe, an audio transcription service.

Figure 2. Example display of resource needs activity



Identify Elements of Successful Outreach and Education
In the same small groups, participants engaged in a facilitated discussion on elements of effective outreach and education. Small group facilitators provided each group six examples of elements needed for successful watershed outreach and education derived from the survey (Appendix A) then documented the discussion on a flip chart. Facilitators guided (Appendix C) participants to gather further information related to recipients, content, and delivery of watershed outreach and education. The discussions were noted and recorded. Audio recordings were transcribed by TranscribeMe, an audio transcription service.

2.1.3 Analysis

The following section describes the analysis methods for the forum activities where data was collected.

Identify Watershed Priorities
This activity used both quantitative and qualitative analyses, described below.

Quantitative
An NRSS researcher conducted a factor analysis using principal component method with varimax rotation on the participants' ranked priorities via the PQMethod software (v. 2.35). The software aggregated participants by similarly ranked priorities and identified the following:

- Priority family: participants with similar priority rankings
- Priority framework: output that provided priority values (PV), distinguishing priorities (DP), and consensus priorities (CP) for each priority family
    - Priority value (PV): Value assigned to each watershed priority based on priority rankings within each priority family. These values reflect family attitudes toward each priority. PVs range from -5, (low priority), to 5 (high priority).
    - Distinguishing priorities (DP): Uniquely ranked priorities from each priority framework. These priorities highlight distinct viewpoints that differentiate priority families from each other.
    - Consensus priorities (CP): Similarly ranked priorities across all priority frameworks. These priorities highlight broad agreement across all priority families.

Qualitative analysis
An NRSS researcher then developed a priority narrative to describe priorities and compare differences and similarities for each priority family. Narratives were created by organizing participants' rationale from the discussion transcriptions by priority and priority rank (MS Excel) as well as the priority framework, provided by PQMethod (v. 2.35). Participants' comments were not identified on the transcription relative to their datasheet; therefore, the comments could not be attributed to a specific priority family. Finally, the researcher developed a name describing each narrative based on high-ranked priorities (see Appendix B, Table B-1 for additional detail).

Identify Resource Needs
The broad categories and resource needs identified by the participants were used as codes and subcodes, respectively, to organize the discussion. An NRSS researcher reviewed all transcriptions and assigned codes in NVivo (v. 12). Then, for each discussion group, the NRSS researcher developed a conceptual diagram (i.e., mind map) of the resources needed for successful watershed management based on the transcribed discussion. The mind maps were then synthesized by identifying reoccurring themes across all three discussion groups.

Identify Elements of Successful Outreach and Education
An NRSS researcher developed codes in NVivo (v. 12) based on reoccurring themes for each of the facilitated discussion topics: recipients, content, and delivery.

2.2 Interagency Partner Interviews

The following section describes data collection and analysis methods used to investigate the perspective of federal and state agency partners (EPA and OCC) relative to their role within the NWQI, the strengths and challenges associated with the NWQI, and elements of successful watershed management and outreach.

2.2.1 Data Collection

An NRSS researcher interviewed representatives from OCC and EPA Region 6. The interviewees were identified through a conversation with a EPA employee who recommended appropriate representatives. A request to participate was emailed to potential interviewees. Both interviews were conducted over telephone, recorded, and transcribed in February 2018. The interview guide developed for these interviews can be found in Appendix D.

2.2.2 Analysis

The transcripts and notes were summarized by three topics:

- Agency role in the NWQI
- Strength and challenges associated with the NWQI
- Key elements for successful watershed management and outreach.

3 Results

3.1 Stakeholder Forum

3.1.1 Demographics

A total of 20 stakeholders participated in the forum. Most participants identified as NRCS Staff (Table 2) and male (Table 3). Participants reported a mean age of 46.3 years old (Table 4) and 40% of forum participants reported living in the watershed (Table 5).

Table 2. Stakeholder type

Stakeholder Type	Frequency (n)	%
NRCS staff	8	40
Producer or Landowner	6	30
SCCD staff	3	15
State Agency staff	2	10
Community member	1	5

Table 3. Gender

Gender	Frequency (n)	%
Male	13	65
Female	6	30
No answer	1	5

Table 4. Participant age

Mean age *(SD)*	Median	n
46.3 (*12.5*)	49.5	20

Table 5. Watershed resident

Resident	n	%	Years Mean *(SD)*
Yes	8	40	16.5 *(13.17)*
No	12	60	

3.1.2 Watershed Priorities

A total of 17 participants' ranked priorities were considered complete for analysis (Appendix B). Two participants were not included in any priority family because their ranked priorities were dissimilar to the three priority families and each other's; therefore, they were not considered their own priority family. The remaining 15 participants' ranked priorities are presented in the following three narratives:

1) Priority Family 1: Biological Integrity (six participants)
2) Priority Family 2: Producers Priorities (four participants)
3) Priority Family 3: Education (five participants)

Each priority given to participants were numbered (Appendix B, Table B-1). These priority numbers (PNs) are added to the following section for reference in parentheses, for example "(PN4)" refers to priority number 4, "A watershed plan is necessary".

The priority family narratives are described below by the priorities with high and low PVs and DPs (Tables 6-8), CPs are then discussed, and the priority framework for each family is summarized in Table 9.

Priority Family 1: Biological Integrity

This priority family included a total of six participants who identified as NRCS staff, SCCD staff, and state agency staff. This family highlighted biological integrity (PN34, PN21, PN22), outreach and watershed planning (PN15, PN16, PN4) for successful watershed management (Table 6).

Table 6. Priority Family 1 Framework: Biological Integrity

Priority Narrative 1: Biological Integrity				
PN	**Priority**	**PV**	**DP**	**CP**
High				
34	Measurably cleaner water should be an outcome.	5		
4	A watershed plan is necessary.	4		
15	A strong working relationship between producers/landowners and watershed managers is important.	4		x
16	One-on-one interactions between resource managers and producers/landowners is necessary.	3		
31	Watershed management should benefit my community and communities downstream of my watershed.	3		
22	Achievable water quality goals and targets should be set to show water quality improvements.	3	x	
Low				
27	Negative effects of watershed management on downstream stakeholders should be minimized.	-3	x	
20	Communicating about soil health is more effective than communicating about water quality.	-3	x	
35	Producers/landowners/businesses should be required to adopt best management practices.	-3		x
9	Only local organizations should be involved.	-4		
29	Watershed managers should focus on water *quality* issues over water *quantity* issues.	-4		
36	The watershed needs to be in an impaired or degraded state.	-5		x
Additional DPs				
1	Landowners/producers should know what best management practices are and why they should be used.	1	x	
3	Technical and/or financial assistance for those who qualify is necessary.	-2	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The "x" indicates the DP and CPs identified by the PQMethod software.
PN=Priority number
PV=Priority value
DP=Distinguishing priority
CP=Consensus priority

Water Quality Improvement

From the perspective of this family, a watershed project needs to include a watershed plan that incorporates achievable water quality goals and includes water monitoring to document measurably cleaner water (PN4, PN22, PN34). They believed a watershed plan provides guidance and direction to essential components of successful watershed management. One participant explained the benefits of a watershed plan:

> *"[A watershed plan] lays the blueprint or framework of which you can target funding, bring stakeholders to the table to get that more money out there, work boots on the ground, people to help the producers [and] communicate what needs to be done."*

Emphasizing the importance of demonstrating success through water quality improvements, this family suggested measurably cleaner water can justify spending public funds on watershed improvement. One participant indicated that successful watershed improvement can secure public support and additional funding for future projects, for example:

> *"We're going to do this and obligate funds, we need to show what we've been doing and continue to get funds for other projects."*

Working Relationships

This family recognized the importance of strong working relationships and emphasized the need for one-on-one interactors between resource managers and landowners/producers (PN15, PN16). They believed mutual trust and understanding is an essential component for successful watershed management. One participant described the benefits of a trusted working relationship:

> *"The trust and the openness between the landowner and the watershed manager is a two-way street. If you're open with everything it helps speed the whole process up. If you're in the background trying to figure out, 'Is he telling me everything or is he not telling me everything?' That makes a big difference."*

Acknowledging that each farming operation is unique, this family suggested one-on-one interactions can help resource managers understand the concerns and limitations of each producer's operation. They indicated that one-on-one interactions can be an information exchange that provide opportunities for producers to share challenges of their operation. At the same time, resource managers can provide tailored information of programs that are available to help landowners/producers address their on-farm resource concerns. A resource manager explained:

> *"We have to be out there to be able to evaluate with that client what's going to work best for him…I can go to a client and make recommendations, but if they're not the things he's interested in he may not implement them at all. If he does, he's probably going to go at it half-heartedly and not get full success out of it. So something I can recommend to him, or I can look at with him that he's really engaged with, that educational issue is a big thing we have to deal with."*

This family recognized that local organizations benefit from technical and financial support from state and federal agencies (PN9), but underscored the need for local organizations to develop relationships with landowners/producers. Emphasizing the value local relationships, one participant explained:

> *"Local working relationships are essential from top to bottom in terms of watershed management. Whether you're the government program working on it, in terms of the local producer, in terms of how it benefits them. You've got to have that local person working that has relationships built and that they trust. I don't think you can use the word local enough."*

Additional Watershed Priorities

Highlighting an interconnected relationship, this family suggested successful watershed management needs to address both water quantity and quality issues (PN29). Additionally, they noted that communicating soil health information is not more effective than communicating about water quality (PN20). One participant cited recent weather patterns as an example of the relationship between water quality and water quantity:

> *"I don't see them as being that different. With the way the weather and the climate is around here, we go from floods to five years of drought…That kind of thing needs to be considered in long-term planning for your personal management and then the watershed management in general, that's a quantity issue. Then [the lake] starts getting low and you've got higher concentrations of sediments and the bacteria and things like that."*

Although this family indicated that successful watershed management should benefit their community as well as communities downstream of their watershed, they prioritized focusing on the benefits of watershed management to all watershed stakeholders over an emphasis on minimizing impacts to downstream communities (PN31, PN27). While the other two families ranked the necessity of technical and financial assistance (PN3) and the importance of landowners/producers understanding how and why BMPs should be used (PN1) as their top priorities, this family ranked these priorities much lower.

Priority Family 2: Producer/Landowner Priorities

This priority family included a total of four participants who identified as producers or landowners, SCCD staff, and NRCS staff. This family identified addressing stakeholder concerns (PN10, PN2), watershed planning (PN26), implementation assistance (PN3), and outreach and education (PN1, PN15) as the most important components for successful watershed management (Table 7).

Table 7. Priority Family 2 Framework: Producer/Landowner Priorities

Priority Narrative 2: Producer Priorities				
PN	**Priority**	**PV**	**DP**	**CP**
High				
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	5	x	
3	Technical and/or financial assistance for those who qualify is necessary.	4		
26	There should be a flexible plan that allows for changes in management over time.	4	x	
1	Landowners/producers should know *what* best management practices are and *why* they should be used.	3		
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	3	x	
15	A strong working relationship between producers/landowners and watershed managers is important.	3		x
Low				
6	Management should be done at a small geographic scale.	-3		
33	Community members should take an active role in watershed management.	-3	x	
29	Watershed managers should focus on water *quality* issues over water *quantity* issues.	-3		
36	The watershed needs to be in an impaired or degraded state.	-4		x
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-4		
35	Producers/landowners/businesses should be required to adopt best management practices.	-5		x
Additional DPs				
20	Communicating about soil health is more effective than communicating about water quality.	1	x	
22	Achievable water quality goals and targets should be set to show water quality improvements.	-1	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The "x" indicates the DP and CPs identified by the PQMethod software.
PN=Priority number
PV=Priority value
DP=Distinguishing priority
CP=Consensus priority

Stakeholder Concerns

Ensuring watershed management activities do not jeopardize the livelihoods of producers/landowners living and working in the watershed is the top priority for this family (PN10). They underscored the need for watershed management to support the farming community, not burden it. One participant emphasized the importance of a profitable operation and the fact that landowners and producers rely on their operation for financial security:

> *"Livelihoods shouldn't be jeopardized due to watershed management activities. That's a given. We live off the land. I don't work anywhere but the farm and that's what pays the bills. So you got to be able to make money at it. If you're losing money, you got to go do something else."*

This family highlighted the importance for resource managers to address the concerns of producers/landowners and to include them in the watershed planning process (PN2). One participant emphasized the need to inform the development of the watershed plan with concerns from producers/landowners and implied that without their involvement, successful watershed management will be more difficult to achieve. For example:

