National Water Quality Initiative Watershed Forum Report

East Creek watershed – Addison County, Vermont

Prepared February 2019 by:
Emily M. Usher, Dr. Sarah P. Church, Dr. Linda S. Prokopy

Natural Resources Social Science Lab
Department of Forestry and Natural Resources
Purdue University

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. (2019). *National Water Quality Initiative Watershed Forum Report – East Creek watershed, Addison County, Vermont.* West Lafayette: Purdue University.

Acknowledgments

This report was made possible with funding with the United State Department of Agriculture-Natural Resources Conservation Service. We thank the Middlebury USDA-NRCS field office and Addison County producers for helping with local logistics and giving us a watershed farm tour.

Table of Contents

List of Tables

List of Figures

Acronyms

BMP	Best Management Practice
CTIC	Conservation Technology Information Center
CP	Consensus priority
DEC	Vermont Department of Environmental Conservation
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
PN	Priority number
PV	Priority value
STC	State Technical Committee
TMDL	Total Maximum Daily Limit
USDA	United States Department of Agriculture
UVM	University of Vermont
VACD	Vermont Association of Conservation Districts

Executive Summary

The Conservation Technology Information Center contracted the Natural Resources Social Science (NRSS) team at Purdue University to inform improvements to United States Department of Agriculture-Natural Resources Conservation Service's (USDA-NRCS) ability to implement small watershed projects and effectively communicate watershed related information. The NRSS team hosted a forum with local stakeholders from the East Creek watershed in Addison County, Vermont to gather input on watershed project design, marketing, delivery, and implementation associated with the National Water Quality Initiative (NWQI), a USDA-NRCS supported small watershed improvement initiative. The NRSS team also interviewed representatives from state and federal agency partners working with USDA-NRCS to improve watershed health and returned to the East Creek watershed a year after the forum to share results and solicit feedback from forum participants. The following document provides recommendations based on data gathered from the watershed forum, interagency partner interviews, and stakeholder feedback.

Forum

Conducted in March 2018, the East Creek watershed forum included three activities that focused on 1) watershed priorities, 2) resource needs, and 3) 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) Planning, Outreach and Assistance, 2) Outreach, Assistance, Collaboration and Local Concerns, and 3) Local Knowledge, Outreach, Biological Integrity and Assistance.*

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) *Identification and Measurement, 2) Strategic Plan Development, 3), Collaborative Leadership, and 4) Flexible Funding for Technical and Financial Assistance.*

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 three elements for successful watershed outreach and education including: *1) an "all-in" approach, 2) public understanding of agricultural contributions and 3) one-on-one interactions.*

Interviews

The NRSS team conducted interviews with representatives from Vermont Department of Environment (DEC) and the United States Environmental Protection Agency (EPA) Region 1 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. EPA Region 1 and DEC representatives suggested USDA-NRCS increase staff resources across the state and increase specificity of shared best management practice (BMP) location data to inform water quality monitoring efforts.

Stakeholder Feedback

Results and recommendations were presented to East Creek stakeholders in April 2019. The presentation shared findings and gave forum stakeholders and community member an opportunity to provide feedback on forum results and validate information gathered from their watershed forum. East Creek stakeholders believed the report accurately represented the needs of their watershed, emphasized the importance of collaboration at the local, state, and federal level and shared examples of how effective collaborations benefit watershed projects in Vermont. Related to staffing needs, some participants agreed with the recommendation to increase staff to manage additional workload of the NWQI, while other participants suggested reducing staff reporting requirements in NWQI watersheds as an alternative to hiring additional staff.

Recommendations

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

USDA-NRCS:

1. Continue working with state and local partners to facilitate a collaborative working environment.
2. Work with partners to find appropriate scale to share BMP location data.
3. Increase staff resources to facilitate one-to-one interactions and mange additional workload of the NWQI.

East Creek watershed:

1. Continue efforts to promote agricultural value to state legislature and non-agricultural community.
2. Promote success stories in the local watershed community.

1 Introduction

1.1 Project overview

In 2017, the Natural Resources Social Science (NRSS) team at Purdue University was contracted by the Conservation Technology Information Center (CTIC) to investigate how to improve the United States department of Agriculture 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 Vermont's East 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 team gathered information from agency partners working with USDA-NRCS toward the common goal of improving watershed health, and presented forum results to forum participants and documented their feedback.

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 the NWQI's strengths and weaknesses, as well as successful watershed management, outreach, and education strategies. Stakeholder feedback meetings included a presentation of forum results, followed by a discussion to validate results and share project progress.

This report provides the following information:

- Brief overview of the NWQI
- Current conditions in the East Creek watershed
- Methods and results from the East Creek watershed forum conducted in Addison County, VT
- Methods and results from interviews conducted with representatives from Vermont State Department of Environmental Conservation (DEC) and the United States Environmental Protection Agency (EPA)
- Methods and results from the East Creek stakeholder feedback presentation and discussion.
- Reccomendations to improve implementation and outreach efforts for the NWQI and other USDA-NRCS supported watershed projects

1.2 Background

1.2.1 National Water Quality Initiative

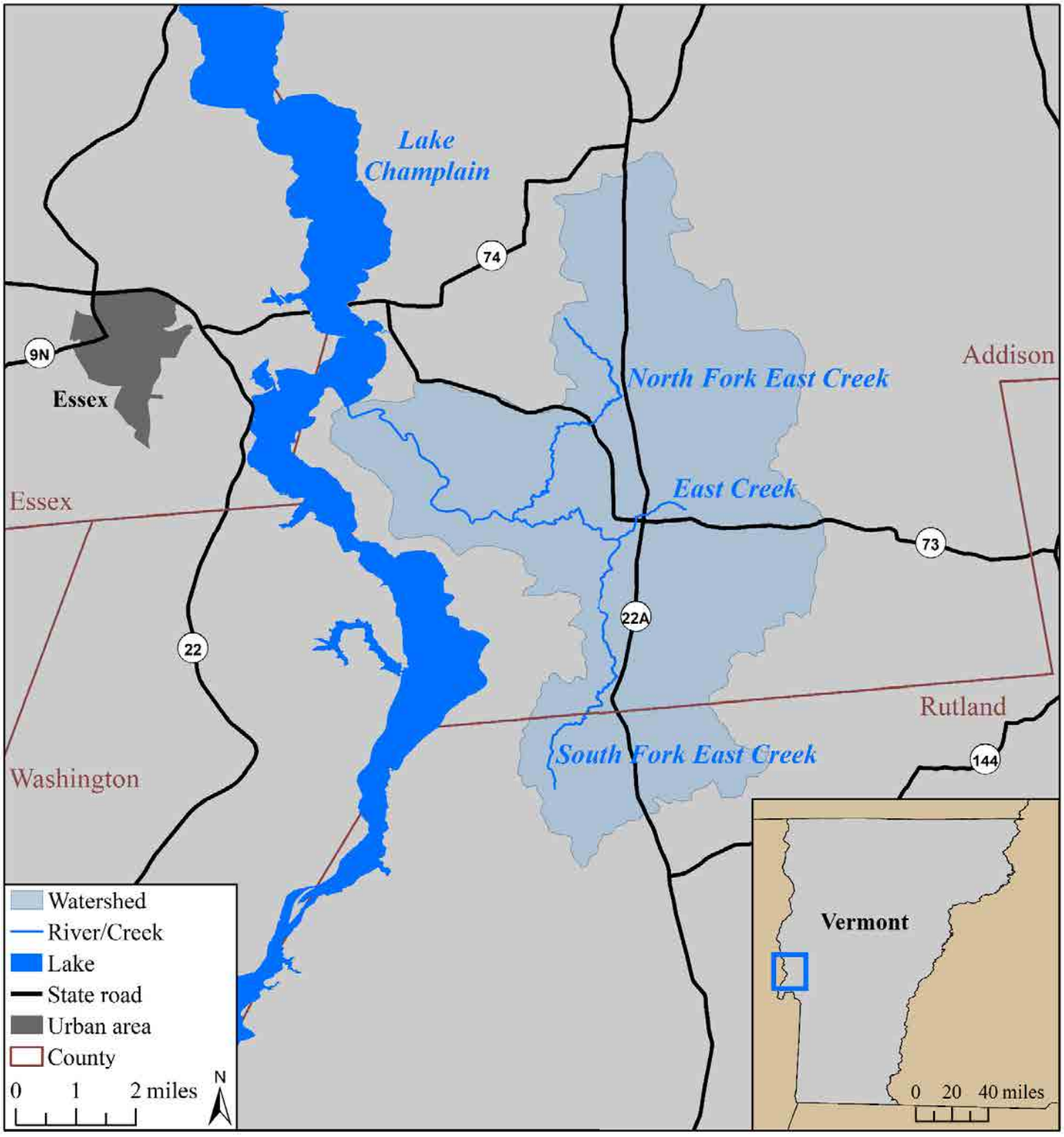
Created to identify impaired watersheds and address water quality issues in targeted watersheds, the NWQI provides technical and financial assistance to accelerate voluntary adoption of best management practices (BMPs) on agricultural land. The NWQI uses a collaborative approach to watershed management 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 funding from the NWQI, 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 East Creek watershed

This report focuses on the East Creek watershed (HUC – 041504080301) located in Addison County, Vermont (Figure 1). The East Creek watershed flows directly into the southern portion of Lake Champlain and is included in the Lake Champlain's phosphorus Total Maximum Daily Load (TMDL). USDA-NRCS has targeted the East Creek watershed to aid the State of Vermont in meeting the phosphorus TMDL for Lake Champlain. East Creek has total estimated phosphorus loading of 14,429 lbs./year and a TMDL reduction goal of 63% over 20 years. East Creek includes 20,553 acres and supports multiple dairies with 46% of acres in agricultural production (17% annual crops, 66% hay, 17% pasture).

The USDA-NRCS Middlebury Field Office and University of Vermont (UVM) Extension currently manage the NWQI project in the East Creek watershed.

Figure 1. East Creek watershed map



2 Methods

This section provides brief methods for forum and interviews conducted by the NRSS team and approved by Purdue University Institutional Review Board (protocol # 1711019902). Further methods detail can be found in Appendices A, B, C and D.

2.1 Stakeholder Forum

2.1.1 Development

The NRSS team worked with local USDA-NRCS staff to gather a contextual understanding of the watershed and develop a list of diverse stakeholders to invite to the forum. USDA-NRCS staff invited forum participants 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 forum pre-survey, developed by the NRSS team. The pre-survey gathered insights on the respondents' stakeholder type (e.g., producer, landowner, community member, USDA-NRCS staff) as well as their awareness of and involvement in local watershed management. Pre-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 East Creek watershed forum was conducted on March 1st 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 team facilitator introduced forum participants to project objectives and the project team. The project team included staff from the NRSS, CTIC, WaterComm, and USDA-NRCS. The facilitator then provided an overview of the forum agenda along with a broad summary of the NWQI and watershed management. Participant contact information including, name, email/mailing address were collected but not used for any analysis.

