Valley Stewardship Network
Kickapoo Farmer-Led Watershed Councils
RP 278-16
River Planning Grant Final Report
May 2016-December 2018 (RPG Funding until December 2017)

Submitted by Shelly Brenneman, Executive Director, VSN

Project Introduction

The Kickapoo Watershed covers approximately 700 square miles containing over 500 river miles. The watershed is within portions of Vernon, Crawford, Monroe and Richland Counties in southwest Wisconsin. The watershed is home to over 25,000 people and includes 12,000 acres of public lands. The counties within the Kickapoo Watershed are among the economically poorest in the state. The dominant land-use in the watershed is agriculture, which makes up 50% of the land cover. The Kickapoo River is fed by a number of smaller streams and tributaries, many of which offer excellent trout fishing opportunities. Recreational fishing generates a significant economic benefit to the local economy, with Vernon County alone generating an estimated 53.2 million dollars annually in tourism-related business sales.

On November 3rd, 2015, Agriculture Secretary Tom Vilsack announced that the NRCS will be investing 100 million dollars in 73 watershed-based projects through the Mississippi River Basin Healthy Watersheds Initiative (MRBI). The Kickapoo River Watershed was one of the selected priority watersheds that would receive 5.3 million dollars over four years to help farmers implement practices that improve water quality and wildlife habitat. Ten HUC-12 subwatersheds were initially selected (with two added in 2017), as priority areas within the Kickapoo River Watershed.

Agriculture in the Kickapoo River Watershed, with a 12% average gradient, causes significant sediment and nutrient run-off. This combined with soil loss from steep eroding stream banks creates degradation in local trout habitat and contributes to the dead zone in the Gulf of Mexico. As a result, the Kickapoo Watershed was designated to receive a significant portion of the MRBI program funding. This was an unprecedented conservation funding opportunity for Kickapoo farmers, but MRBI funds were available for on-farm practices only. There was no associated funding available for the increased outreach and implementation assistance that will greatly enhance the dissemination of 5.3 million dollars. NRCS staff reached out to local agencies and organizations, like VSN, to assist with MRBI outreach and EQIP application support.

River Planning Grant funding built the capacity of VSN to assist with the MRBI outreach and conservation goal development efforts, while increasing the participation of area farmers in our water quality programs. There was a clear need to build bridges between farmers and conservationists and the process of developing farmer-led watershed councils offers the opportunity for this collaboration. This project also addressed the opportunity for leadership capacity building for farmer members of the watershed councils. VSN staff were able to secure significant additional funding to match the RPG funding, extending the overall project until December 31, 2018; although RPG funding was complete in December 2017.

Local NRCS and County Conservation staff originally designated Tainter and Knapp Creek MRBI subwatersheds as priority areas for this River Planning Grant project. This grant project presented VSN with a unique opportunity to inform, enhance and assess the impact this effort will have on water quality within the Kickapoo Watershed. However, the MRBI/EQIP process was wrought with NRCS staffing bottlenecks, resulting in partner agency/organization and farmer frustrations. Although local agencies and organizations, including VSN, worked earnestly with farmers and agency staff to increase efficiency for high ranking proposals, in the end, many EQIP applications were never funded.

Although the Kickapoo MRBI was full of obstructions to funding, the MRBI process and resulting RPG and additional funding secured, was pivotal for VSN in the successful work to help initiate and support farmer-led and landowner-led watershed councils. These watershed councils are now initiating their own conservation practice installation, in some cases, without cumbersome NRCS cost-share. These farmer-led, subwatershed-scale efforts also have great potential for long-term maintenance due to the local leadership and ownership of the watershed improvements. VSN scientific staff were also able to initiate and complete new subwatershed-scale water quality assessments. Water quality assessments have been reported to the watershed councils and expanded to meet the needs for tracking water quality improvements from watershed council conservation practices over the long-term.

VSN's initial study of watershed councils revealed that research has shown that farmer-led watershed councils leverage existing networks and create new networks to improve conservation practice maintenance and watershed management strategies. This is proving to be true during these first 2 years of the Kickapoo watershed councils. The following summaries of the Goals/Job Objectives; Activities; Method/Data; and Deliverable/Outcomes will provide specific details of VSN's watershed council and related water quality work within this RPG grant project.

Watershed Council Initiation and Support

1.Goal/Job Objective:

Initiate two farmer-led watershed councils in an effort to identify and cooperatively solve nutrient runoff issues with conservation practices available through MRBI funding. These pilot councils will act as models for addressing water quality and amplifying the effectiveness of this new MRBI funding.

1a. Activity

By August 2016 (4 months earlier than estimated in the proposal): VSN took the lead role in the establishment of two farmer-led watershed councils in Tainter Creek and Knapp Creek subwatersheds.

Method and Data Collected

This included informational mailings, public meetings, field days, and identifying leadership and conservation goals within the two watershed councils.

Deliverable/Outcomes

VSN set in motion a self-sustaining group of interested farmers, landowners and volunteers who are working together over the long-term to achieve conservation objectives.

Overview

Farmer/Landowner Outreach

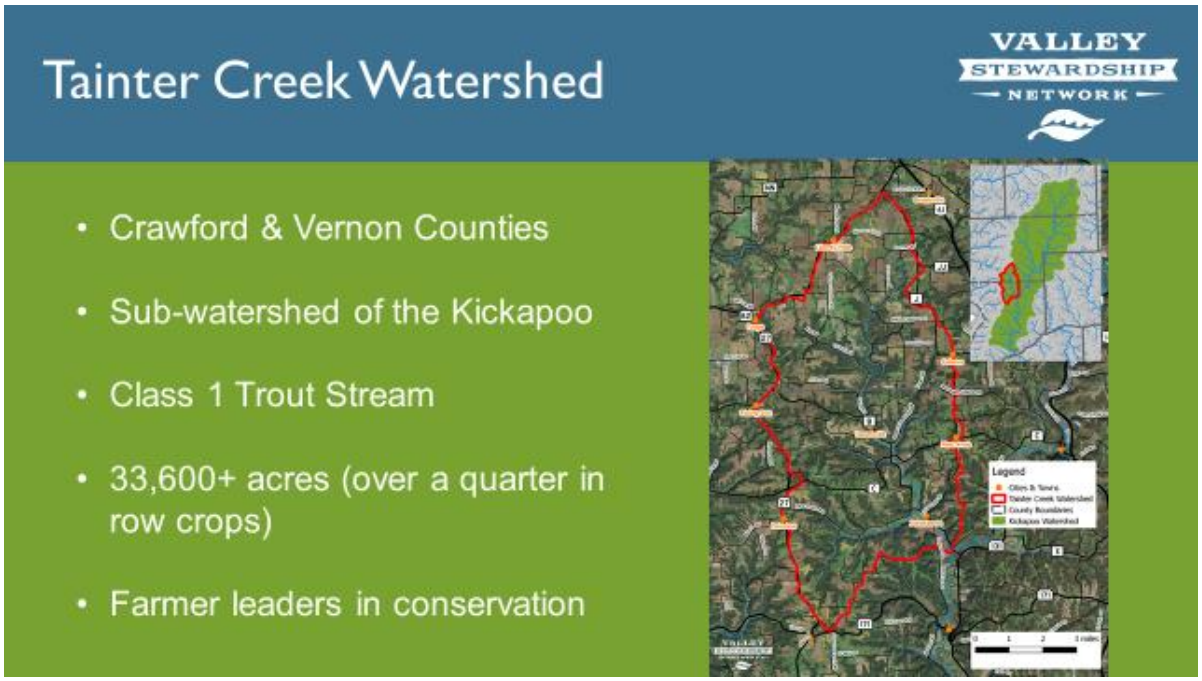
Tom Lukens and Matt Emslie developed a preliminary intake form/template/process for farmers and landowners, primarily in the watershed council subwatersheds, who would like free conservation planning site visits. This form was used as a guide for initial conversations with landowners regarding their goals and objectives for their properties. The process consisted of an initial site visit by Matt or Tom to flesh out exactly what the landowners are looking to do, give them some initial ideas, and then potentially pass them to either a VSN consultant forester, ecologist, or agronomist depending on their goals and needs. Watershed Council leaders and members were identified during this process.