> *"I think that it is very important for people who are providing this plan or this money or whatever, to talk to the landholders first and see what the concerns are. You telling us what the concern is doesn't work. You have to listen to the concern from us because my land condition is different than his land condition. It's not a carbon copy."*

Related to preserving stakeholder livelihoods and including their concerns in plan development, this family also believed that the watershed plan needs to be flexible to accommodate change over time (PN26). They cited a need for a flexible plan that accounts for physical variation thought the watershed, provides landowners/producers a suite of options to achieve on-farm objectives, and allows enough time to complete projects. For example:

> *"You can't give a landowner a plan and say, 'You have six months to do this.' It doesn't work that way. You've got 18,000 new things that have to be done that are more important in some cases. So just be flexible over time, which my involvement with NRCS and the other agencies has always been good. I haven't had any problems. So that's just – that's important to me, to be flexible in that time."*

> *"[There is a] good suite of practices to be utilized, however, in a lot of instances, alternative practices that can be used that may not fall under the purview of someone's idea of a BMP, and those practices may achieve similar goals…[We need] to keep that plan flexible so we can use those BMPs, but if we've got something else in the toolbox, let's use it. I don't want to use a screwdriver for everything I do. Sometimes I want to use a monkey wrench. And so, if I've got it in the toolbox, I want to be able to utilize it."*

Watershed Planning

This family emphasized the need for technical and financial assistance (PN3) and believed that access to assistance is a key component to increased BMP adoption and the likelihood of successful watershed management. Underscoring the importance of reducing economic impacts of BMP adoption, one participant reiterated that adopting BMPs should not impact an operation's bottom line:

> *"If you want us to fix it, you got to help us. [BMPs] have to be economical policies. Personally, our ranch is our sole source of income. We do not have a secondary source of income. So, conservation practices, which I'm all for, have to be economical, whether that's cost-sharing or however it's done."*

Although this family acknowledged that watershed management on a small geographic scale is effective, they suggest incorporating small-scale watershed planning into a larger landscape level strategy (PN6). They believed that this approach can be applied to watershed improvements at a regional level. One participant explained this perspective:

> *"I believe that smaller watershed plans are essential but they have to be a part of a bigger picture. If you look at the Little Beaver Creek watershed that we're dealing with, we started out small, and dealt with four [small watersheds], now we're going to expand with two more. It's just one small block in the overall watershed that goes into Waurika Lake down there. But what about Big Beaver? Those are also contributing areas, so there are other pieces for the puzzle there that we can always utilize smaller watershed plans to be a part of a larger watershed plan."*

Outreach and Education

This family highlighted the importance of a strong working relationship between landowners/producers and watershed managers. They believed it is important for landowners/producers to have an awareness of BMPs and suggest that strong relationships with resource managers can enable important information exchange (PN15, PN1). Participants indicated that without those relationships, important engagement opportunities are lost:

> *"It's no use to have all this technical [and financial assistance] if nobody can listen to you, if you can't build a relationship with your producers. So I think it's really important that you have a relationship with them."*

This family implied that the non-agricultural community members do not need to play an active role in watershed management (PN33) and suggested using a cautious approach with public outreach to avoid conflict and alarm in the non-agricultural community. One participant warned of the potential for a contentious public attitude towards landowners/producers:

> *"You have to be careful about involving the public. Don't involve the public in something they know nothing about. The public turns on the landowners. 'It's your fault. Your cow is pooping in my creek.'…I do believe we, as landowners, should definitely take an active role, us as producers. But as far as involving the entire community, I don't want to say no to that, but you've got to be selective on how you present it to the public because it can create a scare."*

Additional Watershed Priorities

This family believed resource managers should not consider the potential impacts of climate change in their watershed (PN32) because they felt there is too much uncertainty surrounding the topic and thought that climate change is irrelevant to watershed management. One participant simply stated:

> *"There's just so much up in the air about climate change. I don't know why that applies to anything here."*

More so than the other families, this family put a higher priority on the usefulness of a user-friendly website to communicate watershed information (PN20) and a lower priority on educating students of the importance of soil and water conservation (PN22). Finally, this family agreed that water quantity concerns are equally important as water quality concerns (PN29). One participant explained:

> *"Water quality is very important. But come a drought, we won't have any water to qualify. I think that's really important."*

Priority Family 3: Education

This priority family included a total of five participants who identified as landowners/producers and NRCS staff. This family highlights the importance of education (PN1, PN12, PN17), technical and financial assistance (PN3, PN8) and biological integrity (PN34) as key factors of successful watershed management (Table 8).

Table 8. Priority Family 3 Framework: Education

Priority Narrative 3: Education				
PN	**Priority**	**PV**	**DP**	**CP**
High priorities				
17	Watershed stakeholders need to understand the sources of water resource issues.	5	x	
34	Measurably cleaner water should be an outcome.	4		
3	Technical and/or financial assistance for those who qualify is necessary.	4		
1	Landowners/producers should know *what* best management practices are and *why* they should be used.	3		
12	The public needs to understand how a healthy and balanced watershed can benefit them.	3		
8	Conservation practices should be adopted on more acres.	3		
Low priorities				
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	-3	x	
30	The watershed should have a user-friendly website that contains watershed information.	-3		
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3		
35	Producers/landowners/businesses should be required to adopt best management practices.	-4		x
36	The watershed needs to be in an impaired or degraded state.	-4		x
9	Only local organizations should be involved.	-5		
Additional distinguishing priorities				
23	The public should be aware of the range of resource issues associated with their watershed.	1	x	
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	-2	x	
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	-1	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The "x" indicates the DP and CPs identified by the PQMethod software.
PN=Priority number
PV=Priority value
DP=Distinguishing priority
CP=Consensus priority

Public and Producer Education

This family emphasized the importance for stakeholders to understand sources of water resources issues as well as the benefits of a healthy watershed (PN17, PN23). They discussed a changing demographics in their watershed and suggested the need to educate the public about non-agricultural contributions to water quality concerns. One participant explained how education can improve the management of their property:

> *"It's not just the farmer anymore. There's a guy that has five acres that's also on the watershed, who has no cows, who's dumping his trash in the creek or whatever. And I'm right next door to him, building fences and manure ponds…You have to inform and educate them so they can make the right decision [for their property]."*

Describing the connection between public support and project funding, this family believed the public should understand the benefits of watershed health and recognize the agriculture community's efforts to improve it. For example, one participant explained the benefits of public buy-in and support:

> *"Everybody needs to know what we're dealing with and the public needs to understand the benefits. If the public doesn't understand, they're not all in. A lot of people think that what we're doing has no effect on them, when in actuality a lot of what we do impacts a lot of people. We're talking about taxpayers, and that's where we get our money to fund these programs, so I think that's really important. The public knows what we're doing and they're all in, too."*

Although they did not prioritize preserving stakeholders' livelihoods (PN10), this family suggested that poor practices are often a result of lack of awareness. A participant explained that educating producers can raise awareness and encourage changes to their operation that result in on-farm and environmental benefit, for example:

> *"Those livelihoods sometimes depend on poor practices…If they're going wild it may not actually be something that's making them money, but they think it is. [Education] always has to play a factor in it. For example, if they have cattle drinking out of a creek, they don't understand that their quality of water will make their cattle healthier, that's an education thing. It's not necessarily that we're jeopardizing their livelihood. There's not an education there that's going back and forth. So you still have that livelihood, but it'd just be a change."*

Technical and Financial Assistance

This family highlighted the need for technical and financial assistance as well as awareness of BMPs and the on-farm benefits of adoption (PN1, PN3). They agreed that technical and financial assistance is a top priority for successful watershed management and emphasized the financial value technical assistance can provide. For example:

> *"A lot [more] people would buy into doing water things if they know that they can financially make it happen. I wouldn't know how to go out and lay my terraces to make it do better, that falls under technical assistance. I know I want to do it, but am I going to be able to do it without help? Heck no. Not until I get the farm paid for or the cattle paid for and this and that. But at the same time, if it gets done, it'll help me pay for that stuff faster. So it's kind of a catch-22."*

Additional Watershed Priorities

Acknowledging the need for measurably cleaner waters (PN34), a participant discussed the importance of clean water in broad terms and focused on its present and future impacts to their community, for example:

> *"I think that's our whole goal. We shouldn't lose sight of our goal and what we're doing. There is a big social aspect to it, but this is why we're here. We want cleaner water. Not just for our cows and our animals and our grass, but also for our kids."*

This family indicated that local organizations benefit from the support of federal and state agencies and agreed that conservation practices should be adopted on more acres (PN9, PN8). They did not prioritize including impacts of climate change in their watershed plan or the use of a user-friendly website (PN32, PN30). Finally, they suggested that local stakeholders do not need to be a top priority for resource managers, and did not prioritize incorporating local knowledge into the management plan (PN2, PN25).

Priority Narrative Consensus Priorities

All three families agreed that a watershed does not need to be in an impaired state to receive attention (PN36) and suggested a proactive approach to watershed management as opposed to a reactive approach. Citing biological and economic reasoning, one participant shared their opinion:

> *"If you wait to the point where it's degraded, you're too late. On the economic side of it, implementation is going to be either too expensive or too hard. Conservation is a preemptive strike, not during and not post… An ounce of prevention's worth a pound of cure. It takes way more resources to bring something back from the dead than it does to keep it from dying."*

These families also emphasized that BMP adoption should remain voluntary (PN35). One participant suggested that a voluntary-based approach to conservation has proven to be effective in the past and highlighted challenges associated with regulatory enforcement:

> *"The conservation model works very well. We've proven voluntary incentive-based conservation to be a successful model here in the state. We have some improvements to make but the landowners care about what they're doing. They need education and support, that's what we need to do. As soon as we go in there and start trying to regulate. It's an untenable approach. We can't even regulate the areas that we do regulate right now."*

They believed the best approach is to work together and find compromise, rather than imposing regulations:

> *"I don't think [regulatory enforcement] is an option, they're going to dig their heels in no matter what. There's a way to do this. We have to meet in the middle and we have to work together."*

Priority Narratives Compared

Visual comparison of the priority values assigned for each priority narrative.

Table 9. PVs compared across priority narratives

PN	Priority	Priority Family (PVs)		
		1	2	3
1	Landowners/producers should know what best management practices are and why they should be used.	1 D	3	3
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	-1 D	3 D	-3 D
3	Technical and/or financial assistance for those who qualify is necessary.	-2 D	4	4
4	A watershed plan is necessary.	4	1	2
5	Land and water should have species diversity.	-1 C	0 C	-1 C
6	Management should be done at a small geographic scale.	-1 C	-3 C	-2 C
7	Students (elementary through college) should understand the importance of soil and water conservation.	1	-1 D	1
8	Conservation practices should be adopted on more acres.	0	1	3
9	Only local organizations should be involved.	-4	-1 D	-5
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	2 D	5 D	-2 D
11	Watershed managers should actively engage with the community.	0	-2	0
12	The public needs to understand how a healthy and balanced watershed can benefit them.	1	-1	3
13	Funding should be budgeted specifically for outreach and communication.	-1 C	-2 C	-1 C
14	Watershed information should be communicated using diverse methods and reach a broad public audience.	-2 C	-2 C	-2 C
15	A strong working relationship between producers/landowners and watershed managers is important.	4 C	3 C	2 C
16	One-on-one interactions between resource managers and producers/landowners is necessary.	3	2	0
17	Watershed stakeholders need to understand the sources of water resource issues.	1	2	5 D
18	The watershed planning process should include diverse groups of people working towards a common goal.	0 C	0 C	0 C
19	A management plan should support activities that include recreation, economic and environmental benefits.	0 C	0 C	-1 C
20	Communicating about soil health is more effective than communicating about water quality.	-3 D	1 D	-2 D
21	Water monitoring is necessary.	0 C	0 C	1 C
22	Achievable water quality goals and targets should be set to show water quality improvements.	3 D	-1	0
23	The public should be aware of the range of resource issues associated with their watershed.	-1	-2	1 D
24	A clear plan for public involvement/engagement should be included in a watershed management plan.	2	-1 D	1
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	2	1	-1 D
26	There should be a flexible plan that allows for changes in management over time.	0	4 D	0
27	Negative effects of watershed management on downstream stakeholders should be minimized.	-3 D	2	2
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	2	0	0
29	Watershed managers should focus on water quality issues over water quantity issues.	-4	-3	-1 D
30	The watershed should have a user-friendly website that contains watershed information.	-2	0 D	-3
31	Watershed management should benefit my community and communities downstream of my watershed.	3 C	1 C	2 C
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-2	-4	-3
33	Community members should take an active role in watershed management.	1	-3 D	1
34	Measurably cleaner water should be an outcome.	5	2	4
35	Producers/landowners/businesses should be required to adopt best management practices.	-3 C	-5 C	-4 C
36	The watershed needs to be in an impaired or degraded state.	-5 C	-4 C	-4 C