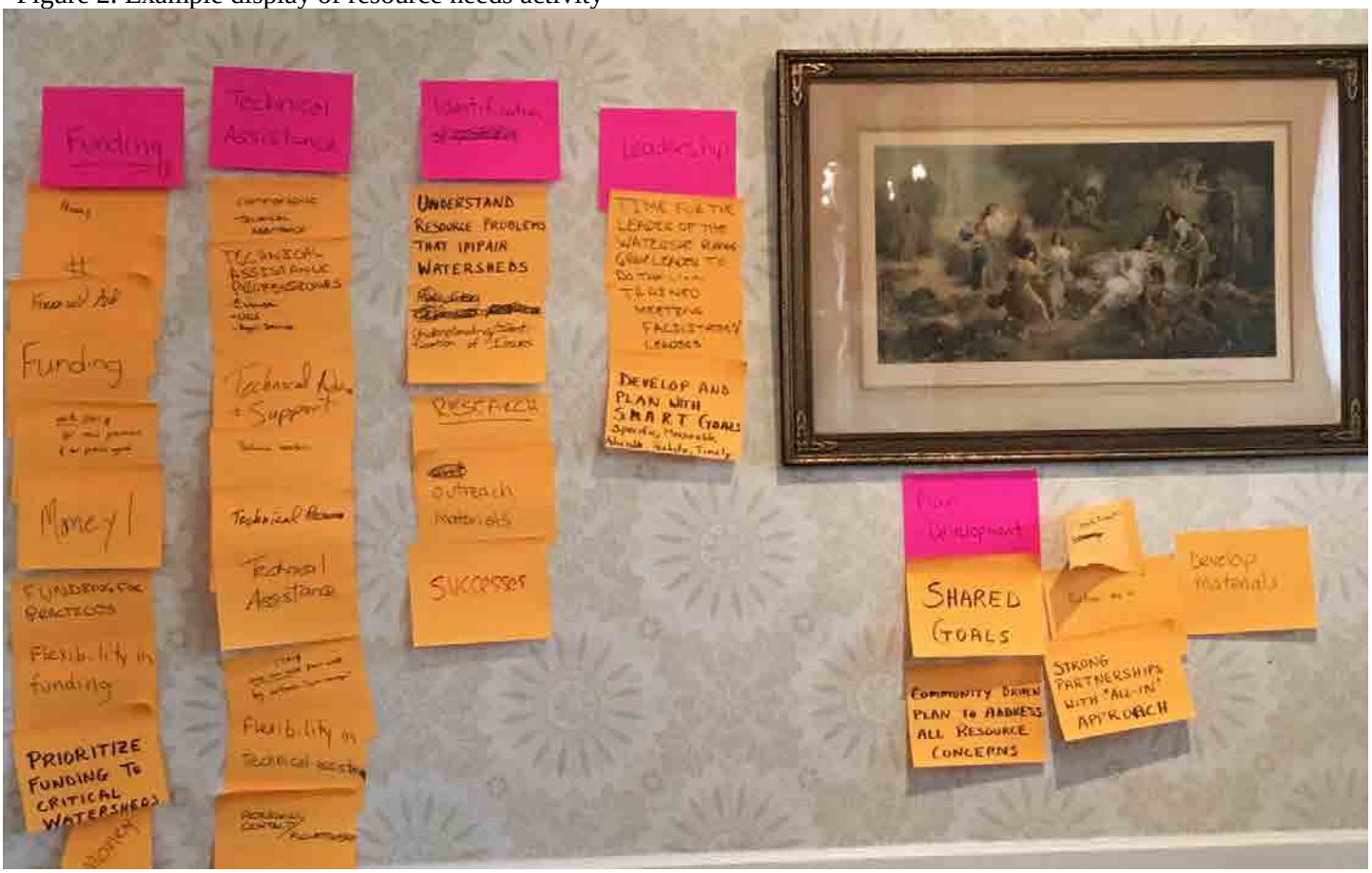
Identify Priorities
Forum participants engaged in a ranking exercise based on Q-Methodology (Brown 1993) to identify individual watershed priorities from 36 predetermined priority statements (Appendix B, Table B-1). The 36 statements were developed to represent a wide range of watershed priorities. Facilitators instructed 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 forum watershed as well as their birth year and gender. The datasheets were collected by the project team at the end of the forum and input into PQMethod software (v. 2.35) at a later date.

After recording the order of their watershed priorities, the facilitator engaged participants in an open discussion lasting approximately 15 minutes and asked volunteers to share their rationale for selecting their top watershed priorities. Participants were then assigned to three small groups. The NRSS team assigned the 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 the CTIC and the NRSS team facilitated the small group discussions while WaterComm staff took notes on the discussion. Large and small group discussions were noted and recorded. An online audio transcription service (TranscribeMe.com) was used to transcribe audio recordings.

Identify Resource Needs
Forum participants listed resources needed to achieve successful watershed management. The project team provided each group with examples of resource needs derived from the forum pre-survey responses (Appendix A). Participants wrote additional resources needed for successful watershed management on 5x7 inch sticky notes then displayed each written resource need (including needs derived from the forum pre-survey) in front of their small group. The small group facilitator prompted participants (see Appendix C for forum facilitator guide) to explain their rationale for the contributed resource needs, then the group 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, the NRSS team collected the 5-inch x 7-inch sticky notes from each group. Group discussions were noted and recorded. Audio recordings were transcribed by an online audio transcription service (TranscribeMe.com).

Identify Outreach and Education Strategies
In the same small groups, participants engaged in a facilitated discussion of strategies for effective outreach and education. Small group facilitators provided each group examples of strategies for watershed outreach and education derived from forum pre-survey responses (Appendix A) then documented the discussion on a flip chart. Facilitators guided (Appendix C) participants to gather strategies related to recipients, content, and delivery of watershed outreach and education. The discussions were noted and recorded. Audio recordings were transcribed using an online audio transcription service (TranscribeMe.com).

Figure 2. Example display of resource needs activity



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
The NRSS team 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
The NRSS team 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 sub-codes, respectively, to organize the discussion. The NRSS team reviewed all transcriptions and assigned codes in NVivo (v. 12). Then, for each discussion group, the NRSS team 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
The NRSS team 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 DEC) 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

The NRSS team interviewed representatives from DEC and EPA Region 1. The interviewees were identified through a conversation with an 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

2.3 Watershed Stakeholder Feedback

The following section describes data collection and analysis methods used to share findings, validate forum results, and solicit feedback on forum results from forum participants and community members.

2.3.1 Data Collection

The NRSS team emailed a draft of the watershed forum report to conservation staff in the East Creek watershed. To validate results and solicit feedback on the forum report, the NRSS team offered to return to the watershed and present findings to stakeholders. These presentations aimed to give conservation staff and stakeholders an opportunity to provide further input and gain insight from data collected at the watershed forums. At the watershed, the NRSS team member provided background and context for the watershed forums and shared results from the East Creek watershed forum. After the presentation, stakeholders discussed results and shared additional successes and challenges related to project design, marketing, delivery, and implementation of the NWQI and other USDA-NRCS supported watershed improvement projects. The NRSS team member took notes of key topics and discussions were recorded.

2.3.2 Analysis

Notes and recorded discussions were used to identify emergent themes inductively. Themes were summarized into key topics discussed at the watershed stakeholder feedback presentation.

3 Results

3.1 Stakeholder Forum

3.1.1 Demographics

A total of 17 stakeholders participated in the forum. Most participants identified as producers or landowners (Table 2) and male (Table 3). Participants reported a mean age of 50.8 years old (Table 4) and 41.2% of forum participants reported living in the watershed (Table 5).

Table 2. Stakeholder type

Stakeholder Type**	Frequency (%; N=17)
Producer or Landowner	33.3
USDA-NRCS staff	27.8
UVM Extension	11.1
VACD staff	5.6
State agency staff	5.6
Local government staff	5.6
Other*	11.1

**Other includes an agricultural retailer and an agri-business owner.*
***If participants identified as more than one stakeholder type both responses were included in the table Percentage will total to greater than 100 since calculated using total number of respondents.*

Table 3. Gender

Gender	Frequency (%; N=17)
Male	76.5
Female	17.6
No answer	5.9

Table 4. Participant age

Mean age *(SD)*	Median age (N=15)
50.8 (*13.1*)	51

Table 5. Watershed resident

Resident	n	%	Mean Years *(SD)*
Yes	7	41.2	24.7 (*14.5*)
No	10	58.8	

3.1.2 Watershed Priorities

A total of 16 participants' ranked priorities were considered complete for analysis (Appendix B). Participants' ranked priorities are presented in the following three narratives:

1) Priority Family 1: Planning, Outreach and Assistance (eight participants)
2) Priority Family 2: Outreach, Assistance, Collaboration and Local Concerns (five participants)
3) Priority Family 3: Local Knowledge, Outreach, Biological Integrity and Assistance (three 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 discussed and the priority framework for each family is summarized in Table 9.

Priority Family 1: Planning, Outreach and Assistance

This priority family included a total of eight participants who self-identified as USDA-NRCS staff, local government staff, a producer or landowner, and an agricultural salesperson. This family emphasized watershed planning (PN4, PN26), biological integrity (PN22), outreach (PN15), stakeholder knowledge (PN1) and assistance (PN3) as key components for successful watershed management (Table 6).

Table 6. Priority Family 1 Framework: Planning, Outreach and Assistance

PN	Priority	PV	DP	CP
High				
4	A watershed plan is necessary.	5	x	
15	A strong working relationship between producers/landowners and watershed managers is important.	4		x
1	Landowners/producers should know *what* best management practices are and *why* they should be used.	4		
3	Technical and/or financial assistance for those who qualify is necessary.	3		
26	There should be a flexible plan that allows for changes in management over time.	3		
22	Achievable water quality goals and targets should be set to show water quality improvements.	3		
Low				
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3	x	
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	-3	x	
19	A management plan should support activities that include recreation, economic and environmental benefits.	-3		
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	-4	x	
9	Only local organizations should be involved.	-4		
36	The watershed needs to be in an impaired or degraded state.	-5		
Additional DPs				
35	Producers/landowners/businesses should be required to adopt best management practices.	2	x	
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	1	x	
7	Students (elementary through college) should understand the importance of soil and water conservation.	-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

Watershed Planning

This family emphasized the importance of a flexible watershed plan that incorporates achievable water quality goals to show water quality improvements (PN4, PN26, PN22).

> *"Without a plan, how do you know which way you're going? You've got to set your goals, set your targets, and define how you're going to get there. To me, it's foundational to the whole method."*

Although they believed a watershed plan is necessary, they did not believe a plan should account for multiple uses (PN19) or include an evaluation of climate change impacts to their watershed (PN32). A participant explained their belief that climate change is a threat, but discussed difficulties associated with predicting and measuring climate change impacts in their watershed.

> *"I have a hard time seeing how you are going to quantify that. I agree with climate change, I think it's happening, but I don't know how you can wrap your arms around that and say what it's going to do."*

Outreach and Education

This family emphasized the importance for producers/landowners to have a strong working relationship with watershed managers (PN15) and be familiar with how BMPs benefit the watershed, and their operation (PN1).

> *"The most powerful change happens when those two folks [landowners/producers and resource managers] are on the same page and working together. The landowners are the ones that are going to have to do the stuff on the ground in the watershed. So, I think it's really important to involve them from the get-go in the management planning process, but also obviously as practices are implemented."*

In addition, this family believed that available technical and financial assistance (PN3) plays a major role in a landowners/producers' decision to integrate BMPs into their operation. They stressed that a working knowledge of a farm operation is key to providing technical assistance and again emphasized the importance of a strong working relationship with resource managers.

> *"[Comparing the] payback for doing conservation versus putting in something that's going to make you more milk – if you start helping with financial assistance just for those projects, it's going to gear people up more towards conservation. Also, technical [assistance] – I mean, what's the sense in saying, 'Let's go and do this,' and then you're on your own? You need people to come out and review what you've done and work through the whole thing. I have a land planner right now that does my plan with me and his advice is as good as anything, because he knows the farm. He's been out there. He knows where everything is. I think that's more beneficial. Having somebody that you can just call up any time there's a question."*

Regulation

Citing the interconnected nature of watershed management, this family suggested that concerns of local stakeholders should not be the highest priorities for resources managers (PN2). One participant explained their perspective regarding local concerns by pointing out the scope of stakeholders involved in one watershed.

> *"There are a lot of stakeholders. There're stakeholders at the local level, more at the regional level, then you get the state level. So, to focus on just one set of stakeholder interests didn't seem, to me, to be the most appropriate way to look at it."*

Acknowledging an aversion to mandating adoption of BMPs, a participant explained how requiring BMP adoption (PN35) could spark collective action and help the watershed reach their shared goals.

> *"You always kind of prickle a little bit at the required piece of it. Unless everybody's pulling on the rope together, you're only as strong as your weakest link, so. You got to have conformity in order to get the objectives that you want."*

This family also indicated that some livelihoods could be jeopardized due to watershed management efforts (PN10), and that this may be necessary in order to improve water quality. One participant explained that mismanaged farm operations have a large negative impact on water quality, and these operations could be negatively impacted by watershed management efforts.