Watershed Council Initiation

VSN staff members, Matt Emslie and Shelly Brenneman provided exemplary facilitation, grant writing and logistics support for the watershed council efforts during this entire grant period. Watershed councils are groups of landowners that come together to improve or preserve the

condition of their watershed in a non-regulatory, voluntary, and locally organized fashion. Research has shown this these types of groups can be as, or more, effective as regulation when it comes to implementing changes on the landscape that improve water quality. The focal point of our 2016-18 efforts includes Tainter Creek (Kickapoo River), West Fork (Kickapoo River). Due to the success of the current watershed councils in the Kickapoo, two additional councils are being initiated in the South Fork (Bad Axe River), and upper Kickapoo River watersheds. The work in these watersheds continues to be facilitated by VSN and we are actively partnering with Vernon County Land and Water Conservation District (LWCD) on these projects.

Tainter Creek Farmer-led Watershed Council

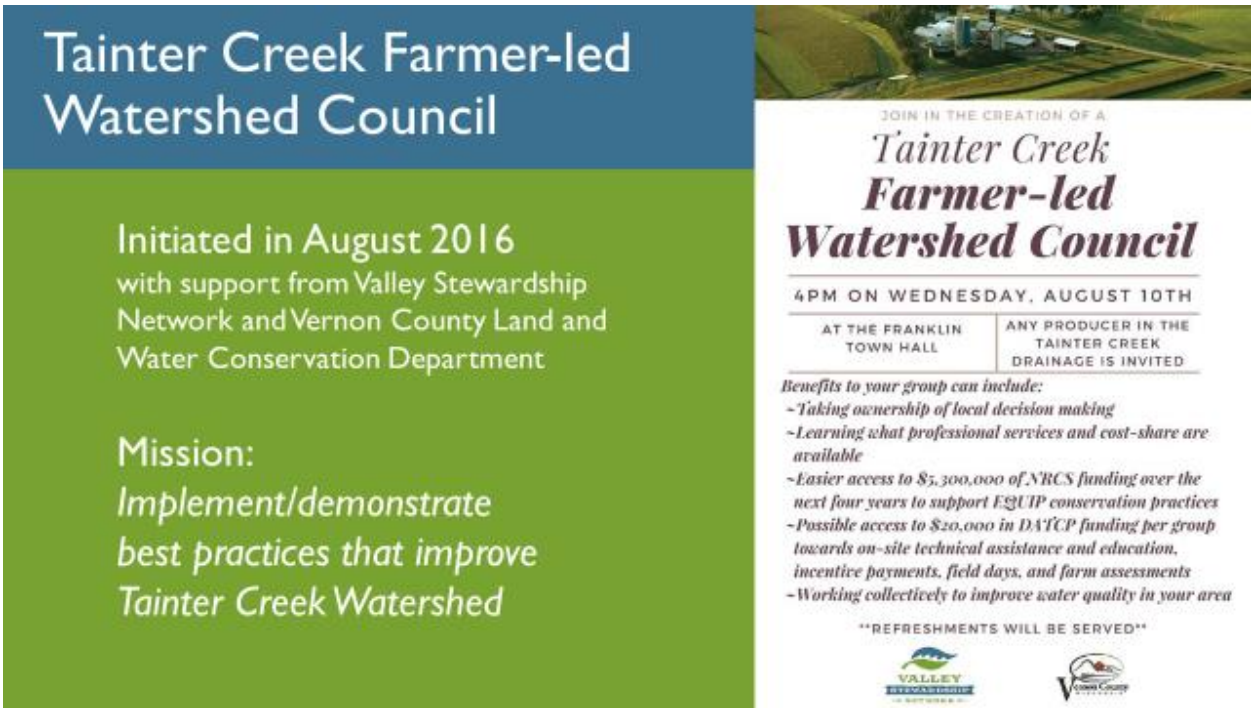


VSN staff first started conceptualizing the idea of local watershed councils in the summer of 2016. Encouraging and facilitating change on the landscape and on farms is as much of a social challenge as it is a technical challenge. For the most part, we have a pretty good understanding of the technical steps required to effect positive change in water quality. The part that is much more difficult is navigating the social conditions that affect adoption of BMPs. For this reason, we determined that we needed to work at the smallest geographic scale possible, where the social fabric and local relationships were identifiable and distinct. We determined that working at the HUC 12 scale would be the most appropriate for the goals we had in mind.

But which HUC 12 watersheds would be the most appropriate to try to develop a model for watershed councils? Because we knew we were, at least regionally, potentially starting something new and trying to create a model we wanted to set it up for success as much as possible. If this first attempt was successful than the hope was that other groups may come together either through our efforts or on their own because they could see that there were other functioning existing groups. Probably the most crucial decision we made at the outset was determining that choosing a watershed that had the greatest potential for strong leadership among farmers, rather than because it had the greatest water quality need, was the most important factor in deciding which watershed to pour our initial efforts into.

We asked for input from our local partners (NRCS and Vernon County LWCD) that had strong relationships with farmers in watersheds to help us identify local watersheds with strong farmer leaders. Their help was invaluable in this process, without their assistance we would have had a much more difficult and slow go of it in our initial efforts. Through these conversations they helped us to identify not only potential watersheds but also individual farmers that might be interested in this type of group or process. Through this process the Tainter Creek watershed was chosen for its strong leadership potential.

The Tainter Creek Farmer-led Watershed Council was conceived in August of 2016. At the first exploratory meeting 5 farmers were present. Since then, meetings have generally been held every other month, but more often if deemed necessary by the group, and especially so at times when events have been planned.