D=Distinguishing priority
C=Consensus priority
PN=Priority number
PV=Priority value
Priority Family 1: Stakeholder Inclusion and Concern
Priority Family 2: Communication and Engagement
Priority Family 3: Measurement and Flexibility

PV Color Key

5	
4	
3	
-3	
-4	
-5	

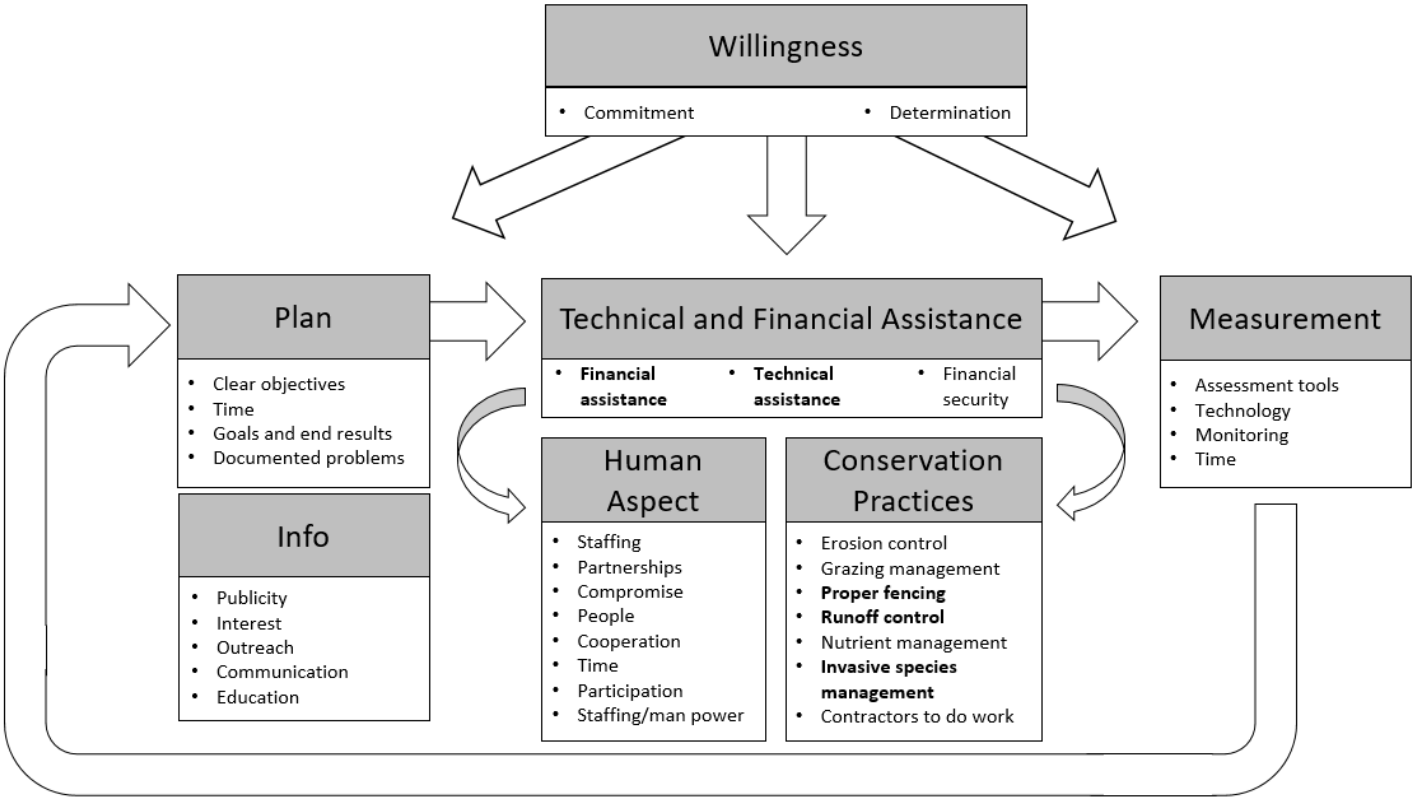
3.1.3 Resource Needs

Discussion Group 1

Group 1 developed seven broad categories of resource needs and identified 33 individual resource needs for successful watershed management (Figure 3). The seven categories include 1) Willingness, 2) Plan, 3) Info, 4) Technical and Financial Assistance, 5) Human Aspect, 6) Conservation Practices, 7) Measurement.

This group believed a willing and driven community is important for successful watershed management and suggested that these attitudes influence other key components. With commitment and determination, this group believed that a publicized plan with clear goals can provide technical and financial assistance to support conservation staff and conservation practices implementation. Finally, they highlighted the need to measure watershed improvement over time and incorporate results into future watershed plans.

Figure 3. Mind map for Discussion Group 1



Bolded resource needs were provided by survey respondents

Willingness

This group believed successful watershed management needs conservation staff and producers in the watershed community to be willing to put in the work needed to accomplish watershed goals. While motivated staff is important, one participant noted that producers' willingness to make long-term commits to maintaining BMPs on the ground would have long-lasting and positive impacts in their watershed:

> *"It's not just a one-way street. Its staff and technical experts, but also the folks on the ground making it work every day. Those guys [need to be] committed to putting practices on the ground, stand behind it and do the long-term operation and maintenance on it…what we're looking for is long-term goals and objectives being met…Sometimes you have clients that are looking to make as much money as they can in as short a period as possible. Others are true stewards of what they planted out there, and they're really looking forward to making it better than when they found it."*

Plan

This group highlighted the need for a plan to improve watershed health that includes goals and objectives to direct plan implementation. This group believed watershed plan goals should address documented impairments in the watershed and include a realistic time frame to accomplish goals set in the plan. While discussing goals and objectives, one participant expressed the need to identify existing problems in the watershed, for example:

> *"There has to be something going on out there to create the necessity to have [a plan]…If there's not an existing problem, what's the point of the plan?[We need] documentation of a problem."*

Info

This group discussed the importance of promoting the watershed plan to potential BMP adopters. They believed that effective outreach can raise awareness of resource concerns and promote available technical and financial assistance programs to potential adopters in the watershed. Such outreach, in turn, would increase BMP adoption and contribute to overall watershed plan goals and objectives.

Technical and Financial Assistance

This group described technical assistance as an overarching need for successful watershed management. They believed it should be used to assist producers in implementing BMPs on the ground as well as funding staff with technical expertise to assist producers as needed. For example:

> *"Technical assistance is some of everything. It's people. It's information. It's financial because you have to pay the people to get that. So it transcends."*

Financial assistance plays a major role in reducing financial barriers associated with adopting BMPs. A participant shared that some producers in their watershed farm part-time and have a full-time job working in the oil industry, which at times, can be unpredictable. Due to the volatile nature of the oil industry and the need for producers to maintain a profitable operation, this group suggested that financial assistance can provide additional financial security to producers and could increase BMP adoption. For example:

> *"Some of our applicants are people who want to do it, but [they hate] signing on the dotted line because they know their job is gone with Halliburton. That's just the up and down cycle [that effects the] majority of our people. So that uncertainty says, 'I know I want to do this. I know I need to do this, but I can't guarantee that I can move toward that.'"*

Another participant saw a relationship between the number of applications for cost-share programs and the economic conditions in the county:

> *"Application numbers start to decline, and some of that was financial because we had a downturn in the economy here in the county."*

Human Aspect

Engaged staff and effective partnerships are an important part of the human aspect category. Participants described successfully recruiting applicants in the past and attributed that to a need on the ground. In addition, however, they emphasized the work partner agencies did to raise awareness and engage producers with one-on-one interactions. For example:

> *"The first year that we had Little Beaver emphasis areas, participation was pretty high. We had a lot of applicants and that was for two reasons. Number one there's an immediate need out there on the ground, but we also had some great partnerships with our state employees that went the extra mile to help us get that word out. So that kind of stretched over the information thing. It dealt with the people part of it."*

Conservation Practices

This group described this category as necessary actions – adopting BMPs – needed to achieve watershed plan goals. While most needs in this category were described as conservation practices, one participant highlighted the need for technical expertise to implement and maintain the practices:

> *"[For] grazing management you dig water wells and pipelines and all that. You have to have the well diggers and the fit builders. Stuff like that is important. If we didn't have anybody to dig the well there, we're stuck."*

Measurement

Finally, this group identified the need for watershed assessment tools to monitor water quality throughout the duration of the project. They also highlighted the need for results to inform current watershed management projects as well as the development of future management plans. Participants acknowledged that measurable change in water quality takes time, one participant stressed the importance of maintaining a realistic time frame to observe results:

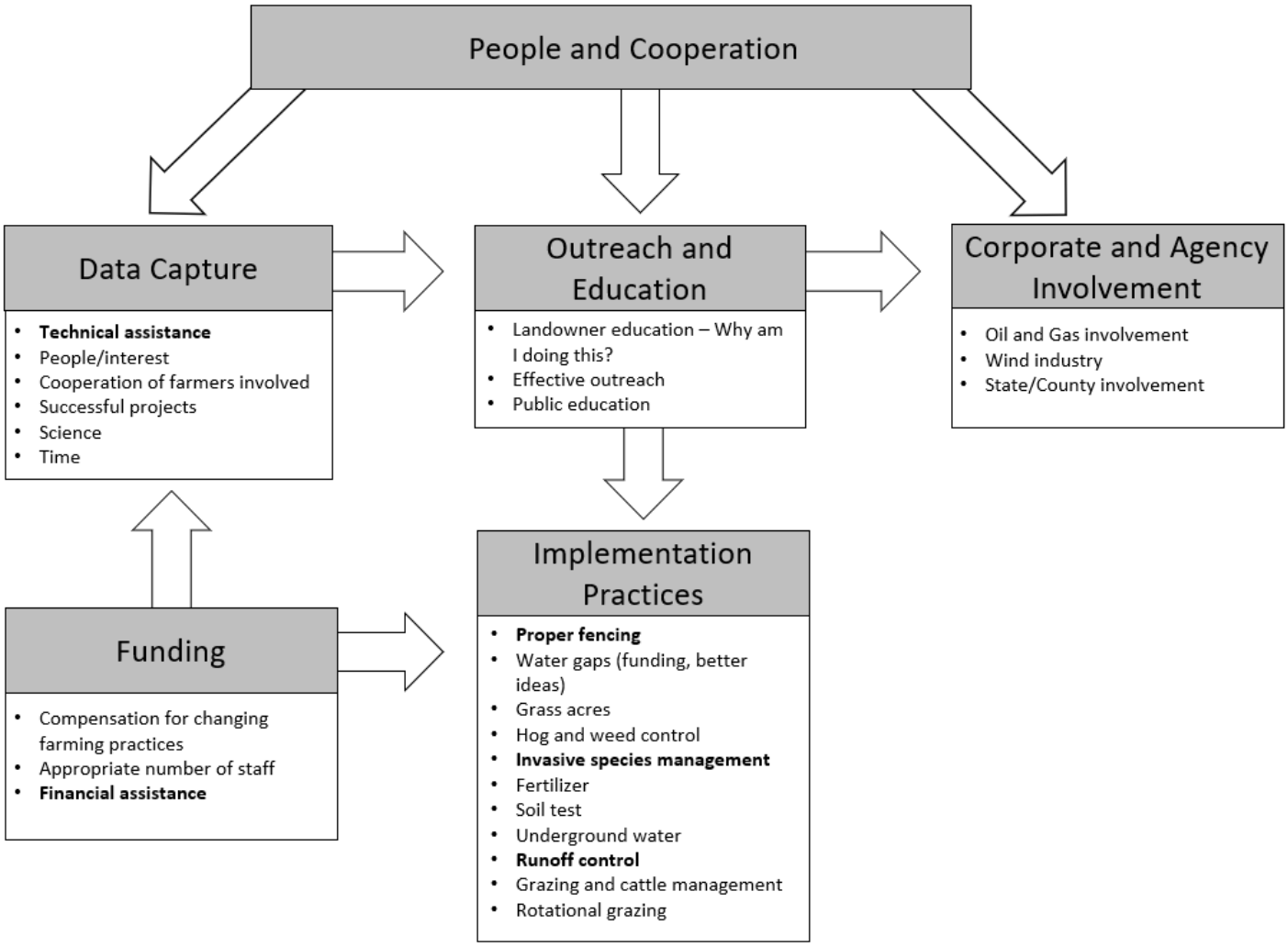
> *"None of this can happen overnight…We have to be patient so we have the time to do stuff."*

Discussion Group 2

Group 2 developed six broad categories of resource needs and identified 26 individual resource needs for successful watershed management (Figure 4). The six categories include 1) People and Cooperation, 2) Funding, 3) Data Capture, 4) Outreach and Education, 5) Implementation Practices, 6) Corporate and Agency Involvement.