> *"In Vermont [farms] are small and you have a lot of farms close to the waterway. There are farms that are a mess, that are a terrible mess and needs to be corrected…. Or they may have to go out of business. I mean I struggle with it but…They're creating a real problem."*

Other Priorities

This family discussed the importance of multi-organizational involvement in the planning and implementation process, did not prioritize educating youth about soil and water conservation, and only slightly prioritized seeking out local knowledge (PN9, PN7, PN25). Commenting on the idea that a watershed does not need to be degraded to receive management attention (PN36), one participant warned that a failure to address small issues can lead to insurmountable challenges.

> *"What happened in this situation is that you wait so long and then all of a sudden, you got to fix it. Well, now, you got a big stinking problem that's not so easy to make an appreciable change in."*

Priority Family 2: Outreach, Assistance, Collaboration and Local Concerns

This priority family included a total of five participants who self-identified as Extension staff, USDA-NRCS staff and a producer or landowner. This family emphasized outreach (PN15, PN25), assistance (PN3, PN8), agency collaboration (PN28), and stakeholder concerns (PN2) as the top priorities for successful watershed management (Table 7).

Table 7. Priority Family 2 Framework: Outreach, Assistance, Collaboration and Local Concerns

PN	Priority	PV	DP	CP
High				
15	A strong working relationship between producers/landowners and watershed managers is important.	5	x	x
25	Watershed managers should seek out and respect local knowledge, perspective and experience.	4		
28	Resources and information between local, regional, state and federal agencies should be coordinated.	4		
3	Technical and/or financial assistance for those who qualify is necessary.	3		
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	3	x	
8	Conservation practices should be adopted on more acres.	3		
Low				
35	Producers/landowners/businesses should be required to adopt best management practices.	-3		
4	A watershed plan is necessary.	-3	x	
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3	x	
36	The watershed needs to be in an impaired or degraded state.	-4		
30	The watershed should have a user-friendly website that contains watershed information.	-4		
9	Only local organizations should be involved.	-5		

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

Community Outreach

This family believed a strong working relationship between producers/landowners and watershed managers (PN15) that works to incorporate local perspective, experience and knowledge (PN25) into watershed planning is an important component for successful watershed management. This family emphasized the importance for producers/landowners to understand the role of watershed managers as a resource for information and assistance, not as a threat.

> *"Being able to speak to NRCS or the state on the farm and not feeling like you're going to be penalized for it, being open and honest – Take them around and they say, 'This is a problem' and you say, 'Okay. How do we fix it?' You'll get a lot more people involved if they don't feel like they'll get a crack of the whip every time somebody comes out."*

Another participant explained the value added when local knowledge and experience is integrated into watershed projects.

> *"I look to my producers often because they know the potential impacts of the change in management too. There's a reason they've made decisions on the land and if we can look to them to say, 'Well, if we have an additional goal of this, what do you foresee the impacts of that being?' They're really the experts on landscape."*

Assistance

This family underscored the importance of adopting BMPs on more acres (PN8) and believed that providing both technical and financial assistance to landowners/producers (PN3) is needed to achieve the goal of improving water quality.

> *"We need [NRCS staff's] technical help to say, 'You got a real problem here. Here's some of the solutions.' If somebody really got out on the farms or on the land and identified [problems], they're going to find out that they're really expensive solutions to the point you're going to put people out of business if there isn't public financial help. If the public's goal is to improve water quality, they're going to have to help out."*

More so than the other two families, this family puts the highest importance on resource managers addressing local concerns as their top priority (PN2). Similar to their attitudes towards integrating local knowledge and experience, this family believed that local concerns need to be addressed for local buy-in of a program or project.

> *"They're really going to be the ones on the ground doing all of this, so if you don't have their concerns in mind, then why would they want to do it?"*

This family suggested that a watershed does not need to be in a degraded state (PN36) to receive attention and local organizations should not be the only groups involved in watershed management (PN9). They emphasized the importance of sharing resources and information between local, state and federal agencies (PN28) and acknowledged challenges associated with lack of agency coordination. Participant mentioned the burden a lack of coordination can have on landowners/producers.

> *"The thing I hate the idea of most is NRCS goes and asks the farm some questions, the Agency of Ag goes, not knowing [NRCS] has gone…It just kind of tends to waste the time of the landowner or the operator."*

Watershed Planning

Although this family understood the value of a watershed plan, they did not identify it is a high priority for successful watershed management (PN4).

> *"I'm not saying that it's not important. I'm just saying everything else went higher…Why do you need to worry about managing a plan if you have the education, outreach, finances, and producer buy-in?"*

Highlighting the distinction between the process of planning and the plan itself, this family focused on the importance of relationship building, rather than the document itself.

> *"It seems to me that the planning process is what's valuable. That interaction as opposed to an actual plan, or piece of paper…It's good to set goals, target reductions, water-quality monitoring activities and be able to establish that and make it explicit. I think less people pay attention to that and look at what's actually happening on the ground. That's where the efforts are being made to help achieve some of those goals and objectives."*

This family found that an evaluation of climate change impacts to their watershed (PN32) to be unnecessary due to difficulties quantifying climate change information. Moreover, they believed that a climate change related message is not an effective way to frame communication about improving water quality.

> *"If you're talking about economics and soil health, things that they can see and things that are going to affect their business, to me that's more of a priority for somebody on the land than it is to worry about climate change. Which, I agree, they tie in hand-in-hand at some point. But if somebody came to me and said, 'Hey, the earth is warming up,' versus, 'Hey, you want to increase your yields and save your soil?'…"*

Additional Priorities

This family opposed requiring producers/landowners to adopt BMPs (PN35) because they believed that quality conservation come from voluntary adoption.

> *"True conservation and BMP happen when adoption is from a place of desire, not requirement. That's when adoption happens. We want farmers and managers to say, 'No, I'm doing this because I want to and it benefits the environment, but it benefits my operation as well.'"*

Finally, this family does not think a user-friendly website will improve communication or information exchange between producers/landowners in the watershed (PN30), although they suggested that it may benefit the general community.

Priority Family 3: Local Knowledge, Outreach, Biological Integrity and Assistance
This priority family included a total of three participants who self-identified as Extension staff, VACD staff, and a producer or landowner. This family emphasized outreach (PN15, PN25) stakeholder knowledge (PN1, PN23), biological integrity (PN21), and assistance (PN8) to achieve successful watershed management (Table 8).

Table 8. Priority Family 3 Framework: Local Knowledge, Outreach, Biological Integrity and Assistance

PN	Priority	PV	DP	CP
High				
1	Landowners/producers should know what best management practices are and why they should be used.	5	x	
25	Watershed managers should seek out and respect local knowledge, perspective and experience.	4		
15	A strong working relationship between producers/landowners and watershed managers is important.	4		x
8	Conservation practices should be adopted on more acres.	3		
21	Water monitoring is necessary.	3		
23	The public should be aware of the range of resource issues associated with their watershed.	3		
Low				
20	Communicating about soil health is more effective than communicating about water quality.	-3	x	
19	A management plan should support activities that include recreation, economic and environmental benefits.	-3		
35	Producers/landowners/businesses should be required to adopt best management practices.	-3		
29	Watershed managers should focus on water quality issues over water quantity issues.	-4	x	
30	The watershed should have a user-friendly website that contains watershed information.	-4		
13	Funding should be budgeted specifically for outreach and communication.	-5	x	
Additional DPs				
9	Only local organizations should be involved.	-1	x	
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	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

Producer Outreach and Awareness
This family believed important components for successful watershed management include landowners/producer awareness of BMPs (PN1) and a public awareness of resource issues in their watershed (PN23). This family suggested that when landowner/producers have a working knowledge of BMPs, they can adapt those practices to best fit their operation.

> *"We know that every best management practice doesn't fit every person. But if somebody knows what it is, they can work towards it themselves or adapt to what works for them."*

They also acknowledged the importance for watershed managers to build strong working relationships with landowners/producers (PN15). This family expressed that one benefit of strong relationships between USDA-NRCS and landowners/producers is increased ease of communication about on-farm concerns, which solidifies the role of USDA-NRCS as a non-regularly agency.

> *"I think it's important that watershed managers are not perceived as the enemy…You want them [producers] to be glad that they are coming to see you, talking to you, and trying to help you, not work against you. I think that's real important."*

This family also highlighted the importance of incorporating local knowledge and experience of landowners/producers (PN25). They believed that this is an effective way to share information with landowners/producers so they can make informed decisions based on the experience of their peers. This family suggested this type of information sharing can validate local experience and can produce collective change, a USDA-NRCS staff participant explained.

> *"Part of what my role in this is to take information you learn from one participant and move that through the community to other people and then that person - after finding some information out - goes and talks to the person that actually did it. And then you start to have collective change and better movement of information."*

Although this family valued outreach and education, they did not believe specific funding should be allocated for outreach and education (PN13). They suggested that their limited staff and funding resources could be better spent on technical assistance.

> *"I'm not saying that there shouldn't be any, but [money should go] into the practices themselves. Or even just more technical type of systems…We know there's people that probably aren't being reached. But at the same rate some people aren't looking to be reached either. So, to spend a lot of money trying to reach people that don't want to be reached, I would think money is better spent for the boots-on-the-ground type of stuff."*

Other Priorities

This family indicated that BMPs should be adopted on more acres (PN8), highlighted the importance of water quality monitoring (PN21), and opposed forced implementation of BMPs (PN35). They understand that measurable change in water quality takes time but indicated that monitoring results can be used to avoid additional regulations and is needed to show lawmakers and the public that the agricultural community is improving water quality.

> *"If we don't show [the public] something, they're going to keep pushing. We're not doing enough. We're not doing enough. I know everybody says it's going to take years and years and years, but I'm afraid if we don't show something, the [State politicians] … are going [to say], 'Guess what. It's not working. More regulations.'"*

This family believed that water quality is equally important to manage as water quantity (PN29) They also suggested that a water quality message is effective for the general public, while a soil health message is a more effective for landowners/producers (PN20). Participant explained this nuance and recommended tailoring the message to each group's interests.

> *"I would break it down into two categories. For the general public, it should be all about water quality. But when you're talking to farmers, talk about soil health. Talk about how your crops are going to grow and all the wonderful things that are going to happen to the soil because that's more impactful to a farmer. And then, when you're talking to the general public who like fish and swim and everything else, they want to hear about water quality."*

This family agreed that a user-friendly website is not a priority (PN30) and did not prioritize managing the watershed for multiple uses (PN19). Although not a top priority, this family recognized the importance of evaluating climate change impacts in their watershed (PN32) and saw it as a potential tool to promote additional benefits of BMP adoption.

> *"I saw that as a hook to why farmers might change their practices. We've seen things change just in the short period I've been here, and farmers are responding to that. And it just happens to be that all the things we're doing for water quality are the exact same things that the climate action commissions are talking about for climate. So, I just wanted to hook them together."*

Priority Narrative Consensus Statements

Although there were no CP in the high and low priorities from these three priority families, there was general agreement that species diversity on land and water as well as reduced impacts on downstream stakeholders (PN5, PN27) were perceived by participants as a neutral to low priority. Additionally, participants in these three families felt neutral towards the idea that watershed management should benefit their watershed community and communities downstream of their watershed (PN31).