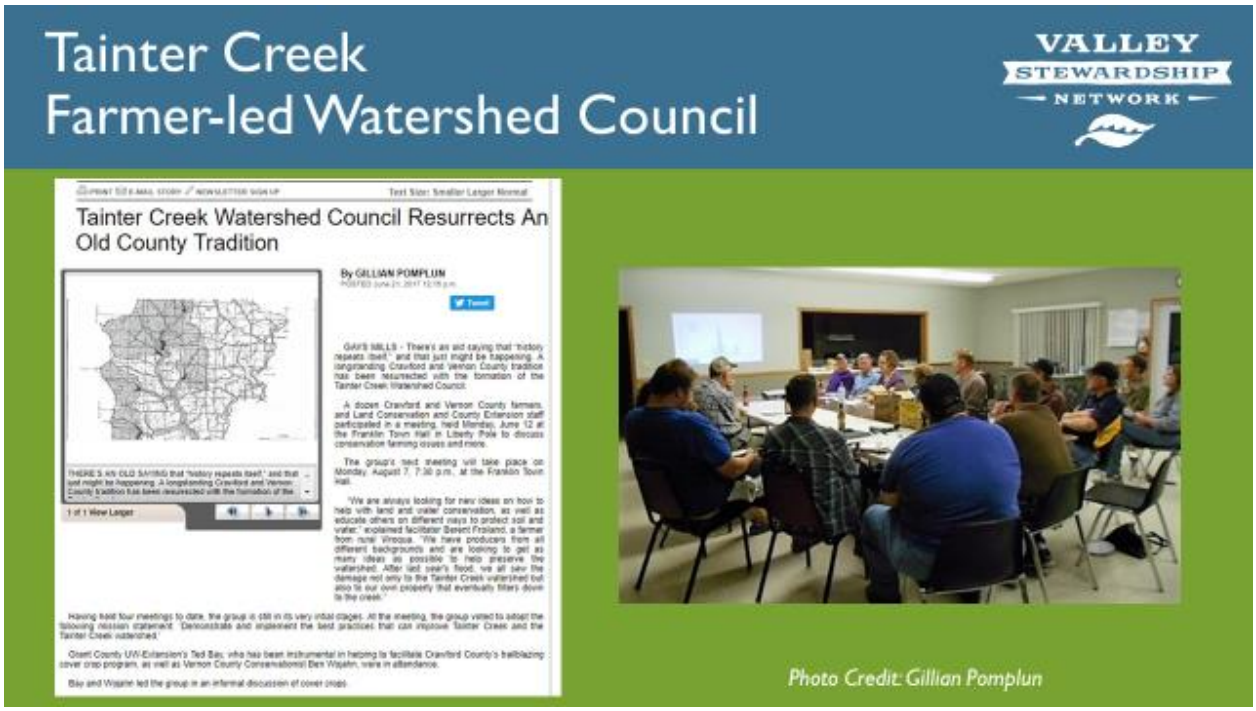


Meeting places are typically on-farm or at the local town hall. The group sets its own agenda and determines when meetings will occur. One member typically drafts an agenda prior to the meeting, photocopies it, and distributes this to everyone at the start of the meeting. If a member wishes to have something added to the agenda, they simply let the coordinator know prior to the meeting. Typically, this happens via phone call. Meetings are typically informal with light conversation occurring before the actual meeting start for up to 30 minutes. A meeting typically is facilitated by one of the group members, but Matt Emslie from VSN and Ben Wojahn from Vernon County LWCD are usually present and support, technical expertise, and facilitation where needed. Food and beverages are almost always present and seem to help bond the group and add an air of informality to the meetings.

Meeting topics have ranged from soil health, cover crops, water quality, well water testing, baseline water quality data, efforts towards conversion to perennial pasture, alternative cropping systems, opportunities for grant funding, opportunities for the implementation of BMPs, NRCS and county programs, Farm Bill, and export tariffs, among others.

The Tainter Creek Farmer-led Watershed Council currently consists of approximately 30 members, with average bi-monthly meeting attendance of about 15. Current Tainter Creek Farmer-led Watershed Council members represent over 4,000 acres (or 12.5%) of land in the Tainter Creek watershed. Individual landowners own anywhere from 40-1,000 acres. The 'typical' landowner is a second or third generation farmer who is part of the group because they are interested in the health, welfare, and future of the watershed and the people and wildlife that live within it. They are interested in adopting changes in their farming practices that will lead to improvements in water and land quality.

The Tainter Creek Farmer-led Watershed Council has identified their mission as: *Demonstrate and implement best practices that improve Tainter Creek*, and their goals as: to gain a better understanding of the baseline surface and subsurface water quality in the Tainter Creek watershed and find ways to actively improve them; to get a better understanding of the public perception of farmers and find ways to actively improve those perceptions through outreach and education; and to find ways to reduce the effects of flood impacts.



This group has been steadily gathering momentum and in December of 2017 and again in November of 2018 were awarded $40,000 Producer-Led Watershed Protection Grants from the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). DATCP's grant cycles were highly competitive with over 20 applications being submitted by different producer-led groups around the state.

These awards, along with support they receive from local partner organizations and agencies, will be used to further the groups' mission and goals. The grant awards also lend a sense of legitimacy, official identity and recognition, and accountability to the Tainter Creek Farmer-led Watershed Council. Vernon County LWCD serve as the group's fiscal manager.

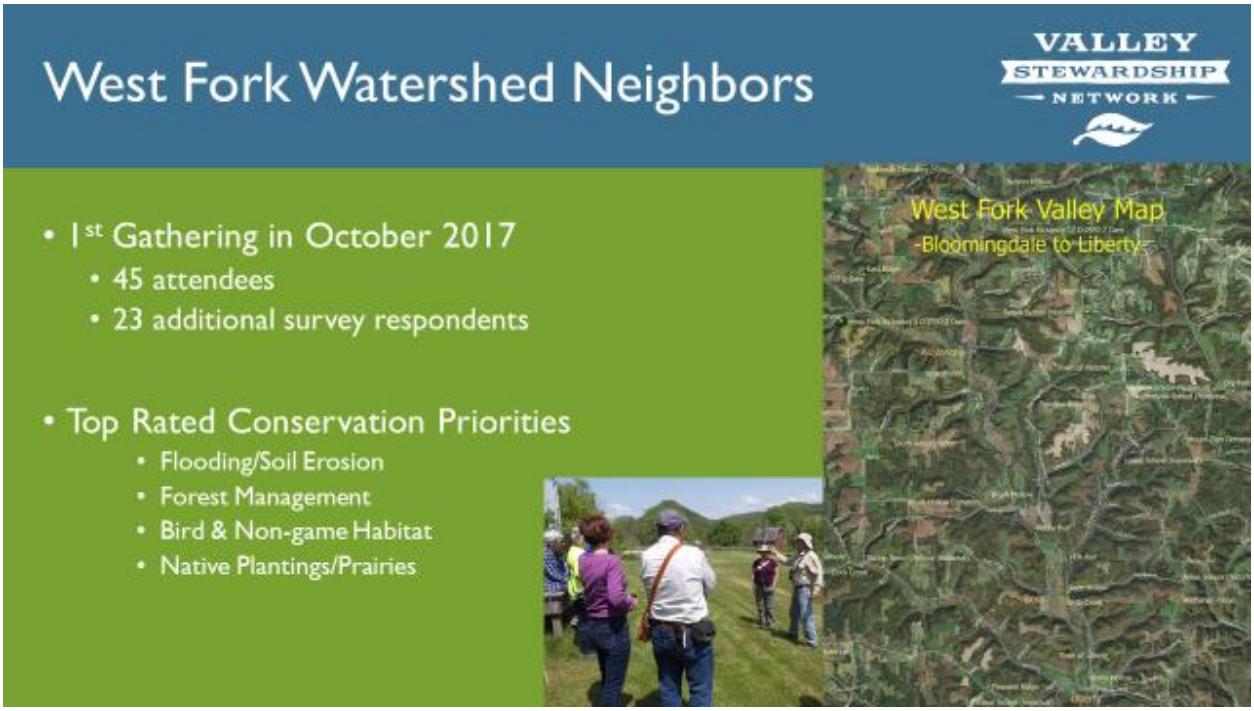
The DATCP grant funds have and will continue to be used to incentivize the increased adoption of cover crops and alternative cropping systems, increase surface water testing sites, test well-water, and host a series of field days in the Tainter Creek watershed that focus on public outreach and education.

In 2018, $10,000 was used to incentivize the introduction of 500 acres of cover crops into the watershed. Another $10,000 was used to test 49 wells in the watershed, and conduct and expand surface water testing efforts. Two public outreach and education events were sponsored by the group also using these DATCP funds: a Tainter Creek Stream day that highlighted water quality in Tainter Creek, and a two-day soil health workshop facilitated by nationally renowned soil health specialist Ray Archuleta. Both events drew 100-200 participants.

West Fork Watershed Neighbors Council

Initial efforts to form a watershed council in the Knapp Creek / Upper West Fork watershed began in late winter of 2016. Maps were made and producers in the watershed were phoned. Two separate meetings were held. Actual number of willing-to-participate farmers was limited and the numerous Amish producers were difficult to engage. Attendance was 8 farmers for the first meeting and only 4 for the second. None of the participants wished to take a leadership role and little enthusiasm for going forward was expressed. So, the effort was subsequently reshaped into forming a lower West Fork Watershed Neighbors Council. This area also offered unique challenges because the majority of the property in this portion of the West Fork watershed (also one of the MRBI HUC-12's) is owned by recreational land owners.

Leadership for this watershed council effort was present in VSN board chair and landowner, Tom Lukens and his partner, Pam Saunders. A mailing comprised of land owners with running water on their properties that drained into the West Fork between the towns of Bloomingdale and Liberty was identified. These 218 landowners were mailed both an invitation to a pot luck



party in October of 2017 and a survey asking folks to identify their areas of greatest conservation concern or interest. Top priorities among the 11 choices were: flooding/erosion control; forest management; bird and non-game habitat; natives/prairie establishment; and invasives control. The pot luck and meet your watershed neighbors gathering was a success. Forty-five people attended and from this group a volunteer core council group was formed.