This group highlighted the need for producer buy-in and cooperation from the public throughout the watershed management process. They emphasized the importance of funding water quality data monitoring as well as financial assistance to mitigate the costs of implementing BMPs. Additionally, they believed that successful watershed management should include effective outreach to producers and the public, as well as buy-in and support from corporate, state, and county entities.

Figure 4. Mind map for Discussion Group 2



Bolded resource needs were provided by survey respondents

People and Cooperation

This group recognized that successful watershed management depends on collective action and support from the watershed community as well as people with technical expertise. They highlighted the need for buy-in from producers, educators, and major industries, as well as technical expertise from the science community. For example:

> *"I mean because there's different sets of people. There's the data people, the science people, the educators because a lot of people who capture data…. We have to have communicating to the public…"*

This group believed successful watershed management depends on a willing watershed community. One participant emphasized the need to understand how the community values their water resources. For example:

> *"People's interest in terms of value and connections with their resource. [We] need to understand that for successful management... because everyone has different opinions about what [success] means."*

Funding

This group identified the need for funding to support NRCS staffing resources across the state. They felt that without adequate staff, NRCS would not be able meet the technical assistance needs of producers in their watershed. Although NRCS provides technical assistance services to producers, if they don't have enough staff to administer the assistance, they cannot provide those services to their community. For example:

> *"I would put appropriate number of staff into funding.…To put it into perspective…there's supposed to be[a soil conservationist] in every county from here to Kansas - There's five of us in our central zone stretching from Kansas to Texas. That's pretty thin."*

This group also indicated that financial assistance and compensation to change farming practices would incentivize producers to participate in programs that work to improve watershed health. They felt that these types of financial assistance could also help mitigate financial barriers associated with BMP adoption.

Data Capture

This group acknowledged the importance of documenting successful projects and believed that using past experiences to inform new projects would increase the likelihood of achieving watershed goals. A participant explained:

> *"There's a lot of stuff we've already tried. Some of them did work, some of them didn't. Go to what worked. Successful projects."*

They discussed the importance of using science-based information to provide concrete data that measures success of watershed management. Additionally, they believed communicating this information helps the public understand that the agricultural community is contributing to water quality improvements. For example:

> *"I'm talking about the technical capacity to put solid facts behind what constitutes success. When you can hand someone a fact that says this stream used to have an issue with bacteria, it no longer does… we're out here to objectively assess the water and have hardcore facts that can show you we got good water quality right in the middle of working lands America. Science helps the public accept that."*

Outreach and Education

Noticing an increasing amount of "hobby farmers" in their community, this group indicated a need to increase education and outreach to them. They described hobby farmers as urban or suburban people who purchase small plots of land (10-20 acres) with the intent to farm or raise livestock. They suggested increasing outreach to this emerging group of farmers because this group has less experience managing a farming operation than conventional producers and landowners in the area. These farmers could benefit from additional guidance and information from NRCS, as well as an understanding of programs and services NRCS offers. A participant explained:

> *"It's really important that we have effective outreach and let people know how to better – especially with new farmers. You have a lot of breaking big [parcels] into little [parcels], so it's important to inform these people …You get a lot of people who say, 'I bought ten acres. I've got a house on one and I want to have 10 cattle, 5 chickens, and a row of crops. Help me do this'. People just have this thought of having farm of having land, whatever you want to call it. Then they just don't understand and we need to educate them."*

This group also believed it is important to educate conventional producers and landowners who purchase large parcels of land. One participant suggested including information about NRCS for producers in the abstract of the property (complete legal description of the property) so new landowners have an idea of what services are available to them. A participant shared an example:

> *"A friend of mine bought 40 acres and I said, 'You need to go to the office and sign up!'...He didn't even know what the NRCS office was or FSA office was. He just didn't know, and he was happy to go do it. He went down there and signed himself up. There's a lot of information in that abstract. [It should say] go by your local FSA or NRCS office so you can know that it's an option."*

Implementation Practices

This group described this category as practices that, when implemented, would contribute to successful watershed management. A participant explained:

> *"In terms of like water quality…Those are all things you have to practice, you have to implement...[If] you manage correctly, you reduce the water quality impacts."*

Corporate and Agency Involvement

Participants suggested that the oil and gas industry should be aware of watershed management efforts because of their large presence on the landscape. For example:

> *"They need to be made aware. They're just involved in the land as we are."*

They emphasized the importance of state and county departments to support watershed management efforts and shared challenges associated with various state and county department constraints. Citing issues with the Department of Transportation's (DOT) management of roads and bridges a participant described a situation where DOT installed rocks to mitigate erosion around a bridge. In a flood event, rocks washed into the stream and onto the participant's private property. Due to their inability to work on private property, DOT was unable to provide assistance to clean up the mess on the private property or in the stream. Participants believed these types of challenges impact watershed health as well as their own farming operations:

> *"That's a huge bridge that needs maintenance. But when their maintenance rolled into my pasture…there's nothing they will do with it … I don't know all the compromises there between us and the state, we got do something about sharing that private versus public property."*

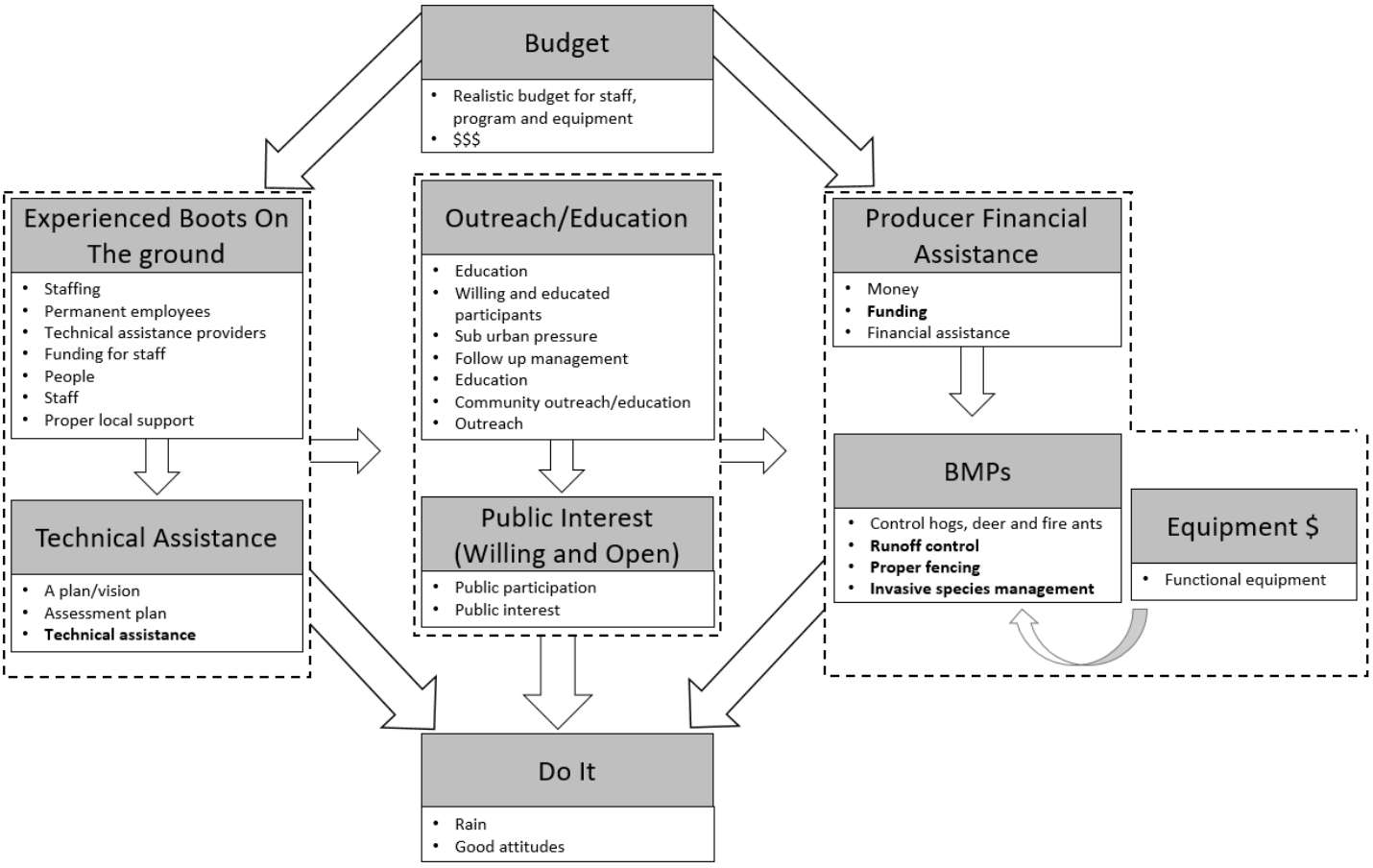
Discussion Group 3

Group 3 developed nine broad categories of resource needs and identified 33 individual resource needs for successful watershed management (Figure 5). The seven categories include: 1) Budget, 2) Experienced Boots On The Ground, 3) Technical Assistance, 4) Outreach/Education, 5) Public Interest, 6) Producer Financial Assistance, 7) BMPs, 8) Equipment, 9) Do It.

This group highlighted the need for a realistic budget that can support staff as well as provide technical and financial assistance to producers. They believed increased staff resources would have a positive impact on producer participation as well as public support for watershed management projects. This group also suggested including equipment costs in financial assistance could facilitate additional BMP adoption and lead to successful watershed management. One participant described this group's overall resource strategy:

> *"I would think you start with the outreach, then you would get public interest, then you'll provide technical assistance since you've got all this money. Then, hopefully, it'll rain. We'll all have good attitudes, and we'll get it done."*

Figure 5. Mind map for Discussion Group 3



Bolded resource needs were provided by survey respondents

Outreach, Education and Public Interest

Participants in this group believed that public interest is needed to raise awareness and support of watershed management. They indicated that outreach and education are needed to promote resources available to producers and potential adopters, as well as the importance of watershed health to the broader public. For example:

> *"You can have education for producers, people who live in the watershed and people who don't even live the watersheds [because] we're working with water for Waurika [Lake]. Community education and outreach as well as producer education and outreach."*

This group described an interconnected relationship between outreach, education, and technical assistance. They highlighted the need to raise producer awareness of technical and financial resources available. A participant explained:

"Some people just don't understand the program, or don't know about it, or have no awareness of it at all … I mean, if you can't even get in the door or they won't even talk to you, then you don't really have anything to offer them."

Recognizing an increased population of ex-urban hobby farms who are new to the agriculture community, this group suggested this population could benefit from additional information about resource management and watershed health. For example:

"These are the urban folks buying up land and not necessarily managing it properly or farming…Outreach and education would be important for that group, so they'd understand what the watershed is and what it functions as."

Implying that downstream water users are largely unaware of challenges associated with watershed health, this group suggested that municipal consumers could benefit from an increased awareness of the source of their drinking water and what impacts its health and viability. A participant simply explained:

"They still need to understand where their water comes from and what affects it."

Budget

This group indicated a sufficient budget to address the full spectrum of project needs (including technical staff, program administration, and producer assistance) is necessary for successful watershed management. For example:

"A realistic budget. Instead of throwing program dollars at something and expecting an end result with $500 and it takes a million. Give us a realistic budget to do something with, and we'll do it."

They also stressed the importance of funding permanent staff to administer technical assistance in the field and staff to manage the clerical responsibilities of the program. A participant explained:

"If you don't have money to help the producer do their thing, they're going to say, 'Okay. But how do I pay for it?' So all the technical assistance in the world doesn't do them any good if they don't have help implementing the program."

Technical Assistance and Experienced Boots on the Ground

Another important component for successful watershed management identified by this group was experienced "boots-on-the-ground". Participants underscored the importance of technical expertise in the field that have the capability to understand the nuances of a producer's operation and provide sound advice that producers can trust. For example:

"Somebody that's there to make sure everything is implemented properly. A go-to person…Just somebody that knows the inside-out of everything. An expert."