Priority Narratives Compared

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

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

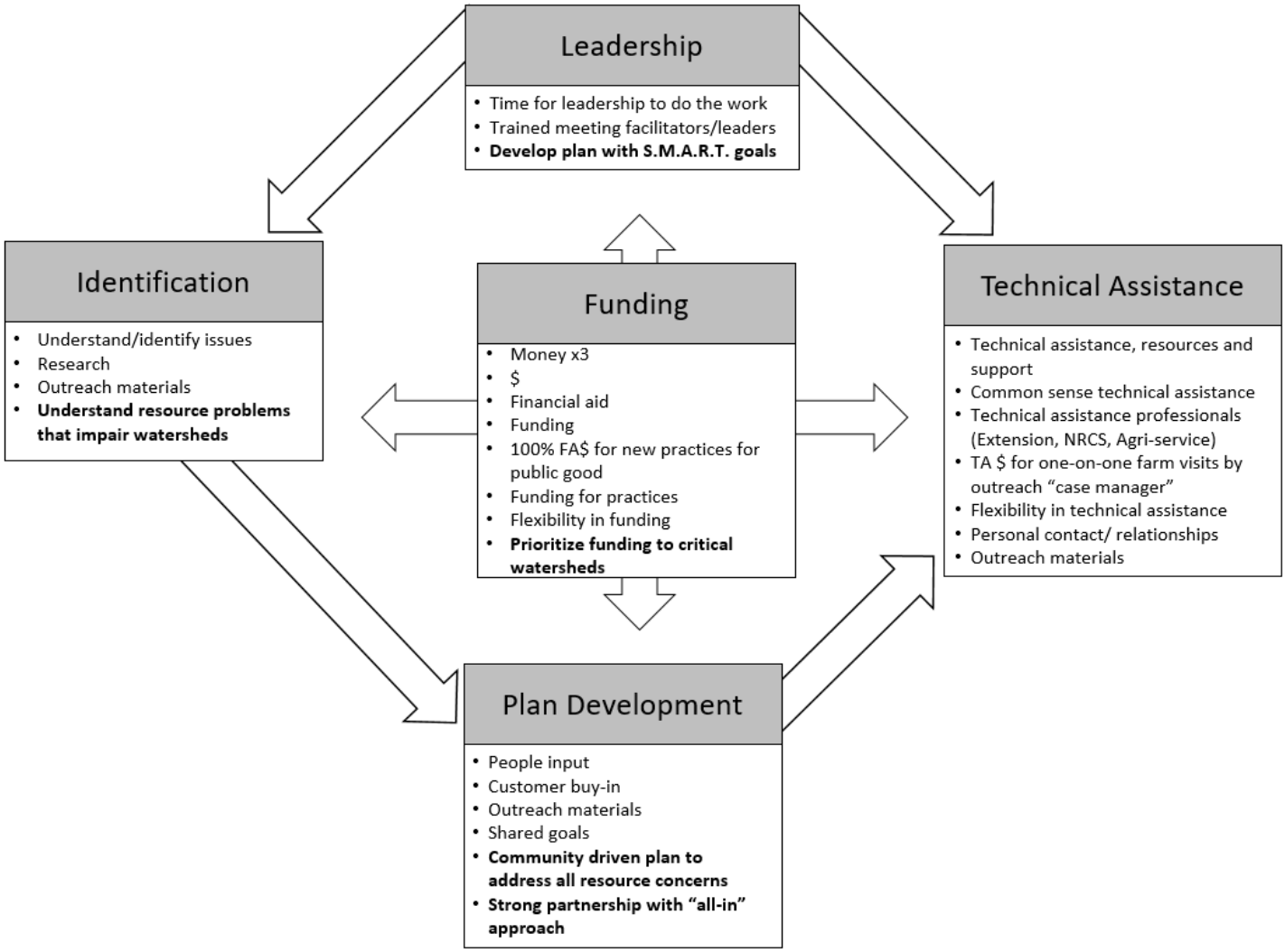
Discussion Group 1

Group 1 developed five broad categories of resource needs and identified 28 individual resources for successful watershed management. (Figure 3). The five broad categories include 1) Funding, 2) Leadership, 3) Identification, 4) Plan Development, and 5) Technical Assistance.

This group believed that funded watershed leadership can identify resource impairments and viable solutions to watershed management. Once problems and solutions have been identified, watershed leadership can work with their community to develop a plan that addresses impairments and garners support from landowners/producers as well as the general public. After developing a plan with community input, this group highlighted the need for flexible technical and financial assistance to achieve objectives. Finally, they emphasized the need to fund each essential category.

> *"If one part is gone, it might not work out for you…At any one point, any piece may be very important, but that doesn't mean you can discount the rest…If you don't have everything, then what do you have? Either a bunch of information or a bunch of money, and you can't do anything with just one."*

Figure 3. Mind map for Discussion Group 1



Bolded resource needs were provided by survey respondents (Appendix A)

Funding

This group stressed that flexible funding is imperative for successful watershed management and emphasized that flexibility at the local level can enable resource managers to allocate funding to best fit the unique needs of their watershed. They also implied that financial assistance can help mitigate external economic forces that impact an operation's finances, such as commodity prices.

> *"There are outside economic forces that are totally removed from [the farm] that can have a great impact on a producer's ability to be able to afford concrete fencing, putting up another barn, or something like that."*

They recognized that dairy commodity prices impact landowners/producers' bottom line, as well as their ability to take financial risks and participate in cost-share programs. While cost-share opportunities can be beneficial when commodity prices are high, agricultural sectors who experience low commodity prices, such as the dairy industry, may find it difficult to contribute matching funds.

> *"The dairy industry can't afford to do anything. It's just barely surviving. So, we could be given 3 million bucks and say, 'Go spend this.' And realizing that the farmers that are going to be spending it are going to [have to] collectively, come up with a million bucks out of their own pockets. We can find places to spend all that money, but [farmers] don't have the money to pick up that other 25 percent."*

Suggesting that financial assistance may be able to mitigate regulatory threats, this group believed that providing producers with financial resources can help them operate within regulatory limits. Again, using the dairy sector as an example, one participant explained that costs to fix certain on-farm issues are beyond the means of many producers. Instead of regulating those operations out of business, they suggested mitigating the situation with financial assistance.

> *"If the people [producers] don't have the money to solve that problem, there's going to be a choice. You either apply funding to help them solve that problem or they're going to be regulated out of business."*
>
> *"Without the money, you're going to put people out of business."*

Leadership

This group identified the need for trained watershed leadership that can devote time and energy to facilitate the watershed planning process. The watershed leaders need to have a working relationship with their community and be able to provide stakeholders information and resources needed to develop an effective community-driven watershed plan. Participant described responsibilities and needs of watershed leadership.

> *"Establish a watershed planning group and invite groups of stakeholders together and express the purpose of the group. [Develop a] process for getting input so everybody is heard and is part of developing the plan. Leadership takes time and energy, and whoever is given that position, whether it's a farmer or someone from extension or NRCS, they need to be granted the time and resources to be able to devote their energy to it."*

They also described the need to provide leadership the flexibility to work with producers in their watershed and the agency to prioritize on-farm issues as they see fit.

> *"We need the flexibility in leadership to prioritize the problems on an individual farm basis."*

Identification

This group recognized the need for research to identify sources of water impairments, as well as methods to inform and improve effective watershed outreach. They believed understanding impairments is vital to successful watershed management and is the first step towards finding a solution to water quality issues.

> *"If you're living on a lake and it's impaired, what's the resource issue? Is it the camps around the lake? Is it the agriculture?... Somebody's got to identify that."*

In addition to identifying water impairments, this group implied that identifying effective outreach methods is another key component of successful watershed management. Once resource managers understand sources of impairments, they can create targeted outreach information to address specific resource concerns. The group agreed that outreach strategies are part of the solution for water impairments and effective outreach methods need to be identified to ensure successful watershed management.

> *"…you're going to identify, through research, materials that are going to help you reach out to folks and talk about different things…"*

Plan Development

This group emphasized the importance of a plan developed by the watershed community and supported by the state government as well as the general public. With input from the community, a plan can highlight shared watershed goals and instill a sense of community ownership of the plan and the watershed. This group implied that this attitude can increase landowner/producer buy-in and ultimately lead to watershed improvement.

> *"Have that small, local watershed take control and improve it, which is a great thing to do. But I think that there's sometimes a feeling that it's being dictated by [the State]. It's not a group-shared vision of what is going to happen, and then you're not getting a good buy-in."*

They highlighted the need for an "all-in" approach but suggest current watershed efforts lack involvement and support from key groups, including state and federal lawmakers, lenders, and environmental advocate groups. A participant expanded on the divide between those who make regulations (legislatures) and those who are expected to follow regulations (producers).

> *"We have people making decisions at the state level in the legislature, or high up in their agencies, or down in Washington, DC, based on the information that they have, which in a lot of cases is very limited information. The trickle-down effect of [those decisions] is not seen by those folks. It makes it very difficult to do this when the decisions from above are working against you."*

Although the group felt there are efforts to represent agricultural interests in the state legislature, they felt as though they faced opposition and struggle to successfully advocate for agricultural interest at the state level.

> *"People drawing up the rules, regulations, and required practices say, 'landowners and commercial agriculturalists must do this in order to meet this water quality improvement goal.' Then the EPA and Agency of Agriculture try to help write policies to meet that without causing a huge, devastating economic catastrophe in the rural landscape. And they're doing a good job, but I just feel the forces beating down on us from [the state legislature], which isn't rural representatives, usually. It's the urban people."*

Technical Assistance

This resource need category includes funding and staff resources to provide one-on-one support to producers for both on-farm assistance as well as assistance in managing administrative responsibilities of program enrollment (e.g., assistance with paperwork and managing deadlines). Additionally, this group suggested including an outreach component to technical assistance so producers in the watershed know what services are available to them.

> *"That's people, the boots on the ground, helping you advise, implement, and devise strategies to spend the money on…and you need some kind of outreach component to let people know what sort of technical assistance would be available."*

Flexible technical assistance that addresses a wide range of on-farm issues was also highlighted as a necessity for successful watershed management.

> *"Every single farm I go to is vastly different and a lot of them require in-depth plans to solve very unique situations…When someone's prescribing one type of way to fix a farm, that could work great for farm A, but farm B down the road could be totally different…That's why flexibility is just key. It can't be prescriptive."*

This group discussed challenges associated with lack of contract flexibility and requirements to address all on-farm resource concerns. They suggested allowing landowners/producers to focus on addressing the most serious on-farm resource concerns, as opposed to addressing all on-farm resource concerns on a particular property.

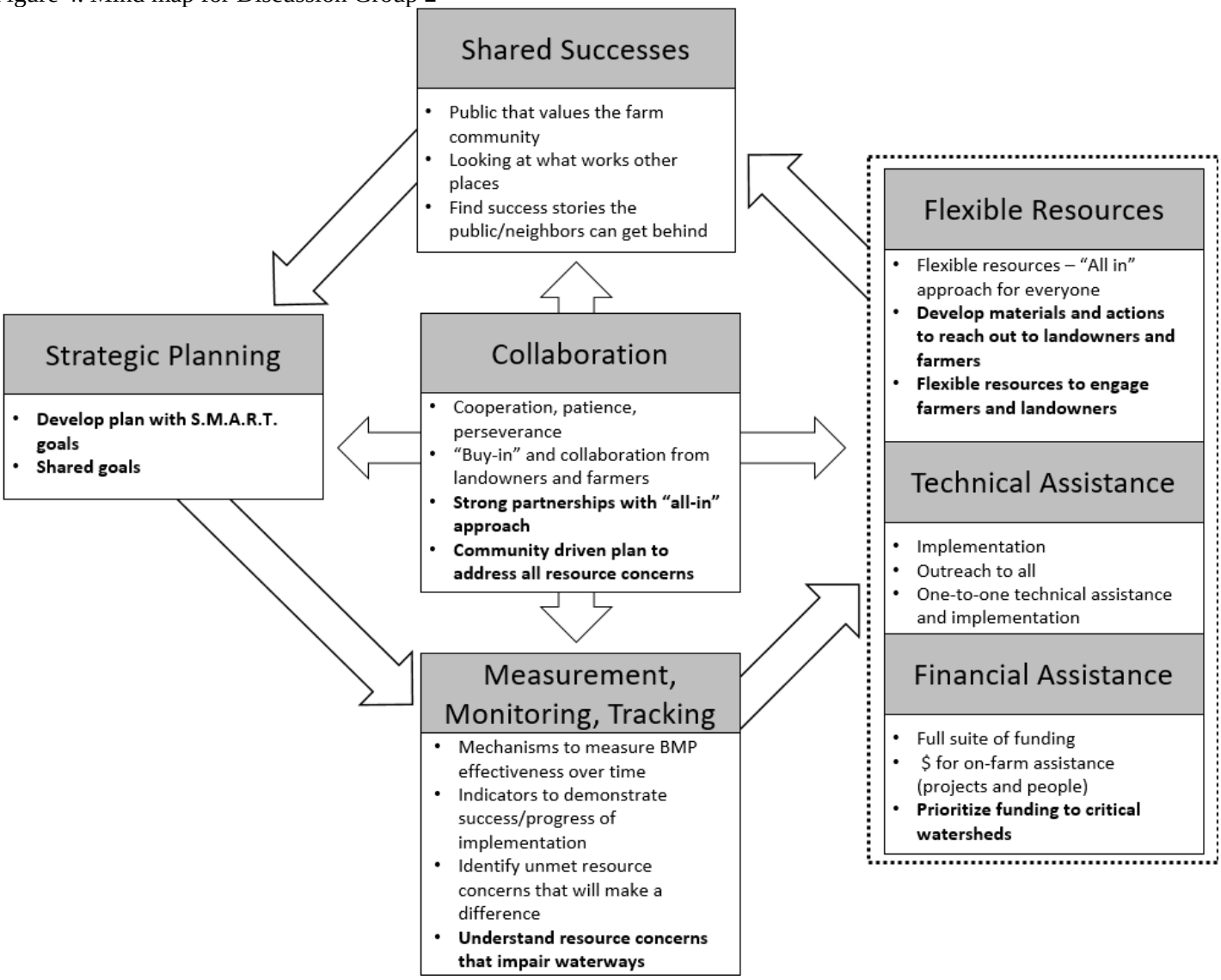
> *"The concept of having to fix all problems in a farmstead versus fixing the most egregious problem and letting the other ones kind of be there for a while, and being okay with that, and then come back around and deal with it later."*