This core group met three times during the winter of 20117/18. Plans were made to hold another fall gathering and to expand the mailing to all property owners between Bloomingdale and Hwy 82 within the West Fork drainage. At the third of these meetings, presentations were given on private lands bird conservation and invasives and a decision was made to include these presentations in the larger group's pot luck and beer gathering scheduled for September 2018. Over six hundred property owners were mailed a letter and an invitation to this event. The survey mentioned above was included. Eighty people attended and enjoyed meeting their neighbors. Survey results were the same as with the smaller mailing.

Survey topics of greatest interest/concern will be used to determine future meeting topics. And, in addition to the conservation concerns identified in the returned surveys, watershed members were given the opportunity to request follow ups site visits with various experts. Numerous follow-up phone calls and emails ultimately led to 24 landowner site visits by VSN staff and subject-specific consultants. These included a licensed forester, a retired extension specialist skilled in cover crops, whole farm plans and sustainable farm leases, a PhD prairie/farm interface expert, a retired career ecologist, expert birders and a stream technician. Several comprehensive conservation plans, one constructed wetland and much general stewardship resource sharing and advice have happened. West Fork Watershed Neighbors Council participants have become better informed as a result of Wallace Center funding.

Also, during the core group's meetings in winter 2018, a small goats-for-brush-control effort was discussed and initiated. This turned into a cooperative effort between a subset of the West Fork Watershed Neighbors Council, Vernon County Land & Water and a private commercial grazing operation. During spring of 2018, a training session for goat & sheep handling, fencing etc. was attended by ten people interested in assisting with or hosting the mixed herd of 60 animals during the upcoming grazing season. In summer and fall of 2018 several properties, both public and private, were grazed as a "beta test" of this public/private goat cooperative. We hope to expand on this effort in the upcoming years.

Watershed Council formation in an area comprised primarily of recreational land owners, as distinct from producers, is challenged by the lack of EQIP and other NRCS cost share programs. However, meeting one's watershed neighbors, walking each other's properties, and sharing ideas, stories, information, resources and visions of success certainly helps move things along in the right direction.

The groups' goal is to help watershed neighbors "zoom out" and consider the larger scale ecologic context and the likelihood of any given conservation practice's success, to see the benefits of connecting buffers and riparian corridors and their habitats; to cooperate beyond our individual property lines in our conservation efforts; to connect habitats and avoid population sinks; and to protect and enhance wildlife corridors in the biodiverse Driftless Area and the globally-significant Mississippi Flyway.

A September 2018 potluck drew a crowd of 80 attendees and several new folks joined the West Fork Watershed Neighbors Council. The gathering featured expert presentations on how neighbors can work together to promote bird habitat conservation and invasive species management. VSN staff continues to provide key facilitation and support for the West Fork Watershed Neighbors Council, including helping with outreach to members, coordination of meetings and speakers, and funding proposals for future group stewardship work.

VSN staff, along with farmer and landowner members of the Kickapoo Watershed Councils, have attended five regional trainings/field days with Fishers and Farmers Watershed Leaders Network. This network of farmer-led watershed councils has provided key technical assistance.

Farmer/Landowner Surveys

1b. Activity

February 2016-December 2017. VSN staff consulted with Pam Porter, UW Sociologist, and a variety of other technical experts, to develop several farmer/landowner surveys within the two project subwatersheds.

Method and Data Collected

Surveys were developed by VSN staff in cooperation with watershed council leaders and tailored to their needs. Surveys were written and administered by mail and in person by VSN staff. These surveys brought farmers and landowners actively into the problem solving and project planning processes. Meetings and surveys were implemented based on prior sociological research in agricultural watershed planning. The survey questions are listed below with results.

Deliverable/Outcomes

The meetings and surveys provided important information on the shared views, needs, interests and opportunities leading to consensus on specific conservation practices and plans appropriate to each subwatershed. VSN's outreach topics and methods were, and continue to be, very much informed by these survey results.

Tainter Creek Farmer-led Watershed Council Surveys

In Fall 2017, VSN staff developed and distributed a survey of Tainter Creek Watershed farmers to determine needs and opportunities for conservation practice implementation. Survey analysis has been completed and results shared with the Tainter Council.

Tainter Creek Watershed Conservation Practices Survey

Total Respondents: 11

What Describes your Operation?

Beef	5
Dairy	2
Grain	5
Vegetable	1
Conventional	4
Organic	2

What are your primary concerns for the land that you work?

Soil Loss/erosion	11
Soil Fertility	8
Water Quality Degradation	7
Soil Quality Degradation	5
Excess Water	5
Economic and Social Considerations	3
Pollinators	2
Inadequate Habitat for Fish and Wildlife	1
Insufficient Water	0
Air Quality Impacts	0
Degraded Plant Condition	0
Livestock Production Limitation	0
Inefficient Energy Use	0

Please rate the following on-farm conservation practices from easy (1) to difficult (10) to implement, or likelihood of implementing.

Contour Strips	2.625
Cover Crops	3
Grassed Waterways	3
No-till/Strip till	3.5
Nutrient Management	3.888889
Fencing	4.090909
Access roads	4.125
Forage Planting	4.125
Conservation Cover	4.363636
Buffer Strips	4.4
Watering facility (Grazing)	4.5
Prescribed grazing/grazing plan	4.75
Pipeline (grazing)	5
Tree Plantings (Pollinator)	5
Stream restoration/Trout Habitat	5.2
Grade Stabilization Structures	5.333333
Streambank and Shoreline Protection	5.333333
Stream Crossings	5.6
Critical Area Planting	5.857143
Prairie Strips	6

Which of the above practices do you currently implement?

Cover Crops	6
No-till	5
Buffer Strips	5
Contour Strips	4
Grassed Waterways	3
Grade Stabilization Structures, Farm Ponds	3
Tree Planting	2
Conservation Cover	2
Fencing	1
Forage Planting	1
Stream Restoration	1
Stream Crossing	1
Nutrient Management	1
Watering Facility	1
Stream Fencing	1
Pipeline	1
Managed Grazing	1
Access Roads	1

How did you implement your Conservation Practices?

Independently	4
Agency Help	6

Which of the above conservation practices are you interested in learning more about?

Prairie STRIPS	5
Grassed Water Ways	3
Access Road	2
Tree Planting	1
Buffer Strips	1
Stream Restoration/Trout Habitat	1

Where do you prefer to get new information regarding on-farm conservation practices?

Local NRCS agent	6
Internet	4
Local LWCD agent	3
Another Farmer	3
Publications	3
Local Conservation Groups	3
Friend/neighbor	3
Agronomist	2
Conferences	1

Other Responses included: VSN, Tainter Creek Watershed Council, and Field Days

Do you lease ground from another person?

Yes	5
No	5

Total Acres Leasing from another person = 1235

Do you implement Conservation Practices on ground you lease from another person?

Yes	3
No	1

Do landowners you lease from Request Conservation Practices?

No	2
No Response	9

Do you lease your ground to another person?

Yes	2
No	8

Total Acres Leased (to another person) = 168

Are you familiar with sustainable land leases?

Yes	1
No	9

Do you have interest in learning more about sustainable land leases?

Yes	5
No	5

Valley Stewardship Network can offer free mapping, nutrient management plans, conservation/stewardship plans, and assistance with on farm research. Would you be interested in any of these free services?

Yes	8
No	1
Maybe	1

How many acres do you have in production?

Total (n=9) = 2910

Mean (n=9) = 323

Median (n=9) = 200

How many acres in pasture?