Noticing a reduction of NRCS staff over time, one participant highlighted the importance of one-on-one interactions with producers. For example:

"Having more people on the ground to interact directly with the producers from NRCS. So he's not trying to cover how many counties he covers."

Producer Financial Assistance, BMPs, and Equipment

This group believed that providing producers with financial assistance can encourage them to participate in programs by offsetting financial risks associated with implementing new or different practices into their operation. Additionally, they shared that equipment costs can be prohibitive, and producers could benefit from financial assistance that addresses those costs.

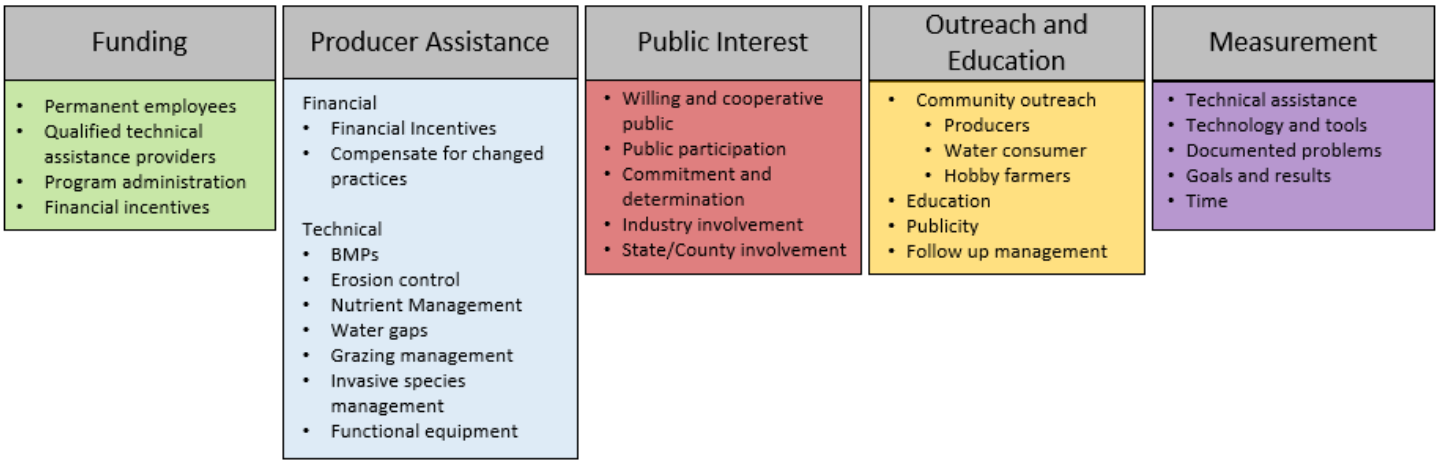
Do It

This final category highlighted the need for participants to have a good attitude and also acknowledges that some necessary components for success are outside of their control. For example:

"If you have all of that and a good attitude, you can do it…and rain."

Combined Groups

Figure 6. Combined group resource needs



Funding
Participants highlighted the need for funding to support permanent staff who have the expertise to provide technical assistance to producers in the watershed. To increase enrollment and BMP implementation, they indicated a need for a realistic budget to support qualified staff that have the time and resources required to provide effective technical assistance. Additionally, participants emphasized the importance of financial incentives to encourage producer enrollment in NRCS cost-share programs.

Producer Assistance
These groups identified technical and financial assistance as an important component for successful watershed management. They believed financial assistance is needed to mitigate financial risks associated with adopting BMPs, which could also incentivize producers to participate in NRCS programs. Technical assistance was believed to play a key role in BMP implementation once producers are enrolled in an NRCS program. Moreover, the groups suggested that a "boots on the ground" aspect of technical assistance, would be import to successful BMP implementation.

Public Interest
Public interest and cooperation were important to these groups because they felt that public support of healthy watershed management is needed for success. Participants recognized that producer participation is needed for successful watershed management and believed public interest can influence producer buy-in. Some groups also highlighted the benefits of collaborating with different sectors (e.g., wind, oil and gas) as well as working with state and county partners.

Outreach and Education
Outreach and education to conventional producers, hobby farmers, and water consumers were recognized as a major component of successful watershed management. While each group requires different information, the groups suggested that it is important for the public to be aware of issues related to watershed health, and for producers (conventional and hobby) to understand their impacts on water quality, as well as actions they can take to reduce their contribution to water quality impairments.

Measurement
Participants believed that water data is essential to successful watershed management. Collecting water data can feed into resource impairment documentation as well as the measurement of water quality improvements and subsequent project successes. This information can be used to inform the adaptation of current and future watershed projects. The groups also highlighted the need for adequate technology and time for accurate results.

3.1.4 Identify Elements of a Successful Outreach and Education Strategy

This section documents participants' discussion around recipients of watershed-related outreach and education, important content to include, as well as effective methods of outreach and education delivery.

Recipients

Landowners and Producers

Participants acknowledged the importance of outreach and education to landowners/producers because this group directly impacts water quality and have the potential to contribute to the improvement of watershed health. Because the way landowners/producers manage their land impacts water quality, participants believed this stakeholder group needs to be aware of water quality issues as well as BMPs that provide on-farm benefits and watershed health solutions. Emphasizing the need for producer awareness, one participant explained:

> *"We're trying to combat [water quality issues] by informing landowners that water quality is affected by how they manage their land. We need to correct these problems right now with those landowners."*

Participants also emphasized the need for collective action and producer buy-in. They believed outreach and education works towards achieving the critical mass needed for measurable change and suggested that water quality goals would be difficult to reach without adequate producer buy-in:

> *"Say you have 100 producers. If two do right, and the other 98 don't do anything, you still got the same problem. You just have two guys thinking, 'Okay, I'm doing good,' but the rest of the watershed is not benefiting."*

Acknowledging the role of non-operating landowners, participants recognized the importance for this group to also be informed. When land is leased to a producer, the landowner is often the ultimate decision maker and should understand the impact their management decisions have on watershed health. One participant explained the need for landowner awareness:

> *"If the landowners don't understand, most of the time the producers don't get to do it."*

Participants observed an increase in small hobby farms operated by ex-urban landowners. These landowners are new to the agricultural community and participants discussed the need to educate these less experienced producers:

> *"I think that's what you see most of, is mismanagement. They put too many animals per acre out there and soon, they're dealing with a soil erosion problem because they have no grass left."*

General Public

Participants highlighted the need to engage the general public to increase their understanding of food production and the value of agriculture. In addition, a participant suggested that no matter the size of the parcel, everyone is a land user and should be aware of how their actions impact the water resources. For example:

> *"Those folks that own their 750 square yards in town, and take enough of those folks together and they have an acre or 10 acres and then 20 acres. They are landowners and users just like [those of us] who operate 1500 acres at a time."*

School-aged children were identified as key recipients of outreach and education because participants believed that their understanding of soil and water conservation is important for future conservation efforts. While there are organizations that focus on youth engagement, (e.g., FFA and 4H) participants suggested youths who have less exposure to the agricultural community could benefit from an understanding of soil and water conservation. One participant explained:

> *"You only get the ones that are interested in that. You're not reaching that group you need to be reaching because most of the people are already FFA and 4H kids. We're trying to reach that other group."*

Community Partners and Legislators

Participants believed it is important for legislators to be aware of efforts to improve watershed health because they can influence funding and policy related to agriculture and watershed health. Community partners were also mentioned as important recipients because they can reach different stakeholder groups and leverage resources to reach a larger audience. Participants thought that raising awareness of watershed efforts to legislators and community partners could increase a public understanding of watershed-related issues and contribute to broader community awareness that would have a positive impact on watershed health:

"Maybe having a bigger partnership with the [stakeholders] inside that [watershed]. For example, inside there's [Bureau of Indian Affairs] land, commissioned school land, cities that need drinking water and county commissioners that are going to have roads through all the counties."

Content

Public Awareness and Success Stories

Participants expressed a need to promote awareness of watershed health related issues as well as success stories to the general public and the agricultural community alike. They highlighted the need to raise awareness of water quality issues, and to promote overarching public benefits of improved water quality. For example:

"One of the messages should be that there is a true problem out there. The problems are existing, and they're not going to go away if we just ignore them."

Another participant suggested framing the message to focus on preserving the integrity of their resources for future generations:

"We're not there yet, and we're not done yet. We still have generations on this earth that have to use these same resources and that we've got to change the way we're doing this."

Participants recognized the need to communicate that solutions are achievable through voluntary action and support from state and federal agencies. They suggested that while it is important to acknowledge existing problems, it is equally important for the general public and landowners/producers to understand that their actions will result in improved watershed health. One participant explained:

"The message should be that we've got goals that can be accomplished. We have opportunities to improve our resources now, and we have assistance from the federal level, state level, and all that."

Another participant suggested sharing success stories of producers' experience with watershed management and implementing BMPs. Participants believed that communicating success stories could build on the momentum of other successful projects and provide evidence that watershed improvement is achievable. One participant suggested:

"Build up the success of existing watersheds. As we move to new watersheds and bring them into the program, those producers share with the [new watershed's] landowners."

Participants acknowledged that water quality improvements take time and believed that producers/landowners and the general public need to have a realistic expectation of timeframes associated with measurable water quality improvements. One participant explained this challenge:

"We're in a society that believes in quick fixes. This didn't happen overnight. It's not going to get fixed overnight."

Participants also discussed the need for legislators to understand that their funding decisions have widespread impacts on the agricultural community and their ability to address water quality issues. For example:

"Legislators and agencies [need to know] that the dollars are extremely important. There's got to be something in the budget for it…They have an opportunity to help everybody in their district as a representative with some funding."

On-farm benefits

For landowners/producers, participants underscored the importance of articulating on-farm benefits of participating in watershed management efforts and BMP implementation. Emphasizing a landowners/producer's need to maintain a profitable operation, a participant explained:

"In order to get people to do things, you got to show them the benefit, no matter what it is. Whether it benefits them a little bit or a lot. Look at it from the perspective of the landowner and the guy that's riding in the land. If it costs money, the landowner's the one that pays for it. He needs to know that it's going to benefit him and the producer both."

Although resource managers have landscape-scale objectives for improving watershed health, they recognized that landscape-scale changes begin with incremental on-farm improvements. A resource manager explained:

"To get the big picture, you got to go with the little pictures first, and the little pictures is educating and making [farmers] understand how beneficial it is to them…[Big picture], we're looking at Waurika Lake, and then we take it down the next step and we're looking at Little Beaver Creek because it's an impaired stream. Then we're

going to take it down to field scale and say, 'If you lose ten foot off that bank every year, look at how it's advancing across your property.' Little things like that…We can promote soil health and all the systems around it, then tie it to economics and cost savings."

Although Waurika Lake is a municipal water supply, most producers do not use municipal water and do not directly benefit from an improved municipal waters supply. With this in mind, participants suggested downstream benefits do not motivate upstream producers, for example:

"Why would people that have no benefit from Waurika Lake or anything downstream, why would they spend money on something like this if they don't feel there's a benefit [to them]?"

Emphasizing the idea that a message to promote personal benefit is more effective than focusing on improving environmental conditions, participants acknowledged challenges associated with convincing producers to change their operation for environmental benefits they don't experience. One participant explained:

"I don't know how you would get to some of these people…[who say] 'why should I fence off my cribs and dig wells and spend that money for Waurika Lake, which I get no benefit out of?'…How do you get people to buy-in environmentally for others?"

Programmatic Awareness

Participants identified a need to inform producers of technical and financial assistance programs for which they are eligible. They also suggested providing participating producers reminders and information about upcoming deadlines to ensure participants submit required paperwork on time. Additionally, producers should be made aware of the suite of conservation practices available to them, so they can choose the best options for their unique operation. For example:

"Maybe there are multiple solutions that would work rather than just one. What's appealing to that landowner, versus one on the other side of the fence that would rather do something different, maybe there are multiple options for each of them that all achieve the same goal."

Promote the value of agriculture

Finally, participants believed the non-agricultural public lacks an understanding of the effort required to produce common products they consume on a daily basis. They felt it is essential for the public to be aware of benefits the agricultural community provides and respect the work that goes into agricultural production. For example:

"They have no idea the scale of work and time involved – I think it's so important to get out there and see how hard it is to make that bread, to make that hamburger, to put that stock on the shelves."