Discussion Group 2

Group 2 developed five broad categories of resource needs and identified 28 individual resource needs for successful watershed management (Figure 4). The five broad categories include 1) Collaboration, 2) Shared Success, 3) Strategic Planning, 4) Measurement, Monitoring and Tracking, and 5) Flexible Technical and Financial Assistance.

This group highlighted collaboration as a key component for successful watershed management and emphasized the need for community-wide support of agriculture. They suggested sharing successes stories and promoting watershed improvements can increase adoption and grow public support for watershed management. They recommended developing a strategic watershed plan that represents the shared goals of stakeholders and prioritizes monitoring and tracking of watershed impairments to demonstrate success in the watershed. Finally, this group emphasized flexible technical and financial resources as well as the need to provide one-to-one technical assistance.

Figure 4. Mind map for Discussion Group 2



Bolded resource needs were provided by survey respondents (Appendix A)

Collaboration

This group believed that collaboration is essential to successful watershed management and described how effective collaboration with UVM Extension and Vermont Association of Conservation Districts (VACD) has resulted in additional flexibility by leveraging funding and resources.

> *"I think we leverage partners here in Vermont and NRCS incredibly well because that's how we're able to expand our dollars a little more. We can't hire anyone else, but we put money towards VACD or extension. We try to leverage our money, DECEM, RCPP, and all of that. For us, it's a way we can leverage more without hiring more people, which NRCS can't do. We can get our money out of other people."*

This group also indicated that collaborating with agricultural businesses and retailers has been beneficial and has played a role in increasing buy-in from producers in their watershed. Some producers who were initially reluctant to participate became more interested in adopting BMPs after working with retailors who were engaged in efforts to improve watershed health.

> *"Five years ago, some of the same [producers] that are a big help and driver were some of the naysayers, so I've heard a lot of different changes of tune in the last five years. There's that collaboration."*

Shared Success

This group suggested that promoting success stories of watershed management can garner the support of the non-agricultural public and increase buy-in from landowners/producers.

> *"I hope at the end of the day we result in a public that values its farming."*

To generate public support, this group suggested using watershed success stories as an outreach tool as well as a tool to facilitate adaptive management.

> *"We can say 'here's what we're planning, what would you do to help? How would you get involved? Then the rest is 'this worked, let's do more of that.' One is after the fact of doing some of these things and the other one is 'here's what we hope to do, and how do you want to get involved?'"*

They also believed that sharing successes and challenges of their watershed management efforts can inform adaptive management in their watershed and help other watersheds understand and prepare for challenges associated with watershed management.

> *"If it's not successful, we also learn and share that. We learn just as much from that as we do if the practice worked."*

Strategic Planning

Emphasizing the need to develop a plan informed by the shared goals of collaborative partnerships, this group identified the need for planning to inform the measurement of watershed improvements and effectively administer flexible technical and financial resources.

Measurement, Monitoring, Tracking

This resource highlights the need to identify resource concerns in the watershed, measure water quality impairments and track water quality improvements. This information is used to identify solutions that address identified resource concerns in the watershed. Additionally, this group illustrated the need to understand overall progress of the watershed project.

> *"Quantification of problems and solutions. It's measurement of the problem, measurement of the solution, and measurement of where we're at on getting there."*

Flexible Technical and Financial Assistance

This group discussed how constraints of technical and financial assistance impede local resource managers' ability to effectively manage their watershed.

> *"It's nice to have resources, but if they're so rigid you can't take advantage of them, they don't do any good."*

Stressing the importance of USDA-NRCS staffing resources, this group believed that producer BMP adoption and watershed improvement is dependent on technical assistance provided by USDA-NRCS staff. Lacking adequate staff resources, producers are unable to receive the technical assistance needed to implement BMPs.

> *"We've got a weak link in the technical assistance by not having enough people to get to every farm and to go back as often as you guys would like."*

This group also described challenges associated with landowner/producer awareness of and enrollment in conservation programs. They expressed that producers could benefit from additional guidance to navigate various programs and deadlines. One participant suggested assigning a "case manager" for every farm.

> *"Give every farm a point person to help them understand which programs might be the right fit, what paperwork to fill out, and when the deadlines are. Then get the funding to get the project done... I don't know any farms that are able to have one person that can spend all their time [filling out contracts]."*

To compensate for a lack of staff resources, USDA-NRCS has engaged in impactful collaborations with other agencies and organizations, including UVM Extension and VACD. This group believed that technical assistance needs flexible resources that allows collaboration with partnering organizations.

> *"We've worked hard to leverage other people because we can't fill them ourselves. There never used to be any part of VACD doing things on the ground, and now 23 VACD employees actually work for NRCS through VACD agreements. That helps our workforce quite a bit."*

Financial Assistance

This group described two important types of financial assistance. The first is financial assistance for producers. They indicated economics are often a barrier to adoption and believed that flexible financial assistance can lower economic barriers to adoption and increase producers buy-in.

> *"As far as projects, and money, and stuff like that, you have to do what's right for the balance sheet, and unfortunately, conservation doesn't always affect the balance sheet in a positive way as much as focusing your time on cattle and milking – That's where the funding and people to help guide you through it is so important."*

After identifying issues with grant funding for project financing, this group suggested alternative types of financial assistance and resources including low interest loans. Participants also suggested increasing engagement with the Farm Service Agency, who offers alternative financing options. Producers in this group explained challenges with grants and benefits of low-interest loans.

> *"Even if you had gotten that grant, you still have to buy the drill and get reimbursed. You [inaudible] have to build the manure storage facility. You have to build it and pay a contractor before you get paid back."*

> *"There's always grants towards projects, but why not low-interest financing? Like as far as, 'I want to buy a new till truck.' Well, there was a grant that was given out by the state. I applied for it. I didn't get it. Free money's nice, but I didn't get it. But what if there was a low-interest loan that I could buy a till truck with?"*

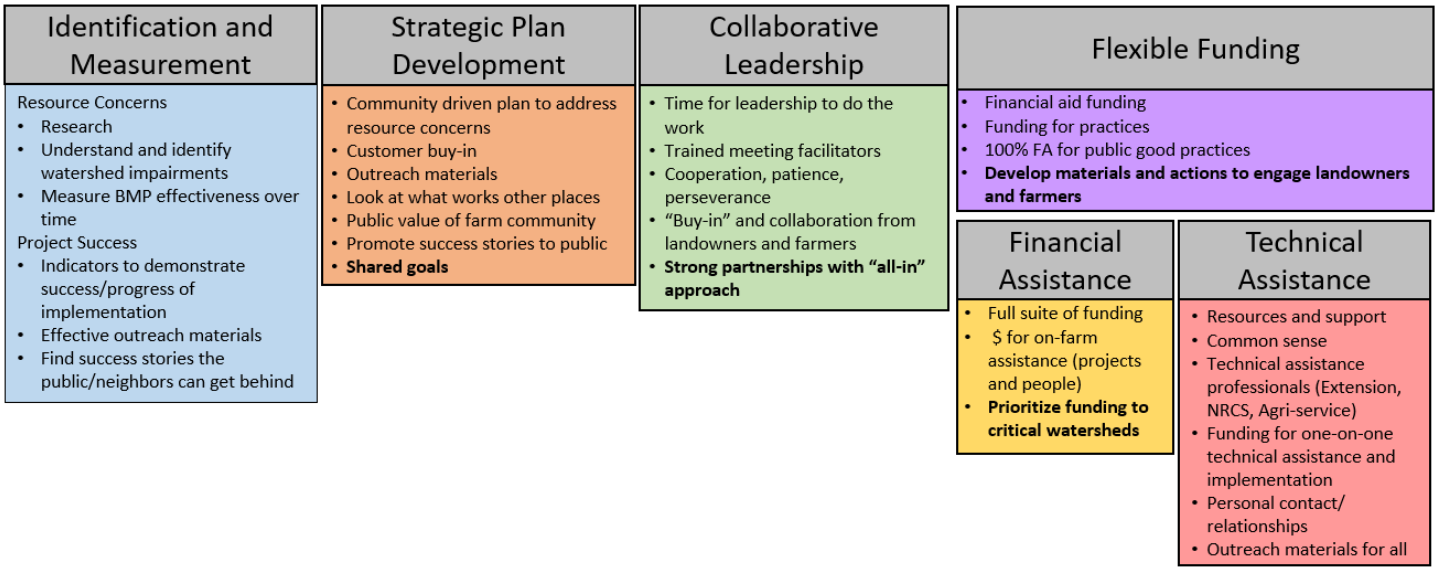
The second type of financial assistance included support from USDA-NRCS to fund a watershed coordinator position. Although local USDA-NRCS staff welcome the NWQI's targeted funding, the increased funding also increases their workload. They believed that a dedicated staff position will be able to increase the overall success of watershed projects.

> *"I say that coming from a position where I've been told 'Hey. You've got to organize this and lead this, but you're still going to do all your other work. And you're going to still meet all your goals and get everything done.'"*

Combined Groups

The following section details overall resource needs that participants identified across each discussion group.

Figure 5. Combined group resource needs



Collaborative Leadership
Participants highlighted the importance of collaborative leadership that can leverage resources from partners and work towards an "all-in" approach to watershed management. It is key for watershed leadership to have time and resources dedicated to one-on-one interactions.

Strategic Plan Development
Participants recognized the need for a community-driven plan to increase producer buy-in. They believed it is important to document and share watershed successes stories, promote the value of agriculture to the public, and prove to landowners/producers that their actions can improve their watershed.

Identification and Measurement
Forum participants believed that successful watershed management includes identifying and measuring both resource concerns and project successes. They highlighted the importance of understanding sources of resource concerns and measuring impacts of BMPs over time. Additionally, they suggested developing effective outreach materials to increase BMP adoption and promote project success.

Flexible Funding for Technical and Financial Assistance
Finally, participants indicated a need for flexible funding resources for technical and financial assistance. They suggested that financial assistance can mitigate economic barriers to adoption and acknowledged the need for additional staff to guide producers/landowners through the process of enrollment and implementation.