Total (n=7) = 555

Mean (n=7) = 79

Median (n=7) = 40

Tainter Creek Conservation Outreach Survey

What types of information activities do you think farmers would find most useful? (circle all that apply)

a. Information in farm magazines
b. Winter Workshops=5
c. Social Media: Facebook, twitter, etc.=1
d. Grants/low interest loans=5
e. How to information fact sheets and handouts=6
f. Outdoor field days and demonstrations=6
g. Farmer to farmer mentoring=6
h. On-line forum for farmers to share information=2
i. Other_____

The top three types of activities that local watershed council farmers find most useful are:

1. How to information fact sheets and handouts
2. Outdoor field days and demonstrations
3. Farmer to farmer mentoring

West Fork Watershed Neighbors Council Survey

The West Fork Watershed Neighbors Council has conducted two rounds of surveys. The first was mailed to 218 Vernon County property owners in the West Fork watershed whose properties had some form of surface water on them which drained into the Kickapoo West Fork between Bloomingdale and Liberty. This occurred during the summer of 2017. The second was mailed to all 624 property owners in this watershed. In total, 57 surveys were returned.

The topics of greatest interest among the options were the same in both surveys. These conservation survey topics are listed below in descending order of popularity.

1) Flooding & Erosion Control
2) Bird Habitat
3) Forest Management
4) Invasives Identification & Control
5) Prairie & Pollinator Habitat
6) Goat Co-Op/Brush Management
7) Sustainable Ag Leases and Whole Farm Plans
8) Other Non-game Habitat

Additionally, survey respondents were asked if they would like to have a site visit to further discuss their conservation concerns. Though four more site visits must wait till spring now, already there have been a total of 24 site visits conducted. Thirteen of these were initial visits and 11 were follow-up site visits with professional consultants having expertise in areas such as Forestry, Cover Crops, Hydrology and Bird Habitat.

Site visit recommendations have led to everything from a successful wetland installation to prairie plantings, erosion control practices, goat grazing / invasive brush management, forestry plans, and cover crops to simply sharing how best to keep raccoons out of bird feeders. All in all, many property owners have enjoyed interacting with knowledgeable conservationists and have expressed sincere appreciation for these opportunities.

Water, Soil and Habitat Quality Assessments

2. Goal/Job Objective

Utilize "Measure to Manage" protocols to educate farmers and landowners about soil conservation, water quality and habitat benefits of MRBI funded conservation practices.

2a. Activity

April-December 2016: Determined specific on-farm sampling locations to gather baseline data within fields and pastures of those interested in implementing MRBI conservation practices. Educated watershed council participants on how specific MRBI practices and land management decisions can affect sediment/nutrient runoff, water quality and fish and wildlife habitat.

Method and Data Collected

In partnership with farmers and landowners, VSN field staff and volunteers conducted on-farm habitat assessment and sampling of water quality and macroinvertebrate populations along with field mesh bag protocols measuring sediment transport in chosen test sites.

Deliverable/Outcomes

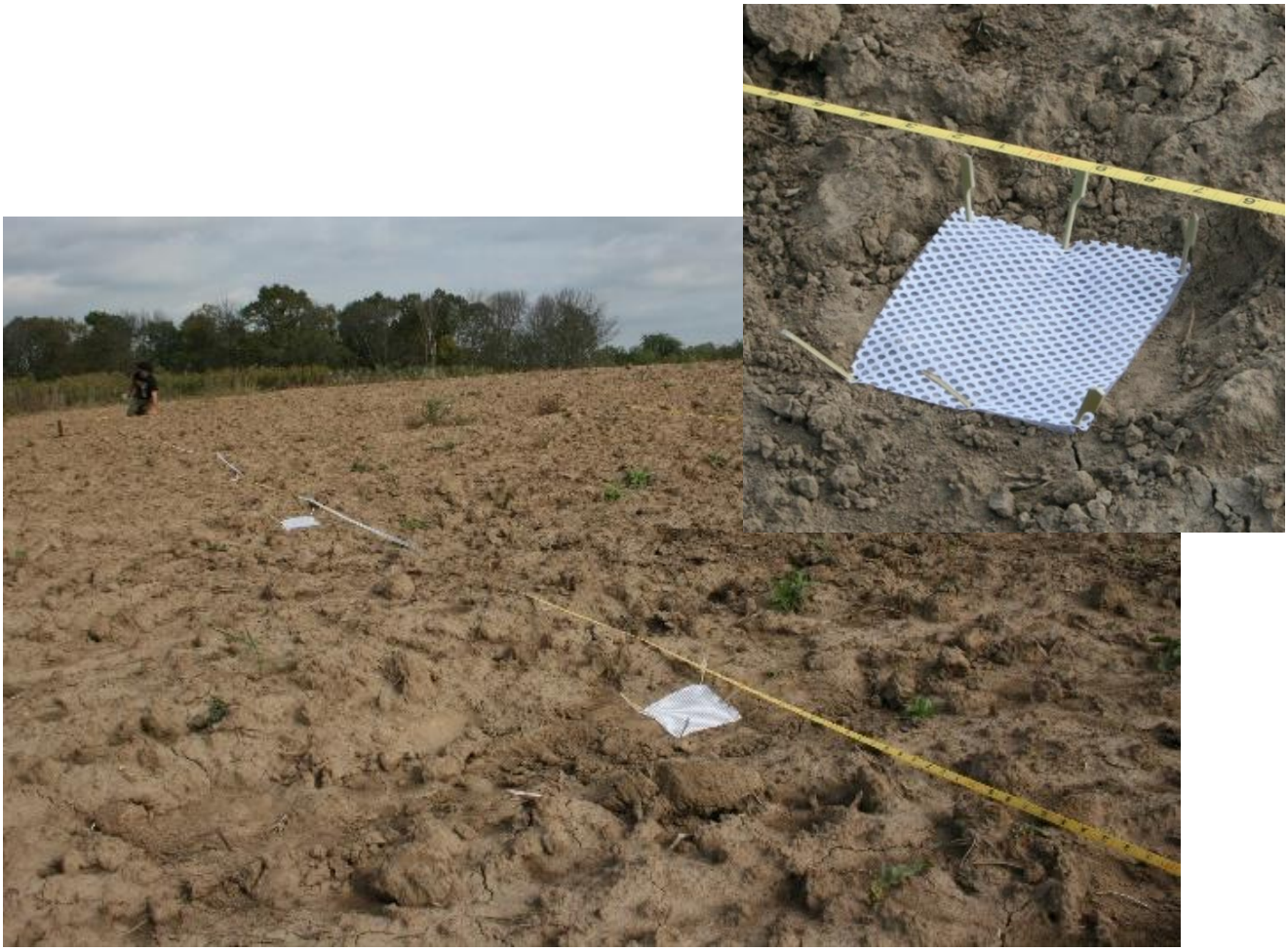
Data collected from participating subwatershed sites be were added to VSN's growing database of monitoring results. Results were summarized in an annual report, with a detailed site specific report and GIS maps and provided to the watershed councils.

2b. Activity

May 2016-October 2017: VSN provided training for partner farmers, landowners and project volunteers in water quality monitoring and measuring sediment transport.

Method and Data Collected

VSN offered training for farmers, landowners and volunteers in water monitoring protocols and the mesh-bag method to quantify movement of soil around select farm fields using the protocol developed by Hsieh et al. (2009).



Deliverable/Outcomes

Results are aiding VSN, NRCS, Trout Unlimited and Vernon County Land and Water Conservation in developing outreach materials and field days for landowners interested in implementing conservation practices on their own land.