Delivery

Additional staff resources

Participants believed effective delivery of outreach and education depends on an increased presence in the community. To improve visibility in the agricultural and non-agricultural community, participants suggested an increase in staff time dedicated to outreach and education. While participants noted that target communities (agriculture and non-agriculture) have different outreach and educational objectives, they agreed that both could benefit from increased interactions with resource managers. For example:

"We just don't have the number of people to go out there and knock on doors and shake hands and say, 'We're here to help. We truly have something to offer.' We do the best with what we have and what we can, but it's limited."

Participants indicated that much of the outreach and education in the agriculture community is conducted through technical assistance. They expressed the need to increase permanent staff and reduce contracted workers, as the existing permanent staff is already familiar with the community and has developed trusted working relationships with producers. Participants also suggest that a lack of available staff to provide technical assistance has negative impacts on producers' willingness to adopt BMPs. For example:

"We need people that have the time and the ability to get into the field with producers and really do a good job. I can remember when we had time to do follow-up. We would go out and meet with producers on land uses and things we had actually worked on two and three years before to follow-up with them to see how that was working for them and see how it was better. And that was part of our job. And now we don't have time hardly to get out one time much less go back and follow-up."

Peer-to-peer

Another important method of delivering outreach and education is through peer-to-peer information exchange. Participants believed that producers learning about conservation practices through the experience of their peers can provide an opportunity to increase knowledge through messengers that offer more credibility than that of resource managers. Recalling a meeting with both producers and university staff as speakers, a resource manager recalled producers were most interested in hearing information from their peers rather than from the university. A resource manager explained:

> *"The best people are the ones that have done work with you before that go tell their buddies. Word of mouth is really the best. Years ago, when no-till started, we'd have no-till meetings, and we'd have a panel. Four or five guys who had been doing no-till for five years, twenty years, whatever. That's who everybody wanted to hear from. Didn't necessarily want to hear from the PhDs, and all the charts – it was good information, but they wanted to hear from other producers."*

Targeted outreach

Participants suggested a targeted approach to outreach and education by making an extra effort to contact producers in priority watersheds. They thought that this could raise awareness of specific issues in producers' own watershed, as well as their eligibility for additional technical and financial assistance. For example:

> *"If you're talking about Little Beaver Creek watershed, you're funneling down the people that it impacts, and you've got a smaller scale. Figure out every producer in that funnel and send them a letter."*

Public connections

Participants underscored the need to connect with the public. They suggested engaging urban populations at farmers markets, developing a catchy watershed health strategy to engage the non-agricultural community, and providing hands-on activities to help children and adults understand the value of agriculture. Stressing the importance of outreach and education, one participant highlighted the need to create a connection with the agricultural community:

> *"Education and outreach is about the connections…Producers, making the connection with the public. A way you can make a connection to the public to inform them about agriculture and make them mindful about it."*

Legislative engagement

Participants also stressed the importance for a strong agricultural voice in the state legislature that can express to lawmakers, the significance of their support. One participant highlighted the importance of communicating their needs to legislative leaders:

> *"I mean what we're seeing here in Oklahoma specifically is the squeaky wheel is the one that gets the grease, and if we don't have people up there squeaking, we don't get funded."*

Challenges

Related to land takings to create Waurika Lake, participants described historic patterns of mistrust of the federal government in the watershed and believed this to be a challenge with many producers in the targeted watershed. Although events that sparked mistrust in the community occurred many years ago, feelings of suspicion persist. One participant described how this attitude can have negative impacts on producer participation in any federal government program:

> *"So for me as a government official to walk out there and tell them all the great things, I can cure everything from freckles to hemorrhoids, and they're not going to buy it… there are just some kind of hurdles we can't get over."*

3.2 Interagency Partner Interviews

In April of 2018, representatives from Oklahoma Conservation Commission (OCC) and US Environmental Protection Agency (EPA) Region 6 were interviewed by an NRSS lab researcher about their role in NWQI, NRCS' role as a local partner in watershed management, and resources needed for successful watershed management and outreach. Interviews with OCC and the EPA were conducted over the telephone; both conversations were recorded and transcribed. The following sub-sections are a summary of the conversations (see Appendix D for interview guide).

3.2.1 Oklahoma Conservation Commission

The OCC is the state's technical lead for managing nonpoint source pollution and uses federal and state funds to support water quality monitoring across Oklahoma. OCC's goal is to demonstrate successful watershed management by improving water quality in the working lands of Oklahoma. The OCC reported a strong working relationship with NRCS, who relies on OCC for water quality monitoring needs. Together, NRCS and OCC identify NWQI priority watersheds and work to carry the momentum of successful watershed management projects to future priority watersheds across the state.

While OCC's working relationship with NRCS existed before NWQI, OCC reported increased interactions resulting from NWQI had strengthened their relationship. While OCC provides technical expertise, NRCS provides financial assistance and the ability to deliver conservation at a local level. OCC commended NWQI's focus on water quality monitoring and their watershed assessment plan but cited rigid regulations that limit access to financial assistance and reduced staff resources as challenges associated with working with NRCS.

The OCC recognized merits of the watershed planning process but believed successful watershed management is not contingent on the plan itself, but effective implementation of the plan. They underscored the importance of dedicated partners, diverse funding streams, and willing landowners as essential components of successful implementation. They highlighted the need to include goals and objectives beyond environmental outcomes and suggested incorporating goals that focus on on-farm benefits, (e.g., improved yield potential and reduced impacts to producers' bottom line). Finally, they emphasized that successful watershed management required effective outreach and recommended ensuring local leadership exists in the watershed, as well as a long-term commitment to the watershed (e.g., 15+ years).

3.2.2 EPA Region 6

EPA Region 6's reported role in NWQI is to facilitate collaboration with NRCS by supporting OCC with funding and guidance. Collectively, these agencies (EPA, OCC, and NRCS) use a targeted approach to watershed management to reduce nonpoint source water quality impairments and document water quality improvements.

EPA believes NWQI provides an effective framework to leverage state and federal resources. They indicated that the collaborative work environment facilitates increased BMP adoption as well as the likelihood of achieving their shared goal of improving watershed health. While EPA recognized the benefits of the watershed assessment plan required for NWQI, they suggested a more in-depth and detailed planning process is needed. EPA also emphasized the importance of sharing BMP location data and stated that data transparency is needed to accurately measure water quality responses to BMP implementation in targeted watersheds.

The EPA stated that successful watershed management results in improved water quality. They emphasized the need for a detailed watershed plan to document water quality impairments, sources, as well as actions to address impairments and metrics to measure project success. EPA also highlighted outreach and education as an important component for successful watershed management and suggested building partnerships based on the shared goal of improving water quality. Finally, they discussed the need for education and outreach to help watershed stakeholders understand sources of water quality impairments and what they can do to improve their watershed.

4 Recommendations

The NRSS research team developed the following recommendations through the synthesis of the stakeholder forum conducted in Stephens County on March 1st, 2018 and the interagency partner interviews conducted in early 2018. This section provides recommendations to NRCS and Little Beaver Creek watershed managers.

4.1 NRCS

1. Continue strong working relationship with OCC.

We recommend NRCS continues to foster a strong working relationship with OCC.

The collaborative relationship between OCC and NRCS was highlighted throughout the forum and participants indicated that this relationship is an important component for successful watershed management. Agreement on NWQI priority watershed selection as well as data transparency between OCC and NRCS has enabled additional resource contributions from OCC and accurate measurement of water quality improvements resulting from NWQI.

2. Increase staffing resources in watersheds across the state.

We recommend NRCS increase permanent staff resources in NWQI watersheds to enable one-on-one technical assistance.

Forum participants and OCC both highlighted challenges associated with reduced NRCS staff across the state. They believed reduced full-time staff has negative impacts on working relationships with producers. In addition, they suggested increasing current staff time allocated towards providing technical assistance to producers in priority watersheds as well as watershed-related outreach and education to the agricultural and non-agricultural community.

4.2 Little Beaver Creek watershed

1. Increase outreach to legislators and the non-agricultural community.

We recommend the Little Beaver Creek watershed managers promote the value of agriculture to the non-agricultural community as well as legislative leaders in the state.

Highlighting the need for public support of watershed management and an understanding of benefits of a healthy watershed, participants described the need to increase outreach and education efforts to the public as well as legislative leaders. Participants believed the public should be made aware of efforts in the agricultural community to improve watershed health, while state legislators should understand that financial support from the state is needed to improve water quality across the state.

2. Promote on-farm benefits of BMP adoption.

We recommend Little Beaver Creek watershed managers promote, to producers/landowners, on-farm and economic benefits associated with adopting BMPs.

Participants emphasized effective watershed communication should focus on on-farm benefits of BMP adoption, as opposed to intrinsic environmental value or downstream benefits of watershed management. Although Little Beaver Creek contributes to the municipal water source to seven downstream communities, producers do not directly benefit from improved municipal water. Thus participants thought producers needed to understand benefits they (and their farms) receive from enrolling in watershed management programs such as NWQI.

5 References

- Brown, S. R. (1993). A primer on Q methodology. Operant subjectivity, 16(3/4), 91-138
- Glasgow, Steve (2018). Little Beaver Creek Summary, personal communication
- Natural Resources Conservation Service (2018). National Water Quality Initiative. www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/initiatives/?cid=stelprdb1047761

Appendix A: Survey – Survey Methods

This appendix describes the development, data collection, analysis, and results of the Little Beaver Creek watershed survey (Figure A-1).

Development

The NRSS research team developed a survey to identify stakeholder priorities, suggestions for successful watershed management, and elements of successful watershed outreach and education (Figure A-1). The survey was designed to incorporate stakeholder responses into forum activities.

Data Collection

Local NRCS office and SCCD invited stakeholders via mail to participate in the watershed forum. Approximately two weeks before the forum the SCCD sent a total of 15 surveys to invited participants. No survey reminders were sent to those who did not respond. Respondents were provided hard copy of the survey as well as a link to take an online version of the survey, administered by Qualtrics, an online survey software (Qualtrics, Provo, UT).

Additional information collected from the survey include 1) involvement in Little Beaver Creek watershed planning, 2) who recipients receive watershed related information from, and 3) preferred method(s) to receive watershed management related information. This information was not used in the forum activities and therefore is not included in this report.

Analysis

Survey response rate was calculated by dividing the total number of completed survey responses by the total number of surveys sent. Survey questions incorporated into the forum included four open ended questions (Table A-1). One NRSS researcher analyzed survey response by identifying emerging themes in MS Excel.

Table A-1. Survey questions used in forum activities

Survey Question (Q#)	Survey Question (text)
Q4	In your opinion, what does successful watershed management look like?
Q5	In your opinion, what resources are needed for successful watershed management implementation?
Q6	In your opinion, what are key elements of successful watershed outreach and communication?
Q7	In your opinion, what resources are necessary for successful watershed outreach and communication?

Results

Of the 15 surveys sent, a total of 5 surveys were completed, for a final response rate of 33.3% (Table A-2). Most respondents identified as a producer or landowner (Table A-3).

Table A-2. Response rate

Completed (n)	Sent (n)	Response Rate (%)
5	15	33.3

Table A-3. Respondent stakeholder type

Stakeholder type	Frequency (n)	%
Producer or landowner	4	80
*Other	1	20
*Respondent did not specify		

Survey responses to the four open ended questions (Q4, Q5, Q6, and Q7) were incorporated into the watershed priority activity as individual priorities. Derived from Q4, Q5, Q6, Q7 emergent themes, five priorities were incorporated into the watershed priority activity including priority numbers 1, 5, 7, 14 and 30 (Appendix B, Table B-1). Survey responses from a different watershed were used to enable comparisons between watersheds.