3.1.4 Identify Elements of Successful Outreach and Education

Recipients

Participants continued to emphasize the need for an "all in" approach to outreach and education. They identified three specific stakeholder groups as targets for outreach and education including 1) Producers, 2) General public, and 3) Legislative leaders.

> *"Definitely the farmer. I think that that's one branch. Then I think we got to outreach to the general public, to legislators."*

"All-In" Approach

The "all-in" approach discussed during the forum was also highlighted as an important component of outreach and education. Participants agreed that the "all-in" approach includes producers, the general public, and legislative leaders. They also believed this approach includes partners and state conservation leaders. Participants described the benefits of leveraging resources and collaboration between public and private partners.

> *"Extension does demonstrations and research and shows cover crops, then NRCS put a focus on it, then a farmer organization was started, who talked [to farmers] about putting focus on it. Industry came in and supported the idea, and all of a sudden it just all joined together. That's why it blossomed. It just happened to fall together all at the same time. And those demonstrations and research don't happen unless your agency provides some funding or technical assistance and conservation innovation grants."*

Producers

Participants identified producers as important targets for outreach and education because ultimately, it is up to them to make the decision to participate in a watershed management project and incorporate BMPs into their operation. While participants believed outreach and education is important for all producers, they suggested targeting less engaged producers.

> *"We have a group of farmers who engage. They're trying to figure this stuff out. They're huge partners but I think the ones we really need to reach are the ones who aren't engaged, and that's hard one."*

General Public

Throughout the forum, participants described a contentious relationship between agricultural and non-agricultural communities across the state. They believed the agricultural community needs the support of the general public and stressed the need for a public understanding that the agricultural community is a major contributor to improving water quality. Additionally, they identified children as an important group for outreach and education. Participants believed children are the next generation of leaders and need to understand the benefits of a healthy watershed, as well as the value agricultural communities contribute to improving watershed health.

> *"Convince the public that that we are the solution, instead of thinking that we are the problem…and they have to support [us]."*

Legislative Leaders

Similar to the general public, forum participants believed state legislative leaders lack an understanding of challenges facing the agricultural community and their contribution to water quality improvement across the state. Participants believe today's legislative leaders are disconnected from the agricultural community and do not realize the impact their decisions have on the future of water quality and agriculture in Vermont.

> *"You've got to affect the policy people today or else it will be all gone…I sat in on the [state] Senate Ag and the chairman asked [the farmers] if there was anything they wanted to say. I said, 'No, what do you want to ask me? I've been doing this for 43 years. Been modestly successful. Here you've got a real, live farmer. What do you want to ask me?"…they had no clue what to ask."*

Content

Promote Success

Often criticized for their contributions to water impairments, participants believed that outreach and education can promote watershed success stories and reduce the accusatory tone towards agriculture in the media. Reacting to the negative public opinion of agriculture, participants stressed the need to focus on success stories to change the negative coverage of water quality in Vermont.

"When people Google 'water quality in Vermont' they get just as many good articles as negative ones. The success story has to be the first one that pops up when you Google 'water quality Vermont'…There's a lot of information out there about what's going on that impairs water quality, but there's not near as much information that's put out there about some of the successes that could be improved on. I think it challenges the community."

Participants also suggested promoting success stories that have resulted from the watershed plan, rather than focusing outreach on the watershed plan itself. Participants felt that showing the general public, legislative leaders, and producers that implementing BMPs can have a positive impact in their watershed could increase public support as well as producer buy-in.

"I think one of the solutions to this problem is going to be found by what we're doing in these small watershed efforts where we're focusing in on technical and financial assistance in small areas. We can show the results and say 'if we do this, we can have a success.' As we make that public we can replicate it and get the momentum that's needed to move it forward throughout the [larger] watershed."

While participants acknowledged the importance of promoting successful watershed management to the general public and legislative leaders, when focusing on farmers in specific priority watersheds a local resource manager shared that they spotlight farmers to promote local success. Participants expressed that this mechanism highlights local experience and sends a message that encourages producers in targeted watersheds to adopt BMPs.

"We do a farmers' spot, a members' spotlight. And because we've had this priority watershed initiative we've done a lot of our demonstration projects and crop control within the watersheds…The Conservation Farmer of the Year is also coordinated within the watershed…Hopefully somebody will be nominated from the East Creek to be the farmer champion [this year]."

Highlight Importance of Agriculture and Watershed Health

Participants believed that effective outreach needs to emphasize the important contributions agriculture provides to the general public. Participants described outreach material from Vermont's Agency of Agriculture that highlighted public benefits provided by the agricultural community.

"A lot of today's public probably did not grow up on a farm. They may have seen farms, or they may have been around them, but there's a chunk of the population that has not been on farms. The Agency of Agriculture, a couple years back, put out a brochure that tried to capture all the different pieces of their lives that are impacted by farming. It talked about hunting land, snowmobile grounds, access to fishing. I think that makes more sense to the public."

Other participants suggested crafting a message that does not specifically emphasize agricultural contribution, but instead suggested promoting the benefits of healthy watershed that are publicly relatable.

"Rather than reaching out through the farm and saying, 'this is what the farm's doing for the larger community' but on their terms. They may not care about milk and cows, but they do want that field to snow-shoe across or that spot to hunt. They want their fishing access, you know, so more in their terms."

Delivery

One-On-One

Participants identified one-on-one interactions with producers as an effective method to deliver both outreach and education as well as technical assistance. Additionally, participants emphasized the importance for USDA-NRCS staff to have a well-developed relationship with the producers and a working knowledge of their farming operation.

"We can generate a document that is however thick, but that doesn't really solve [water quality impairments] unless we are actually going out, doing stuff and getting away from our desk and our computers and meeting with people…I'm going to learn something from him and he's going to learn something from me. Luckily we start to respect each other."

Peer-To-Peer

Participants highlighted the need to raise awareness and establish a level of comfort with BMP adoption. Peer-to-peer learning opportunities were identified as an effective way to deliver information. One participant described his experience showing other producers BMPs on his property.

> *"The first year we had few farmers came down and people thought, 'Wow, you can grow corn like this!' And I got to admit, I was a hesitant [at first] too…If nobody's doing it, you don't want to be that one weird guy, but after a while, if you get enough people engaged and enough people go out and see it, they say, 'Hey, so-and-so [is doing it too].'"*

Another participant suggested working with area farmer coalitions and other respected partners within the agriculture community to promote BMPs and other actions that can to improve watershed health.

> *"If you could work through a massive PR program with [the farmer coalitions] delivering the message about what we're doing with the help of the extension and NRCS. Get it out there where people see it, where the young people see it, where the older see it."*

Connect to the General Public

Throughout the forum, participants described a disconnect between the agricultural community and the general public, fueled by negative publicity. They suggested this disconnect can have negative impacts on the agricultural community and could threaten the success of watershed management projects. Participants agreed that sharing success stories is an effective method to contest negative publicity, but highlight challenges they face reaching the larger general public.

> *"This process needs to be at a small watershed, but we're talking about a big problem. An educational process needs to be more widespread… [Our success stories] don't go to everyone in the world. It goes to everyone that subscribed to UVM or NRCS, and that's a big problem. I mean, we're not even communicating between the farmers and the non-farmers within a tiny, little watershed."*

Participants also suggested a large public relations campaign is needed to change the attitude of the general public towards agriculture.

> *"You've got to have massive PR because that's what our opponents do. We're talking tens of thousands or a hundred thousand [people] that you need to reach… and it's going to cost money. Somehow, you've got to turn that ship, that attitude. Somehow, it's got to be turned."*

Another participant shared a successful public outreach effort that that featured UVM staff sharing information about cover crops as a preview for movies in an urban movie theater. Collaborating with local businesses and leveraging funding from commodity groups, this outreach effort was able to deliver a positive agricultural message to the general public.

> *"The whole thing started when the Farmer Coalition was going to do some videos about how farms appeal to the public because they care for the animals. We couldn't afford to do it, and the New England Dairy Promotion Board came along and said, 'We've got some deep pockets. Let's work on this.' A couple years later, they produced a video about cover crops and manure that's gone wide and far. Then out of that, came the [movie preview] piece."*

Hands-On

Hands-on learning events were suggested as effective outreach for the general public and producers alike. Participants described a well-attended event called "Breakfast on the Farm", where the public was invited to a working farm and encouraged to participate in various hands-on activities that helped them understand agriculture's contribution to conservation and the value agriculture provides to their community. Responding to a public misunderstanding of on-farm nutrient management practices, another participant suggested hosting an introductory lesson on nutrient management geared towards the general public. Participants believed that this could be another opportunity for the public to learn about on-farm challenges and solutions producers deal with on a regular basis.

> *"[Invite the public to] come on a Saturday for an hour to discuss nutrient management on a farm and [give them a] basic introduction of how feed goes in one end, manure comes out the other and how that feeds the crop that then feeds the animals and what [farmers] are doing to protect water quality."*

For producers, hands-on demonstrations and test-plots have been successful in showing producers that BMPs can be successfully implemented in operations similar to their own. One participant described increased cover crop adoption and attributed it to demonstrations conducted by UVM Extension.

> *"In 2013 I knew of a couple hundred acres of cover crop in this county. By 2016, we have about 10,000 acres of cover crop in this county. We have people moving from a lot of fall tillage to more reduced tillage to no-till, and that all was based on [UVM Extension] going out and doing demonstrations and research. [UVM] replicates the work across the landscapes so that it can be seen in landscapes, topography, and soils."*

3.2 Interagency Partner Interviews

In February and April of 2018, representatives from Vermont's Department of Environmental Conservation (DEC) and US Environmental Protection Agency (EPA) Region 1 were interviewed about their role in the NWQI, USDA-NRCS' role as a local partner in watershed management, and resources needed for successful watershed management and outreach. Interviews with DEC and the EPA were conducted over the telephone and 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 Vermont Department of Environmental Conservation

DEC representatives reported their role in the NWQI is to work with USDA-NRCS and other partners to improve Vermont's water quality. DEC participates in their State Technical Committee (STC), a collaborative working group that provides information, analysis and recommendations to USDA-NRCS regarding new and existing conservation programs. They continue to provide recommendations for NWQI priority watersheds based on their state-wide water quality monitoring program and available resources across the state.

According to DEC, the STC provides a collaborative environment for state and federal partners to work towards improving water quality. The STC offers partnering agencies a venue to discuss priority watershed site selection, strategies to maximize resource contributions (technical, financial, and outreach), progress updates, and resource gaps. DEC shared that the working relationships fostered by the STC ensures resource coordination and avoids duplicate efforts. Additionally, DEC believed USDA-NRCS is in a unique position to work with producers due to their non-regulatory status. Moreover, they felt USDA-NRCS has contributed to the state-wide effort acknowledging agriculture contributions to water quality impairments as well as improvements in Lake Champlain.

DEC indicated that a lack of USDA-NRCS staff resources has a negative impact on working relationships with the public. They also reported that USDA-NRCS' reluctance to share sufficient BMP location data hinders DEC's ability to track water quality improvements and distribute available resources across the state. Additional challenges associated with the NWQI and USDA-NRCS include rigid requirements to access funding (e.g., 10-year contract periods) financial barriers (e.g., price cap, matching funds), onerous contracts, and slow implementation time.

DEC highlighted water quality monitoring as an essential component for successful watershed management. They emphasized the need for data-informed priority watershed selection and discussed the importance of an adaptive management approach to direct resources. They stressed the need to collaborate with partners to address emerging priority issues and water quality monitoring needs, as well as to measure success of technical and financial assistance (dollars invested, BMP location data, outcome, and performance measures). For successful watershed outreach, DEC discussed the need to work with producers and partner organizations. For producers, they believe it is important to communicate that conservation programs work to improve operations by integrating practices into existing business plans. Moreover, they discussed the need to communicate a holistic approach to watershed management that does not focus on a single sector (e.g., agriculture). Finally, they stressed the need for data transparency and the importance of maintaining high levels of interagency trust.