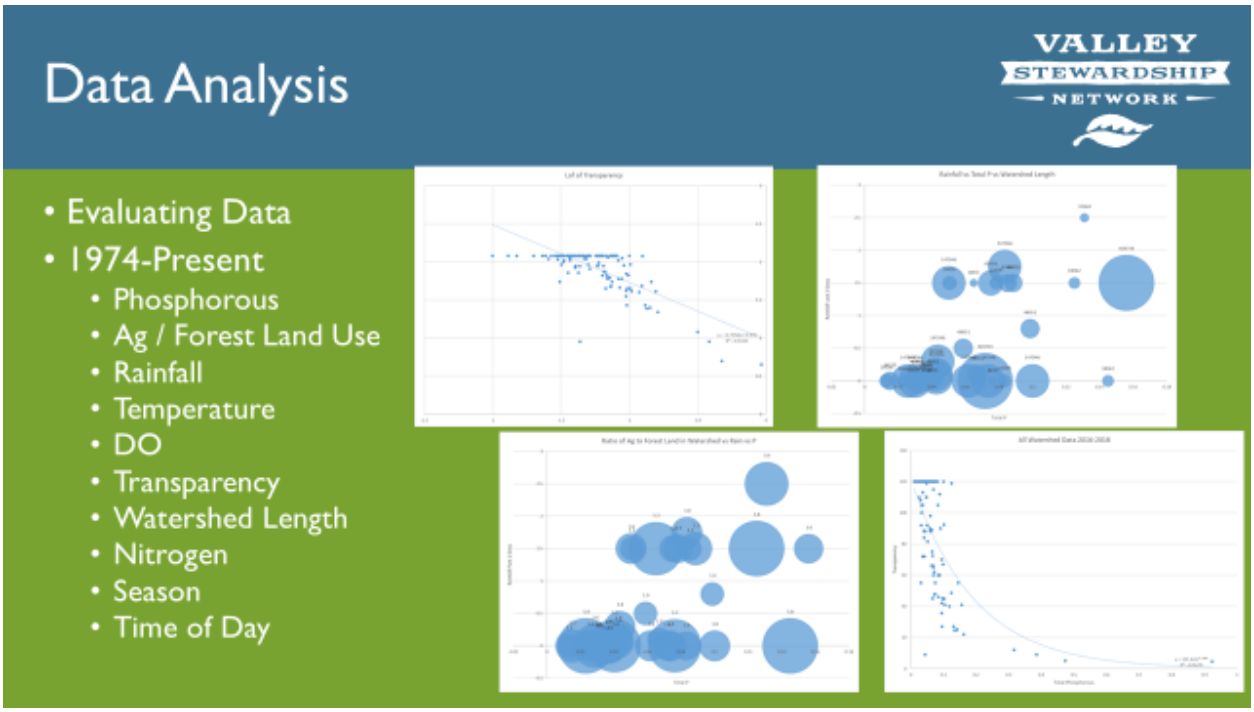
Water Quality Data

3. Goal/Job Objective

Update VSN's Water Quality Database to enable readily-available water quality information for farmers, landowners, Water Action Volunteers and community members.

3a. Activity

February 2016-December 2017: VSN's database was updated with recent data entered into the SWIMS database. Data is being used to identify active volunteer monitoring stations located within the 10 MRBI priority subwatersheds. VSN staff attended WIDNR conferences to build capacity and then trained other VSN professional staff and volunteers for collecting total phosphorous and nitrogen samples at their stations and also added new stations within the watershed council subwatersheds.

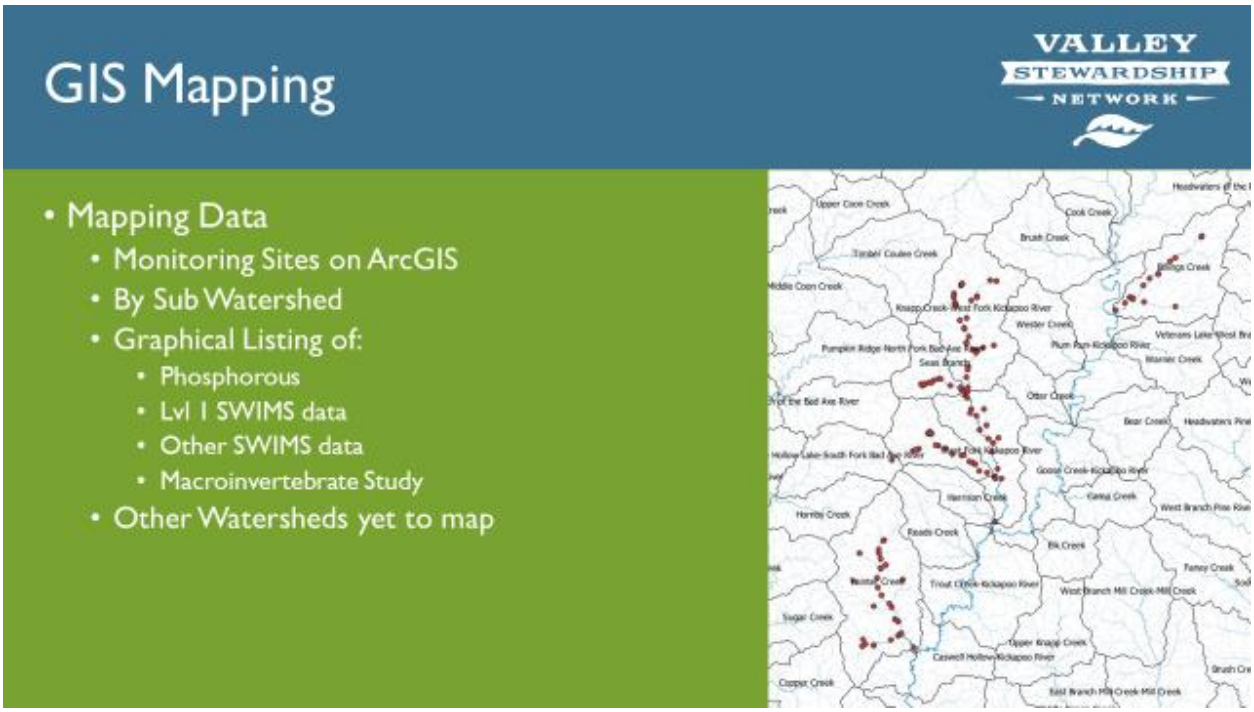


Method and Data Collected

Data was retrieved from the SWIMS database, and organized and analyzed using spreadsheet and GIS software. In the fall of 2016, we updated our volunteer database and added SWIMS station numbers associated with each volunteer. Field data was collected using standard WAV protocols. We selected VSN staff and volunteers who collected water samples for total phosphorous and nitrogen. Sampling at priority stations was conducted by VSN professional staff.

Deliverable/Outcomes

In 2016, VSN had an updated database with the most current data from its staff and volunteers. VSN will then had the improved infrastructure and capacity to easily produce reports summarizing data collected by VSN's volunteers and any changes/trends of note from the 10 MRBI subwatersheds. GIS maps depicting VSN's sampling locations and choropleth maps showing the median and mean of select testing parameters within each of the subwatersheds of the Kickapoo were also produced.



HUC 12 sub-watershed water quality assessments

Water Quality Research

This project funding has been invaluable in ensuring that we have the capacity to collect and report scientifically relevant water quality data. We have been able to continually monitor total phosphorus from several locations over multiple years. Collecting phosphorus data over at least two years is important for characterizing total phosphorus concentration levels because precipitation can vary from year to year. Additionally, this funding gave us the capacity to monitor phosphorus concentration levels at some long term monitoring sites that have been set up to monitor water quality within watershed with watershed council development.