Survey responses to Q4 and Q5 were incorporated into the resource needs activity as examples. Derived from Q4 and Q5 emergent themes, 10 resource needs were provided to each group as examples, including:

- Financial assistance
- Technical assistance
- Runoff control
- Invasive species management
- Proper fencing

Survey responses to Q6 and Q7 were incorporated into the outreach and education activity as examples. Derived from Q6 and Q7 emergent themes, 6 elements of successful outreach and education were provided to each group as examples, including:

- Notifying about deadlines and requirements
- Funding for communication personnel
- Show the big picture
- Personal communication
- Provide update

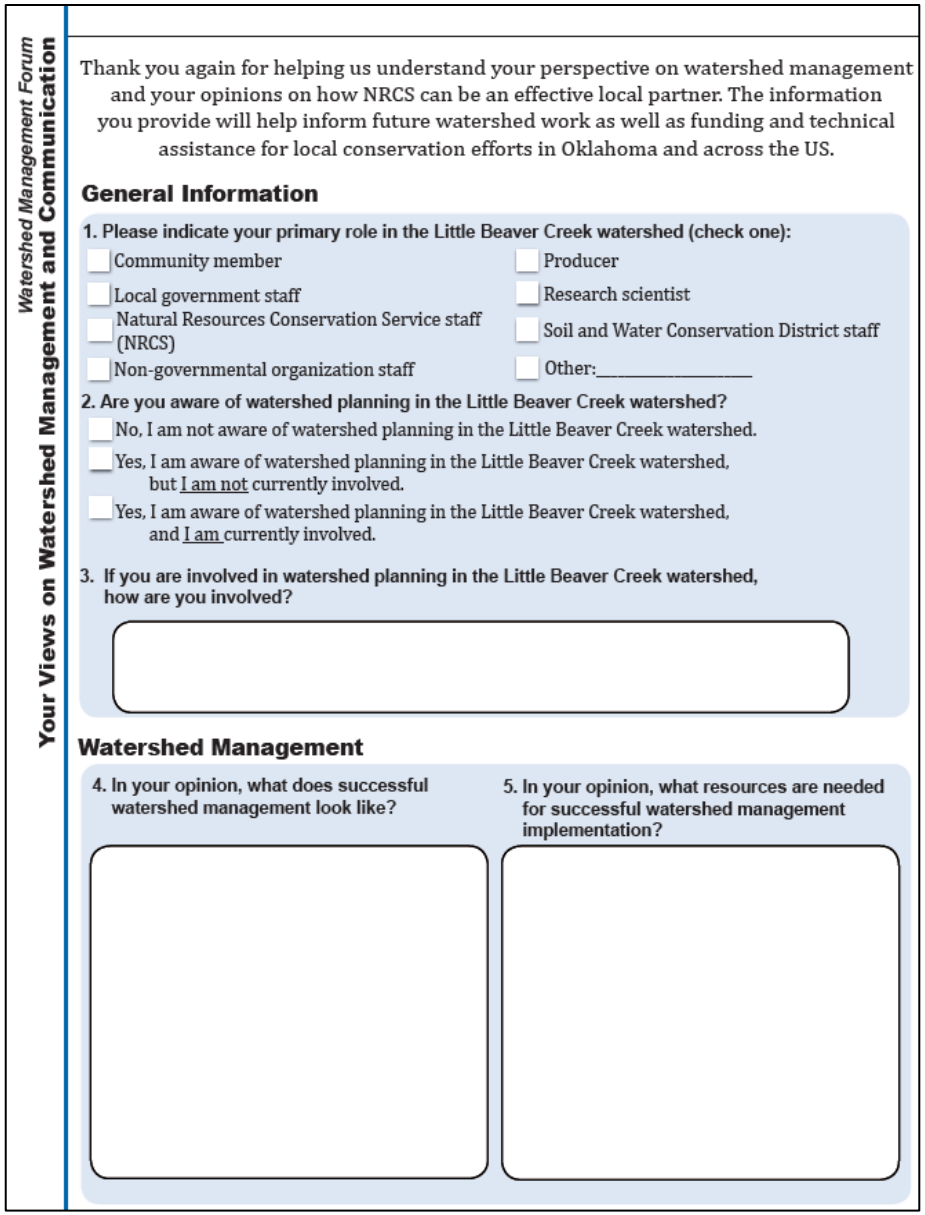
Conclusion

Survey information gathered from recipients and incorporated into the forum include 1) priorities for successful watershed management (Q4), 2) resource needs for successful watershed management (Q5), 3) elements of successful watershed outreach and education (Q6), and 4) resources needed for successful watershed outreach and communication (Q7).

The following open ended survey questions were incorporated in the watershed forum activities:

Activity	Survey question(s)	Format in forum
Identify Resource Needs	Q4, Q5	Resource need on 5x7 sticky note
Identify Elements of Successful Watershed Outreach and Education	Q6, Q7	Examples on a pre-populated flip chart

Figure A-1. Little Beaver Creek watershed survey



Watershed Management Forum

Your Views on Watershed Management and Communication

Thank you again for helping us understand your perspective on watershed management and your opinions on how NRCS can be an effective local partner. The information you provide will help inform future watershed work as well as funding and technical assistance for local conservation efforts in Oklahoma and across the US.

General Information

1. Please indicate your primary role in the Little Beaver Creek watershed (check one):

- ☐ Community member
- ☐ Local government staff
- ☐ Natural Resources Conservation Service staff (NRCS)
- ☐ Non-governmental organization staff
- ☐ Producer
- ☐ Research scientist
- ☐ Soil and Water Conservation District staff
- ☐ Other:_____

2. Are you aware of watershed planning in the Little Beaver Creek watershed?

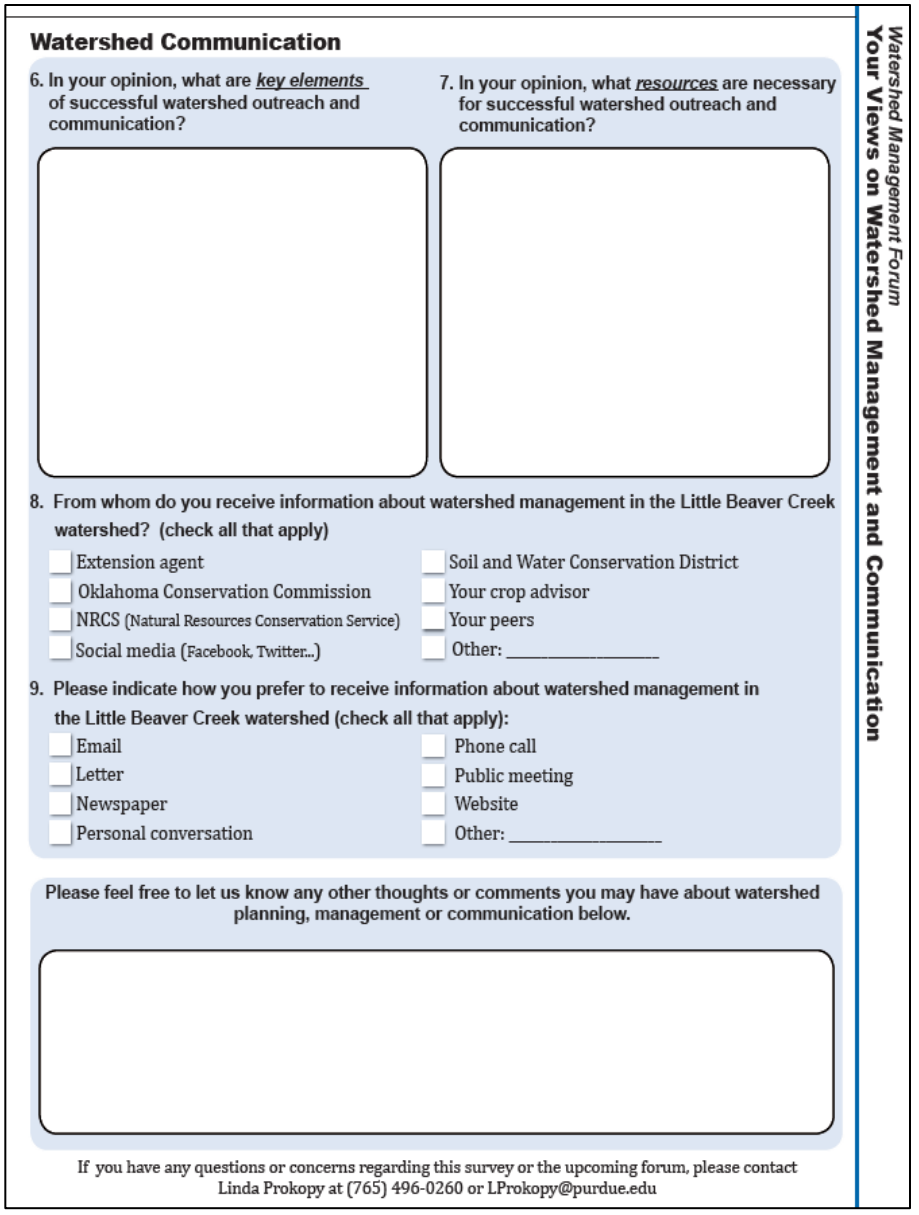
- ☐ No, I am not aware of watershed planning in the Little Beaver Creek watershed.
- ☐ Yes, I am aware of watershed planning in the Little Beaver Creek watershed, but I am not currently involved.
- ☐ Yes, I am aware of watershed planning in the Little Beaver Creek watershed, and I am currently involved.

3. If you are involved in watershed planning in the Little Beaver Creek watershed, how are you involved?

Watershed Management

4. In your opinion, what does successful watershed management look like?

5. In your opinion, what resources are needed for successful watershed management implementation?



Watershed Management Forum

Your Views on Watershed Management and Communication

Watershed Communication

6. In your opinion, what are *key elements* of successful watershed outreach and communication?

7. In your opinion, what *resources* are necessary for successful watershed outreach and communication?

8. From whom do you receive information about watershed management in the Little Beaver Creek watershed? (check all that apply)

- ☐ Extension agent
- ☐ Oklahoma Conservation Commission
- ☐ NRCS (Natural Resources Conservation Service)
- ☐ Social media (Facebook, Twitter...)
- ☐ Soil and Water Conservation District
- ☐ Your crop advisor
- ☐ Your peers
- ☐ Other: _____

9. Please indicate how you prefer to receive information about watershed management in the Little Beaver Creek watershed (check all that apply):

- ☐ Email
- ☐ Letter
- ☐ Newspaper
- ☐ Personal conversation
- ☐ Phone call
- ☐ Public meeting
- ☐ Website
- ☐ Other: _____

Please feel free to let us know any other thoughts or comments you may have about watershed planning, management or communication below.

If you have any questions or concerns regarding this survey or the upcoming forum, please contact Linda Prokopy at (765) 496-0260 or LProkopy@purdue.edu

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Appendix B: Watershed Priorities - Detailed Methods

Development

The NRSS lab developed 36 priority statements to represent a wide range of watershed priorities for this watershed priority activity. Statement development was informed by two data sources, 1) current literature about successful watershed management and 2) input from stakeholders in a different NWQI watershed.

Researchers reviewed content that addressed successful planning, design, marketing, and delivery of watershed initiatives. To gather information from watershed stakeholders, researchers incorporated voices of stakeholders in the different watershed by adapting survey responses to the question, "What does successful watershed management look like?" (see Appendix A for more detail). Each statement was assigned one of 11 priority categories, based on the subject of the priority (Table B-1).

Table B-**1**. Priority statements and associated categories

PN	Priority	Priority Category
1	Landowners/producers should know what best management practices are and why they should be used.	Knowledge/Education
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	Stakeholder Concerns
3	Technical and/or financial assistance for those who qualify is necessary.	Assistance
4	A watershed plan is necessary.	Watershed Planning
5	Land and water should have species diversity.	Biological Integrity
6	Management should be done at a small geographic scale.	Geographic Scale
7	Students (elementary through college) should understand the importance of soil and water conservation.	Knowledge/Education
8	Conservation practices should be adopted on more acres.	Assistance
9	Only local organizations should be involved.	Agency Collaboration
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	Stakeholder Concerns
11	Watershed managers should actively engage with the community.	Outreach
12	The public needs to understand how a healthy and balanced watershed can benefit them.	Knowledge/Education
13	Funding should be budgeted specifically for outreach and communication.	Outreach
14	Watershed information should be communicated using diverse methods and reach a broad public audience.	Communication
15	A strong working relationship between producers/landowners and watershed managers is important.	Outreach
16	One-on-one interactions between resource managers and producers/landowners is necessary.	Outreach
17	Watershed stakeholders need to understand the sources of water resource issues.	Knowledge/Education
18	The watershed planning process should include diverse groups of people working towards a common goal.	Inclusion
19	A management plan should support activities that include recreation, economic and environmental benefits.	Watershed Planning
20	Communicating about soil health is more effective than communicating about water quality.	Communication
21	Water monitoring is necessary.	Biological Integrity
22	Achievable water quality goals and targets should be set to show water quality improvements.	Biological Integrity
23	The public should be aware of the range of resource issues associated with their watershed.	Knowledge/Education
24	A clear plan for public involvement/engagement should be included in a watershed management plan.	Watershed Planning
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	Outreach
26	There should be a flexible plan that allows for changes in management over time.	Watershed Planning
27	Negative effects of watershed management on downstream stakeholders should be minimized.	Stakeholder Concerns
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	Agency Collaboration
29	Watershed managers should focus on water quality issues over water quantity issues.	Biological Integrity
30	The watershed should have a user-friendly website that contains watershed information.	Communication
31	Watershed management should benefit my community and communities downstream of my watershed.	Stakeholder Concerns
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	Watershed Planning
33	Community members should take an active role in watershed management.	Inclusion
34	Measurably cleaner water should be an outcome.	Biological Integrity
35	Producers/landowners/businesses should be required to adopt best management practices.	Regulation
36	The watershed needs to be in an impaired or degraded state.	Biological Integrity