3.2.2 EPA Region 1

The EPA reported their role in the NWQI to include three elements: 1) identify positive trends in water quality data by working with partners to manage state and federal water quality funding sources (e.g., Lake Champlain Basin Program 319 program), 2) troubleshoot challenges associated with BMP adoption, and 3) assist in the development of a water quality monitoring plan to document water quality response to BMP adoption.

The EPA cited USDA-NRCS' leadership role in the NWQI as unique and indicated that the NWQI has had a positive impact on interagency coordination in Vermont. The EPA indicated that USDA-NRCS' collaborative approach to priority watershed site selection and water quality monitoring are important to the success of targeted watershed management. EPA also believes that USDA-NRCS successfully leverages resources to increase producer adoption and effectively communicates the benefits of public investment in water quality improvement.

To improve the NWQI, the EPA suggested sharing more specific information regarding location of implemented BMPs. They felt that with sufficient data, partners can guide water quality monitoring plans, measure water quality response to BMPs, and direct targeted outreach efforts to critical areas. EPA also suggested increasing USDA-NRCS staff resources to manage additional workloads and provide assistance with program enrollment requirements.

According to EPA representatives, successful watershed management requires partnerships, cooperation, and funded BMP implementation to encourage widespread adoption of BMPs in targeted watersheds. They emphasized that outreach plays a vital role in successful watershed management and recommend targeted outreach efforts in targeted watersheds that focus on personal contact and result in trusted working relationships between producers and watershed managers.

3.3 East Creek stakeholder feedback

In April 2019, a member of the NRSS team returned to Addison County to present results of the East Creek watershed forum outlined in this report. The researcher met with local conservation staff (USDA-NRCS, VACD and UVM Extension) and a representative of the Champlain Valley Farmer Coalition to discuss forum results and project progress. The following is a summary of information discussed during the return visit.

Collaboration

Throughout the forum, participants highlighted the importance of collaboration and its positive impacts on watershed management in Vermont. At the return visit, conservation staff provided specific examples of how and why collaboration is facilitated across the state. For successful partnerships, conservation staff believe there needs to be an established working relationship as well as a formal agreement and a documented exchange of resources. The Vermont Agricultural Water Quality Partnership is an example of an effective partnership that includes diverse agencies and organization who signed the Lake Champlain Memorandum of Understanding (MOU). Depending on the expertise of the agency or organization, participants agree to contribute to water quality improvements by providing technical and financial assistance, and/or outreach and education directly to the agricultural community. Conservation staff emphasized that the MOU is a key component to facilitating partnerships and resource exchanges that result in successful collaboration. They also emphasized the importance of partnering with producer-led organizations, such as the Champlain Valley Farmer Coalition, as producers have the ultimate authority to implement conservation practices in their operation.

Related to collaboration and partnerships, USDA-NRCS underscored the distinction between partnerships with regulatory and non-regulatory agencies. Responding to the recommendation for USDA-NRCS to find an appropriate scale to share BMP location data with DEC, USDA-NRCS staff stressed the importance of maintaining the confidentiality of their clients' personally identifiable information. At the state level, USDA-NRCS is unwilling to provide more specific BMP location data and are confident that data currently provided meets DEC's water quality monitoring needs.

Staffing Needs and Enrollment process

Two perspectives were discussed relative to staffing needs and workload management. Some return visit attendees agreed with the forum results that stated the need for additional conservation staff. These attendees emphasized the importance of strong working relationships between conservation staff and producers; therefore, it was suggested that new staff be assigned bureaucratic tasks to allow current staff with established relationship and knowledge of the watershed to provide on-farm technical assistance.

Alternatively, other attendees suggested increasing efficiency of the current staff by reducing reporting requirements in NWQI watersheds. These attendees highlighted their frustration that the individual field enrollment process requires additional justification for funding beyond its placement in an NWQI watershed. Attendees suggested that the NWQI designation should result in increased flexibility of individual field reporting and justification requirements. That is, if a producer wants to implement a conservation practice on a field, within an NWQI watershed, that addresses a resource concern identified by the NWQI watershed assessment, no further justification should be required. They believe this would increase staff efficiency and shift the priority to resource concerns of the watershed rather than an individual field.

4 Recommendations

The NRSS team developed the following recommendations through the synthesis of the stakeholder forum conducted in Addison County on March 2018, interagency partner interviews conducted in early 2018 and stakeholder feedback discussions conducted in April 2019. This section provides recommendations to USDA-NRCS and East Creek watershed managers.

4.1 USDA-NRCS

1. ***Continue working with state and local partners to facilitate collaborative environment.***
   We recommend USDA-NRCS continue to facilitate a collaborative environment with local, state, and federal partners.

   Forum participants and agency partners highlighted the importance of a collaborative working environment to achieve their common goal to improve water quality. Working with state and local partners, Vermont USDA-NRCS has leveraged resources from across the state and improved their capacity to effectively monitor water quality, increase BMP adoption and disseminate watershed outreach and education to producers and the non-agricultural community.

2. ***Work with partners to find appropriate scale to share BMP location data.***
   We recommend USDA-NRCS increase the specificity of BMP location data to meet water quality monitoring needs of DEC while maintaining participant confidentiality.

   Agency partners (DEC and EPA) highlighted the need to increase specificity of BMP location data to direct their water quality monitoring program. They understand the need to protect participant confidentiality but stressed that this information is needed to guide efforts to document water quality improvements resulting from the NWQI and inform resource placement across the state.

3. ***Increase staff resources to facilitate one-to-one interaction and manage additional workload of the NWQI.***
   We recommend USDA-NRCS increase staffing resources in the NWQI watersheds to manage additional workload and enable one-to-one technical assistance.

   Forum participants and agency partners both suggested increasing staff resources across the state and providing additional staff to the NWQI watersheds. They believed the state-wide lack of available staff has a negative impact on working relationships with producers. Moreover, with a lack of adequate resources, current staff are increasingly burdened by administrative responsibilities and are unable to provide the “boots-on-the-ground” technical assistance needed to achieve water quality goals. Although local resource managers welcomed targeted assistance in their watershed, they discussed a need for a watershed coordinator type position to manage the additional work load associated with the NWQI.

4.2 East Creek Watershed

1. ***Continue efforts to promote agricultural value to state legislature and non-agricultural community.***
   We recommend the East Creek watershed community continue to promote the value of agriculture to the state legislature and the non-agricultural community.

   Throughout the forum, participants described an anti-agriculture sentiment held by the non-agricultural community and emphasized the need to promote agriculture's value to the community. Participants reported interactive public events such as "Breakfast on the Farm" and informative videos have reached a broad public audience and highlighted agricultural contributions to water quality improvements across the state.

2. ***Promote watershed success in the agricultural community.***
   We recommend East Creek watershed community promote watershed success to the local agricultural community.

   Forum participants believed that successful watershed management depends on voluntary adoption of BMPs. They emphasized the importance for producers to understand that voluntary adoption of BMPs can benefit their operations and have positive impacts on water quality. Promoting watershed success stories through one-to-one interactions and peer-to-peer networks can raise awareness of resources available to producers and can encourage further adoption of BMPs in targeted watersheds.

5 References

Brown, S. R. (1993). A primer on Q methodology. Operant subjectivity, 16(3/4), 91-138

Vermont Natural Resources Conservation Service (2018) State Technical Committee. www.nrcs.usda.gov/wps/portal/nrcs/main/vt/technical/stc/

Vermont Natural Resources Conservation Service (2018) Helping Farmers Protect Water Quality in the East Creek watershed.

Natural Resources Conservation Service (2018). National Water Quality Initiative. www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/initiatives/?cid=stelprdb1047761

Appendix A: Forum Pre-Survey

This appendix describes the development, data collection, analysis, and results of the East Creek watershed.

Development

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

Data Collection

East Creek watershed managers invited stakeholders via email to participate in the watershed forum. Approximately two weeks before the forum the East Creek watershed managers sent a total of 19 surveys to invited participants via email. Respondents were provided a link to take the 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 East 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 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). The NRSS team 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 32 surveys sent, a total of 12 surveys were completed online, for a final response rate of 37.5% (Table A-2). Most respondents identified as producers or landowners (Table A-3).

Table A-2. Response rate

Completed (n)	Response Rate (%; N=32)
12	37.5

Table A-3. Respondent stakeholder type

Stakeholder type	Frequency (%: N=12)
Producer or landowner	25
USDA-NRCS staff	25
VT Agency of Natural Resources staff	16.7
Community member	8.3
VACD staff	8.3
Other*	16.7

**Other includes an agricultural retailer and an agri-business owner.*

Survey responses to four open ended questions (Q4, Q5, Q6, and Q7) from a different watershed 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 response from a different watershed were used to enable comparisons between watersheds.

The researcher incorporated East Creek watershed survey responses to Q4 and Q5 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

- Community driven plan to address all resource concerns
- Understand resource problems that impair watersheds
- Flexible resources to engage farmers and landowners
- Develop a plan with S.M.A.R.T. goals (specific, measurable, achievable, realistic, and timely)
- Shared goals
- Strong partnership with “all-in” approach
- Prioritize funding to critical watersheds
- Develop materials and action to reach out to landowners and farmers

Survey responses to Q6 and Q7 were incorporated into the outreach and education activity as examples. Derived from Q6 and Q7 emergent themes, 12 elements of successful outreach and education were provided to each group as examples, including:

- Explain complicated funding mechanism
- Outreach budget
- Show how farm fits into larger picture
- On-farm programs to show new practices
- Short, straight to the point letters and emails
- Before and after display of implementation and explain how farmers benefit from practices
- Show impacts of conservation practices
- Cooperative approach (farm, community gvt)
- Highlight success stories
- Up-to-date contact info
- Include diverse groups in advertising
- Updates and reports

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

Appendix B: Watershed Priorities

Development

The NRSS team 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, including: 1) current literature about successful watershed management (Borisova, Racevskis & Kipp, 2012; Church & Prokopy, 2017; Druschke & Hychka, 2015; Focht, 2002; Osmond et al., 2012; Schall et al., 2018; Steelman & Maguire, 1999) 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 watershed 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 team 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:

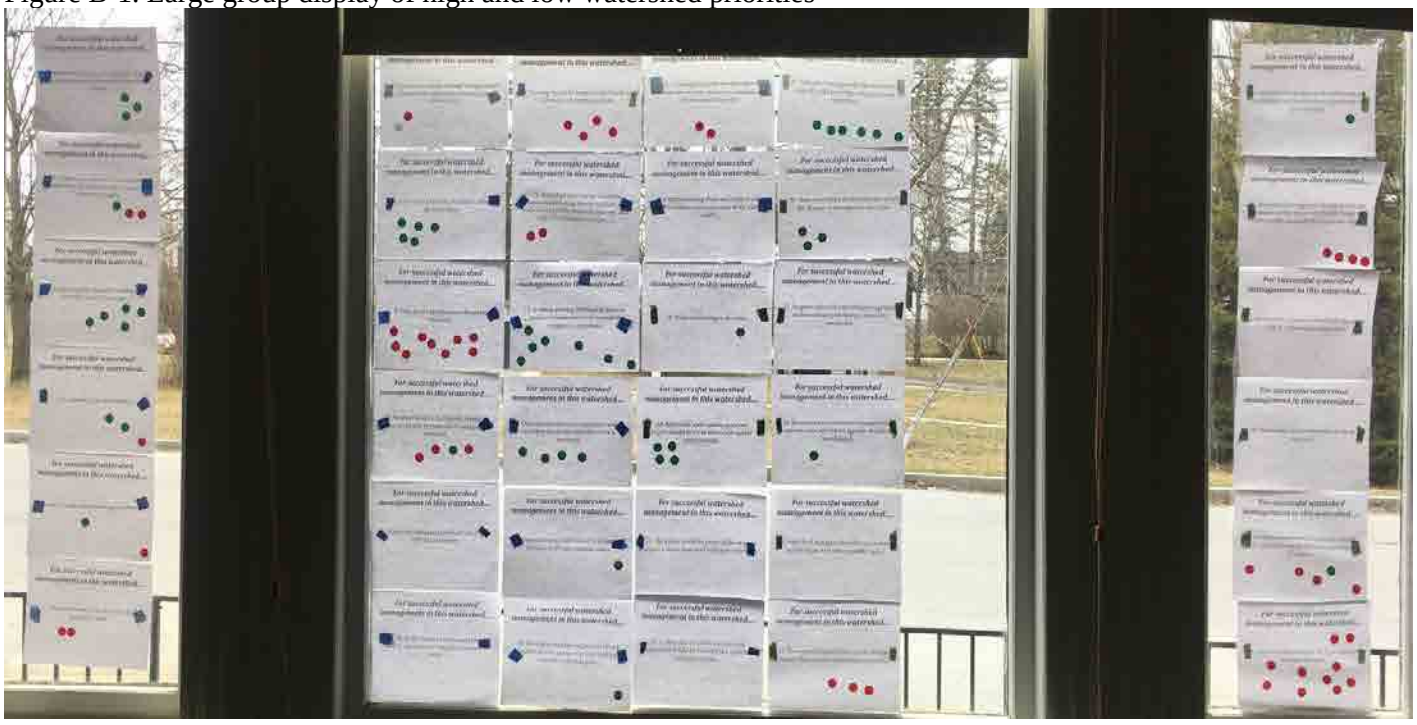
Stage 1: Priority ranking

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 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

The NRSS team 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 team 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 team. 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 team reviewed each priority framework and identified relevant DPs from each priority framework. 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.