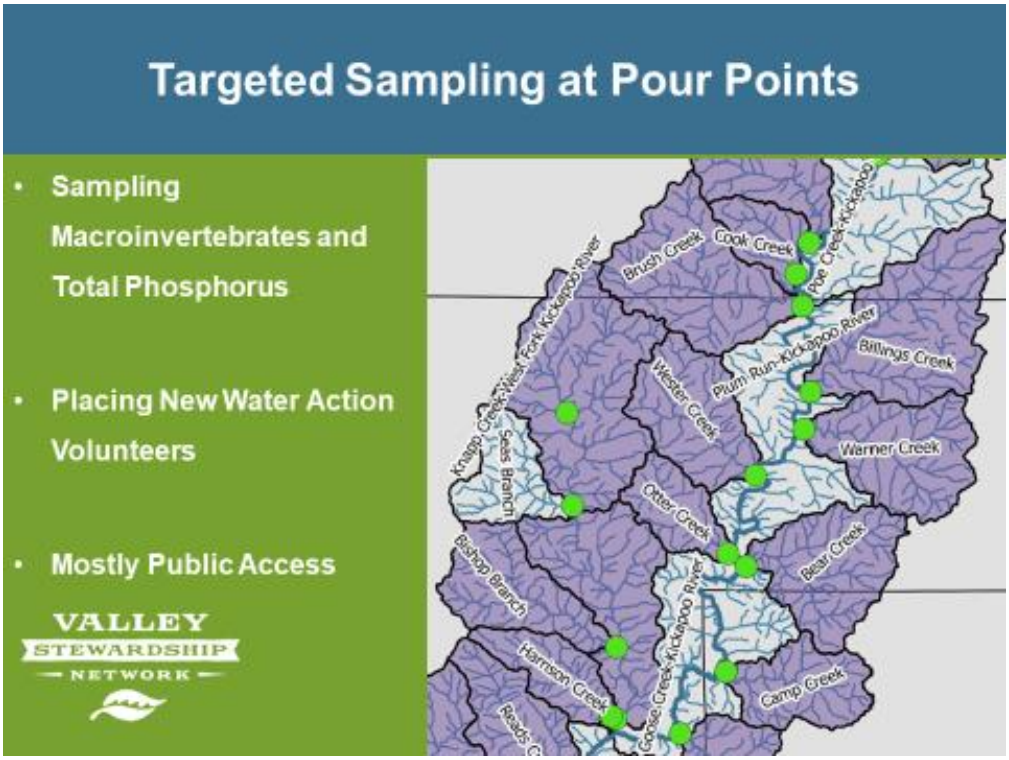
Water Action Volunteers

We completed very successful 2016, 2017 and 2018 WAV field seasons, which included major improvements in our storage, inventory, ordering and preparation of equipment and supplies. VSN staff led 7 WAV trainings in 2016, 2017 and 2018, in partnership with WI DNR and Crawford Stewardship Project, training a total of 67 new volunteers. Volunteer Appreciation events were held on 11/14/16, 12/4/17 and 12/11/18.

Each season there are an average of 50 active volunteers taking baseline and targeted subwatershed water samples on a monthly basis. Dave Krier was hired in April, 2018 to assist John Delaney with WAV and water quality research coordination. John provided extensive training for Dave. In April 2016, Valley Stewardship Network was awarded the statewide Outstanding Achievement in Stream Monitoring, Organization Category; and in April, 2018, John Delaney was awarded the statewide Outstanding Achievement in Stream Monitoring Award, Employee Category, by the WI DNR and UW Extension at the WAV conferences.

Stream Nutrient Monitoring

VSN initiated total phosphorus concentration sampling in 2015 and expanded to 15 locations in the Kickapoo River Watershed in 2017, using the WI DNR's established protocol for estimating phosphorus concentrations in Wisconsin waterways. This represents a substantial increase in total phosphorus concentration measurements within the Kickapoo River Watershed compared to previous years. The locations of these samples are prioritized at the pour points of sub-watersheds, and in some cases at multiple points upstream from the pour points.

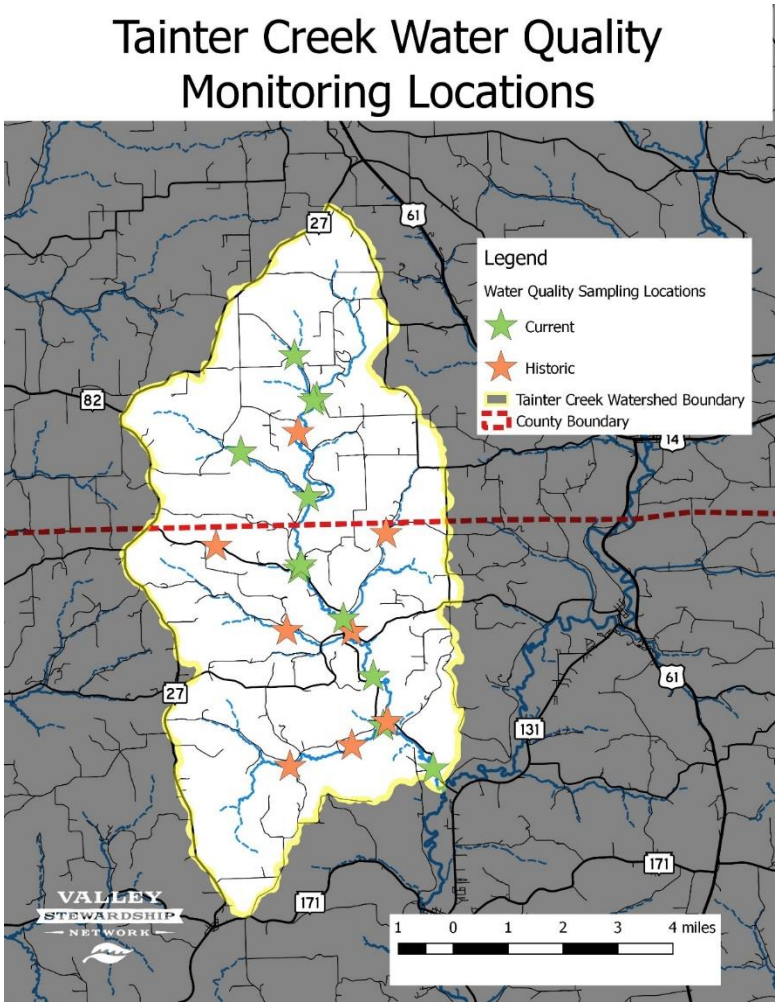


Location selection of sampling sites were designed to characterize entire sub-watersheds (HUC 12) to further inform precision conservation efforts and to provide a baseline by which progress following future conservation initiatives can be assessed.

We significantly expanded our stream nutrient monitoring plan for 2018, and collected total phosphorus information from local streams with emphasis on subwatershed with watershed council development. In addition, we began collecting nitrogen (total Kjeldahl-n, nitrate + nitritite, ammonia, and total nitrogen) from a few select locations within the Tainter Creek Watershed at the request of the watershed council.

Tainter Creek and West Fork Subwatershed Water Quality Summaries

As a part of our on-going watershed council support, with the feedback from council farmers, VSN staff analyzed data from 2016 and 2017, developed a Tainter Creek water quality research plan for 2018 and presented the plan to the Tainter Council in October, 2017. VSN staff finalized the summary of existing data for a summary report and 2018 water quality research plan for the West Fork sub-watershed, in cooperation with the West Fork Neighbors Watershed Council. Water quality research plans are in development for the new Bad Axe Watershed Council.



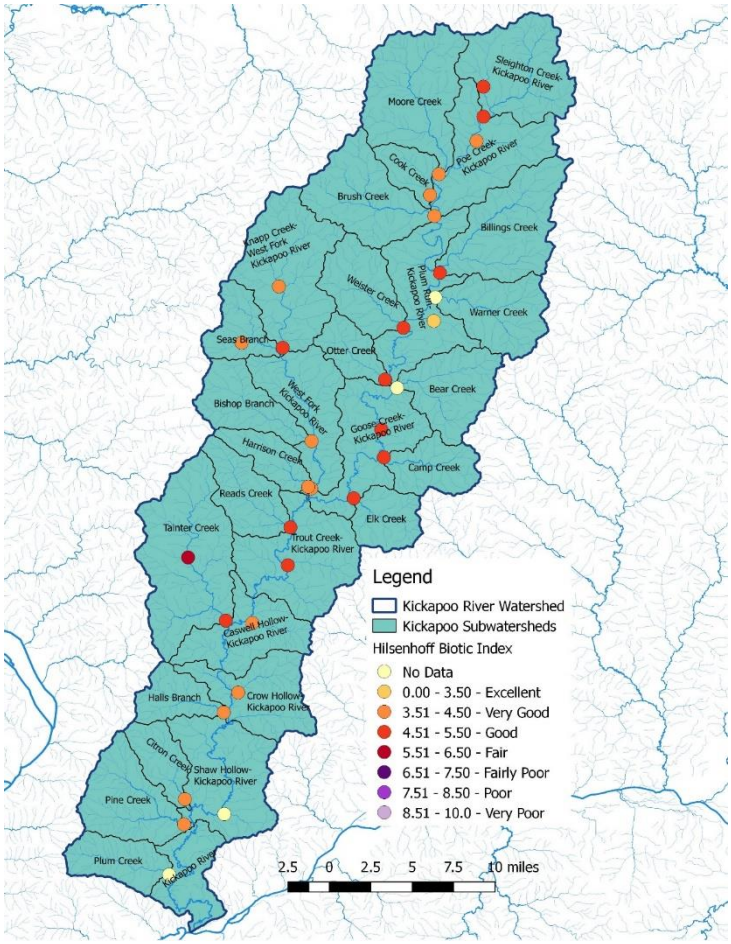
GIS mapping and modeling to assist in identification of priority areas

VSN staff have provided watershed councils with GIS maps for presentations, mailing lists, and planning purposes. For instance, we have provided multiple maps for both the Tainter Creek Farmer-Led Watershed Council and the West Fork Watershed Neighbors Council for planning purposes. Additionally, we have used GIS parcel information to create mailing lists of landowners in each of these watersheds to allow the councils to reach out to landowners about their efforts.