Data Collection

Upon arrival to the forum, NRSS facilitators explained the watershed priority activity and provided participants with additional written instructions (Figure B-2), 36 priority statement cards, a datasheet (Figure B-3), and a list of all 36 priorities for reference. The activity included three stages: 1) ranking, 2) open discussion, and 3) group discussion. Each stage is described below:

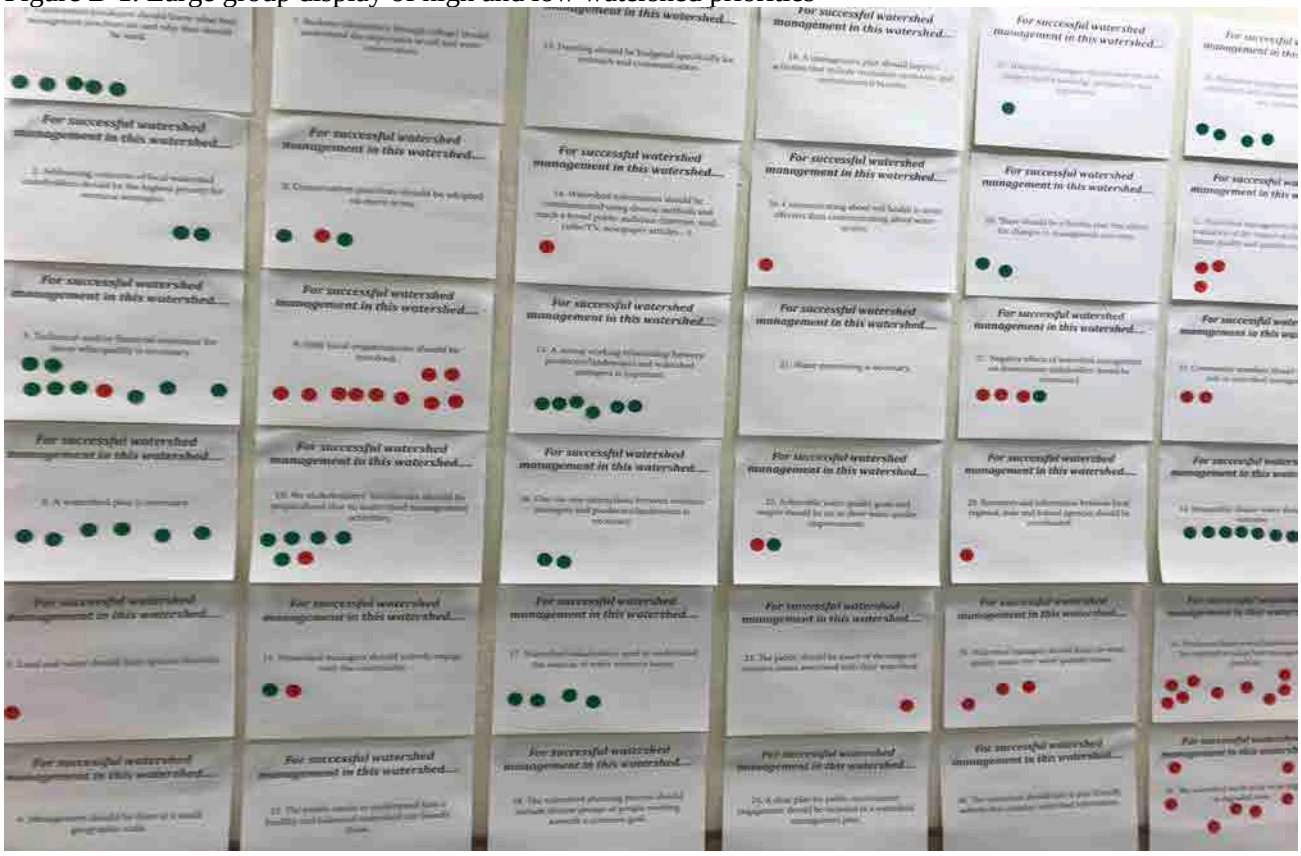
Stage 1: Priority ranking

Facilitators instructed participants to read and rank each priority according to how much they believed each statement was necessary for successful watershed management. Each priority statement included the phrase "For successful watershed management in this watershed…" and was then followed by one of the 36 priorities (e.g., "For successful watershed management in this watershed…a watershed plan is necessary"). Participants were given approximately 20 minutes to record their ranked priorities onto the datasheet. Participants ranked priorities on their data sheet by level of agreement with each priority (most disagree = -5 to most agree = 5). Facilitators were available to answer questions as needed.

Stage 2: Open discussion

Each of the 36 priorities were printed on an 8½ x 11 sheet of paper and displayed at the front of the room. After completing stage 1, participants were provided three green stickers and three red stickers, then asked to place green stickers on their top three priorities and red stickers on their lowest three priorities. As participants placed green and red stickers on the large priorities, similarities and differences of stakeholders' ranked priorities were visually displayed (Figure B-1). To initiate the open group discussion, the lead facilitator asked volunteers to share their top priority and explain their rationale to the group. After approximately 10 minutes of open discussion, participants moved into preassigned small groups.

Figure B-1. Large group display of high and low watershed priorities



This photo displays high (green stickers) and low (red stickers) priorities and was used to visually display broad agreement and disagreement amongst forum participants and facilitated the open group discussion

Stage 3: Small group discussion

Small groups were predetermined by the research team to ensure diversity of stakeholder types in each group. Each group included seven to nine forum participants, a group facilitator (NRSS), and a note taker (WaterComm). For approximately 45 minutes, participants shared their high and low ranked priorities, then discussed rationale for their priority rankings.

At the conclusion of the small group discussion, the NRSS research team collected datasheets from each participant and input them into PQMethod software (v. 2.35) at a later date. Large and small group discussions were recorded and transcribed by TranscribeMe, an audio transcription service.

Analysis

Only completed priority ranking datasheets were included in analysis. Completed datasheets were defined as sheets with all 36 priorities ranked and only ranked once.

Family Selection

An NRSS researcher conducted a factor analysis using principal component method with Varimax rotation in the PQMethod software (v. 2.35) to identify similarities between participants' priority rankings. The NRSS researcher used the following criteria to identify priority families (i.e., factor groups).

- Eigenvalue >1 (according to the Kaiser criterion)
- Participants in each family ≥ 3

The PQMethod software then created a priority framework for each factor selected by the NRSS researcher. Each priority framework included the following:

- Priority value (PV): Value assigned to each watershed priority based on priority rankings within each priority family. These values reflect the participants' attitude in that family toward each priority. PVs range from -5, indicating a low priority, to 5, indicating a high priority.
- Distinguishing priorities (DP): Uniquely ranked priorities from each priority framework. These priorities highlight distinct viewpoints that differentiate the priority families from each other.
- Consensus priorities (CP): Similarly ranked statements in all priority frameworks. These statements highlight broad agreement across all priority families.

Narrative Development

The NRSS researcher reviewed each priority framework and identified relevant DPs and CPs.

If PQMethod identified a DP that was not a high (PV ≥3) or low priority (PV≤-3), the PV was compared across all priority families.

Additional DPs incorporated into priority narratives include:

- DPs identified in only one priority family,
- Only DPs with the highest and lowest PVs, if identified in all priority families,
- Only when the absolute value of PVs was ≥3 compared to other priority families.

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Figure B-2. Watershed priority instruction sheet

Little Beaver Creek Watershed Management Forum

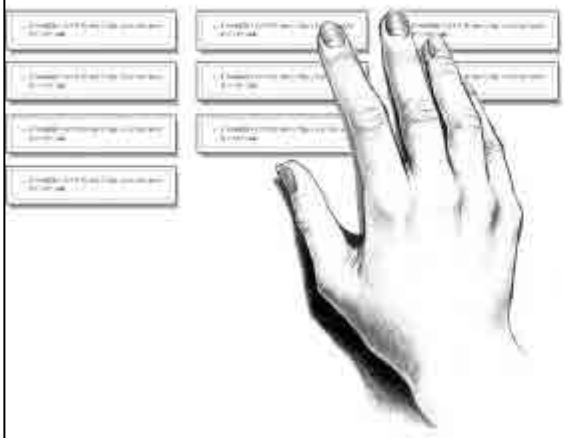
Session One: What is Successful Watershed Management?

In this activity you will be asked to sort 36 cards in order of your agreement with each statement. Each card contains a statement from forum participants and current literature that describes necessary elements for successful watershed management. This activity should take approximately 30 minutes.

1. Read each of the 36 statement cards and consider to what extent you agree or disagree with the statement.

2. Organize the statement cards into 3 piles based on whether you agree, feel neutral or disagree with the statement.

3. Examine the score sheet on the opposite page. Notice there are 36 boxes in 11 columns ranging from *Most Disagree* in column -5 to *Most Agree* in column 5. When complete, you will have sorted your statements into columns that exactly match those on the score sheet.

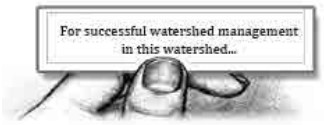


4. Re-read each statement in your "agree" pile and decide which 1 statement you most strongly agree with.

5. On the score sheet, write the number associated with your chosen statement in the furthest right column, labeled "Most Agree".

6. Continue ranking the remaining statements and transcribe the numbers on the score sheet.

Figure B-3. Watershed priority datasheet



The number on the statement card is the number you will write on the score sheet below.

Score Sheet

Most Disagree										Most Agree
-5	-4	-3	-2	-1	0	1	2	3	4	5

Once you have finalized your ranking, please fill out the questions on the back on the score sheet.

1. Please indicate your primary role in the Little Beaver Creek watershed (check one):

- ☐ Community member
- ☐ Conservation District staff
- ☐ Local government staff
- ☐ Natural Resources Conservation Service staff (NRCS)
- ☐ Non-governmental organization staff
- ☐ Producer or landowner
- ☐ Research scientist
- ☐ State Agency staff
- ☐ Other:_____

2. If applicable, please list any conservation practices you currently use on your property:

3. Years of experience with watershed management:.....

4. How many years have you lived in the Little Beaver Creek watershed? .....

5. In what year were you born? .....

6. What is your gender? .....

Thank you for your time and participation.
Please write down any additional comments below:

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Appendix C: Facilitator's Guide

Activity 1: Identify Watershed Priorities

We will start with a full group activity and discussion. About half an hour before lunch, we will break into small groups. Probing questions to ask in the small groups. Note: some of these may already have been discussed in the open group:

- What is the role of planning in watershed management? Specifically, what is the role of the plan in this watershed?
- What is the best role for NRCS in small watersheds?
- What is the ideal scale for watershed management? (HUC 12, bigger?)
- What is success in watershed management? How can this be measured?
- What elements of successful watershed management were missing from the statements you sorted?

Activity 2: Identify Resource Needs

Lead facilitator will provide the directions for the activity.

- When people bring their post-it notes to your wall, ask them to arrange them with other similar post-its.
- Group the post-its and create labels for the categories.

Ask:

- Does everyone agree that these are necessary categories of resources?
- What resources are missing?
- Which resources are most important?

Activity 3: Identify elements of successful outreach and education

Facilitate a small group discussion using the following questions:

- Who should deliver education and outreach? Who are trusted partners?
- What should education and outreach look like?
- When should it happen?
- What is the role for NRCS in this?

In last 10 minutes

Ask the group to select top 3 things they want to share with the entire group

Appendix D: Interview Guide

1. What is your role in EPA/OCC?
2. What role does EPA/OCC play in NWQI?
3. What role does EPA/OCC play in the Little Beaver Creek watershed?
4. What resources does EPA/OCC contribute to NWQI?
5. What resources does NRCS contribute?
    a. Is anything missing? If so, what additional resources would you like NRCS to contribute?
6. Does NWQI impact interagency collaboration?
7. What is the biggest challenge working with NWQI?
8. What makes NWQI a unique program?
9. What is successful watershed management and what resources are needed to achieve it?
10. What are key elements to a successful watershed outreach/communication plan and what resources are needed to achieve it?