Reference

Borisova, T., Racevskis, L., & Kipp, J. (2012). Stakeholder Analysis of a Collaborative Watershed Management Process: A Florida Case Study 1. JAWRA Journal of the American Water Resources Association, 48(2), 277-296.

Church, S. P., & Prokopy, L. S. (2017). The influence of social criteria in mobilizing watershed conservation efforts: A case study of a successful watershed in the Midwestern US. *Land Use Policy*, *61*, 353-367.

Druschke, C. G., & Hychka, K. C. (2015). Manager perspectives on communication and public engagement in ecological restoration project success. *Ecology and Society*, *20*(1).

Focht, W. (2002). Assessment and management of policy conflict in the Illinois river watershed in Oklahoma: an application of Q methodology. International Journal of Public Administration, 25(11), 1311-1349.

Osmond, D., Meals, D., Hoag, D., Arabi, M., Luloff, A., Jennings, G., ... & Line, D. (2012). Improving conservation practices programming to protect water quality in agricultural watersheds: Lessons learned from the National Institute of Food and Agriculture–Conservation Effects Assessment Project. *Journal of Soil and Water Conservation*, *67*(5), 122A-127A.

Schall, D., Lansing, D., Leisnham, P., Shirmohammadi, A., Montas, H., & Hutson, T. (2018). Understanding stakeholder perspectives on agricultural best management practices and environmental change in the Chesapeake Bay: AQ methodology study. Journal of Rural Studies, 60, 21-31.

Steelman, T. A., & Maguire, L. A. (1999). Understanding participant perspectives: Q-methodology in national forest management. Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management, 18(3), 361-388.

Figure B-2. Watershed priorities instruction sheet

East Creek and McKenzie Brook Watershed Conservation Planning Forum

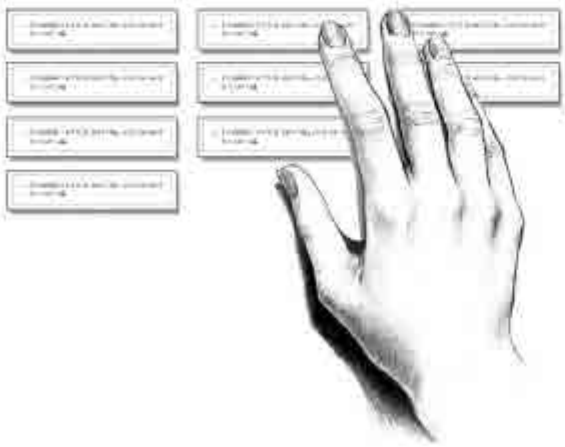
Session One: What is Successful Watershed Management?

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.

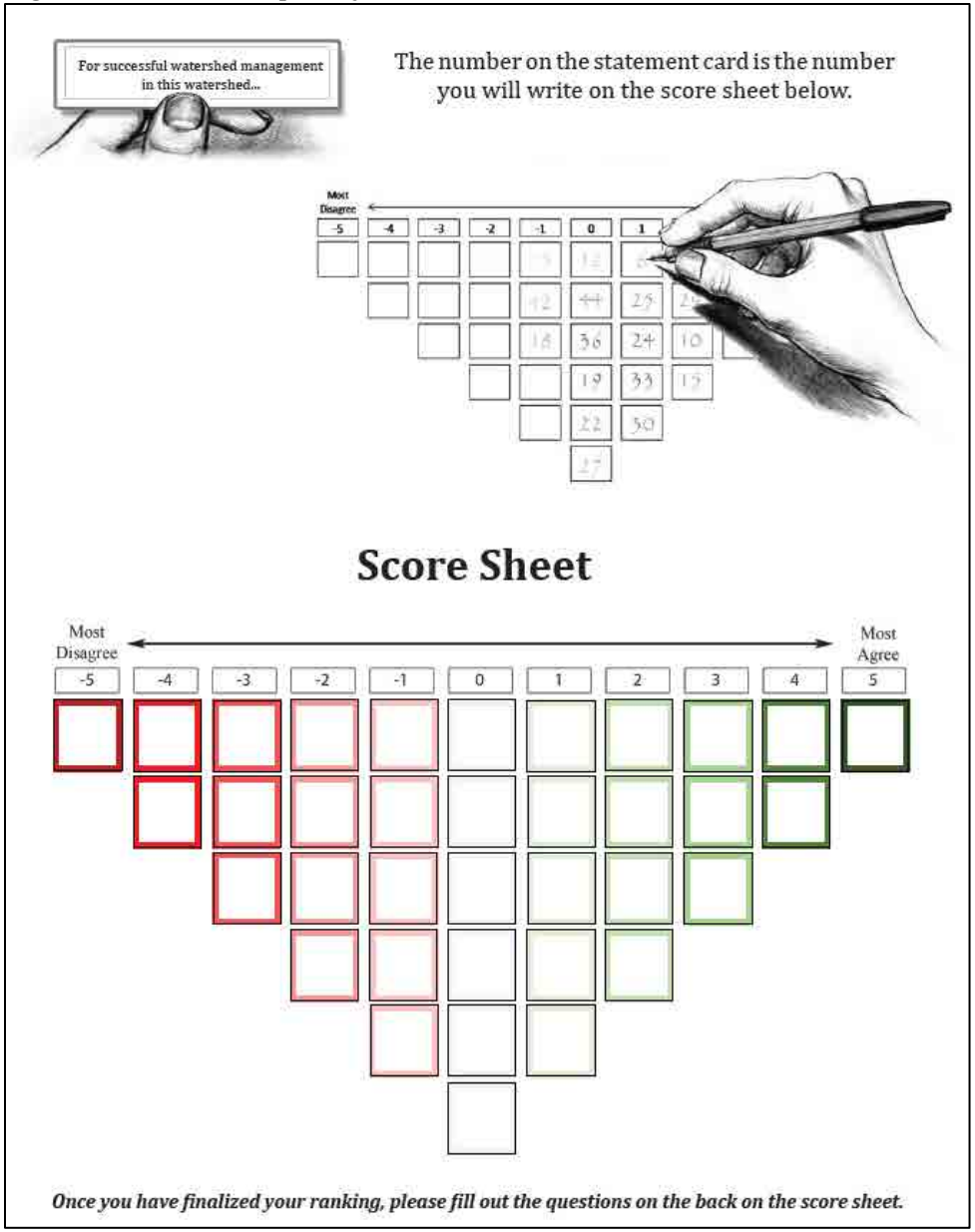


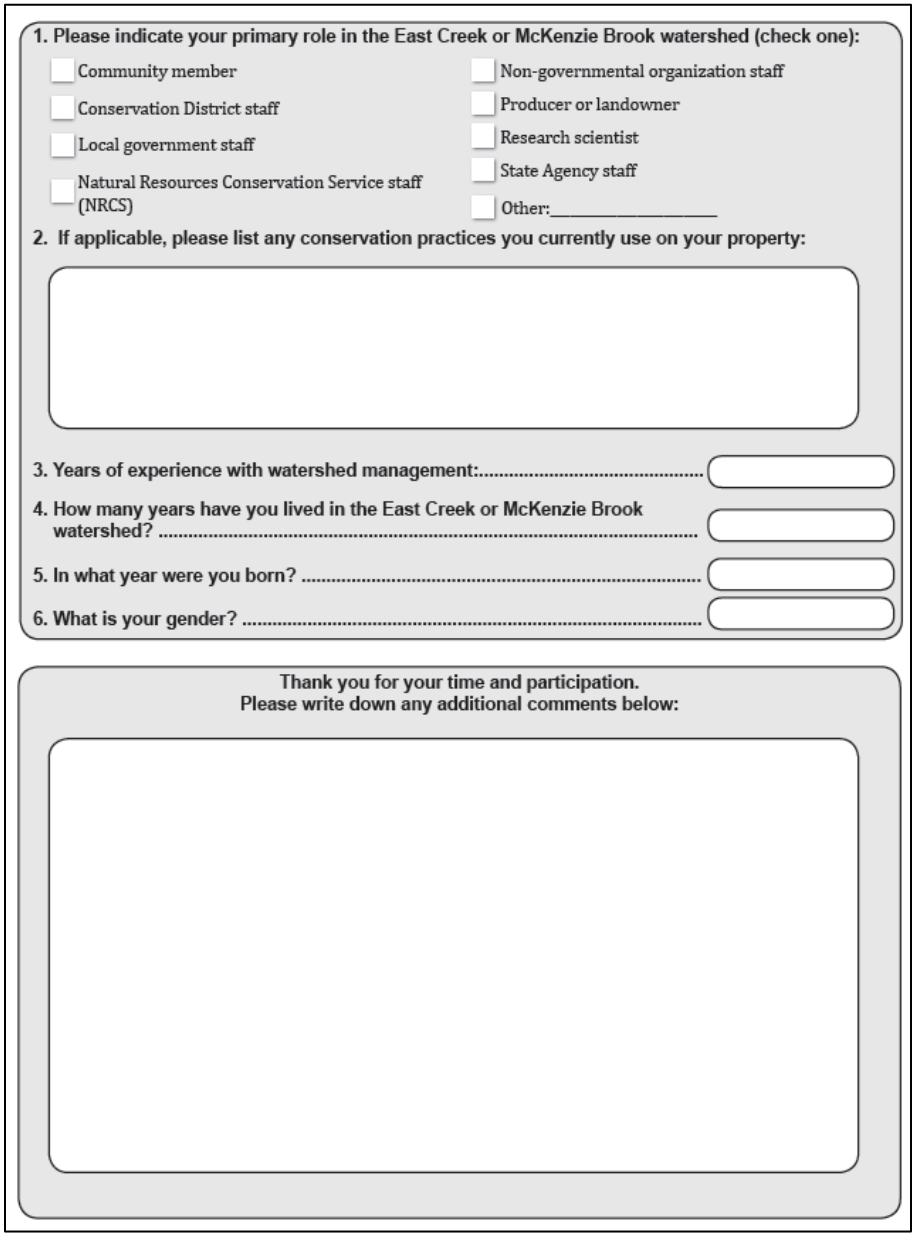
4. Re-read each statement in your "agree" pile and decide which 1 statement you most strongly agree with.

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





This page is intentionally left blank

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 USDA-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 USDA-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/DEC?
2. What role does EPA/DEC play in the NWQI?
3. What role does EPA/DEC play in the East Creek watershed?
4. What resources does EPA/DEC contribute to the NWQI?
5. What resources does USDA-NRCS contribute?
    a. Is anything missing? If so, what additional resources would you like USDA-NRCS to contribute?
6. Does the NWQI impact interagency collaboration?
7. What is the biggest challenge working with the NWQI?
8. What makes the 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?