VSN staff recently finished an analysis that we began in early August 2017, utilizing the WI DNR's PRESTO (Pollutant Load Ratio Estimation Tool) model (Wisconsin DNR, 2017) to estimate phosphorus loading in all 30 of the HUC 12 sub-watersheds within the Kickapoo River Watershed (HUC 8). This model uses land cover, topography, and precipitation information to estimate phosphorus loads contributed by a watershed delineation. The results from this model are helping us, and our partners, to identify areas where on-the ground measurements are needed and to prioritize sub-watershed scale conservation efforts.

We also completed our initial discussions with stream ecologists and GIS analysts at the WI DNR to conduct further GIS modeling projects that will aid in precision conservation efforts. This team is working together to employ the WI DNR's EVAAL toolset to prioritize areas within watersheds that may be vulnerable to nutrient export and erosion. WI DNR employees ran the EVAAL model for the Tainter Creek Watershed and shared the results with VSN staff, who will then share results with the Tainter Creek Farmer-led Watershed Council. Additional applications of PRESTO and EVAAL are planned throughout the Kickapoo Watershed.

In collaboration with DNR Biologist, Jean Unmuth, VSN staff mapped 32 lab identified macroinvertebrate samples based upon the Hilsenhoff Biotic Index from subwatersheds within the Kickapoo River watershed. Hilsenhoff Biotic Index estimates water quality based upon the tolerance of the macroinvertebrate community to organic pollutants. This information will help our organization and our local partners categorize subwatersheds based upon their water quality.



Water Quality Data Download

Data was downloaded from the Wisconsin DNR-managed Surface Water Integrated Monitoring System (SWIMS) database for six HUC-12 watersheds:

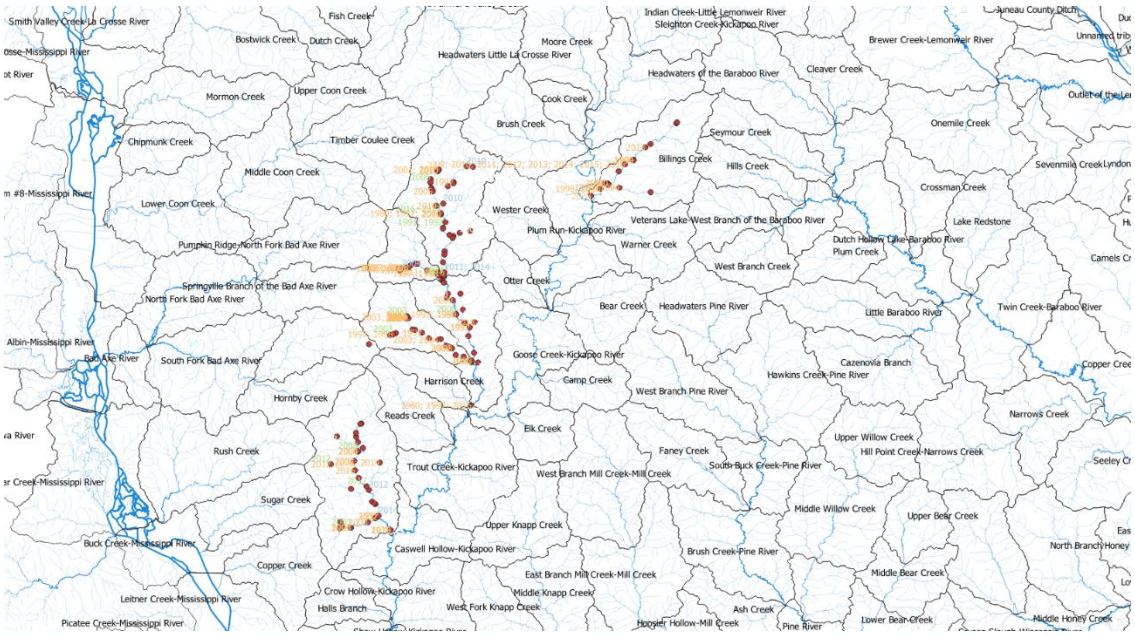
- Billings Creek
- Knapp Creek-West Fork Kickapoo River
- Seas Branch
- West Fork Kickapoo River
- Bishops Branch
- Tainter Creek

The data was divided into four categories:

- SWIMS Level I
- Phosphorous
- Macroinvertebrates
- Other SWIMS

Data Mapping

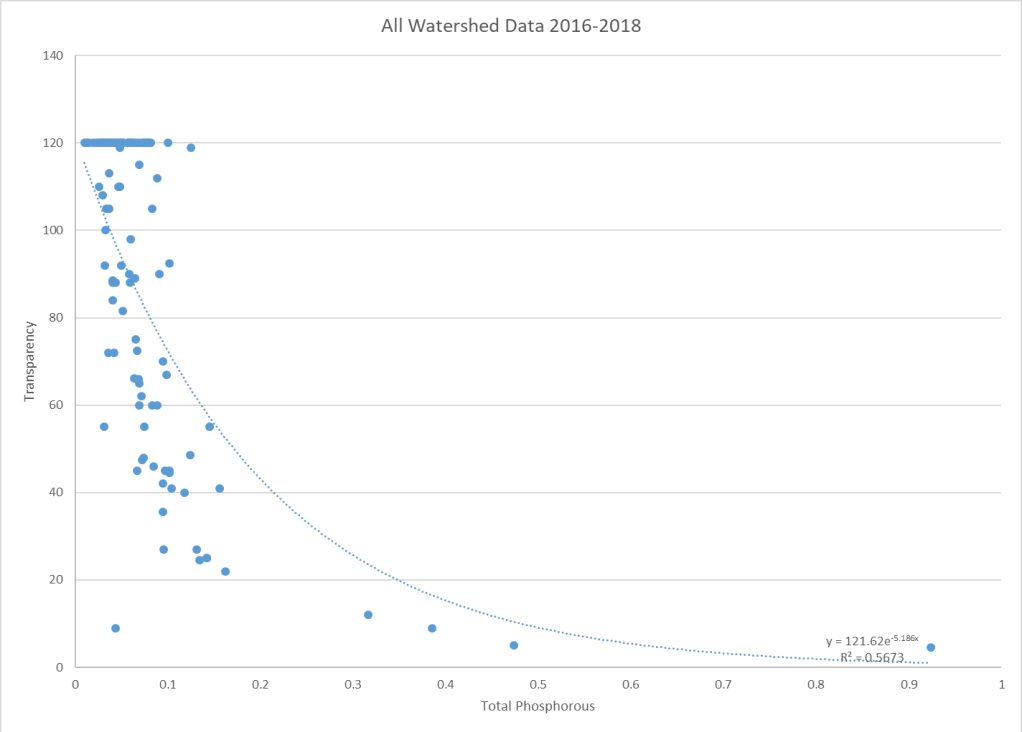
This information was mapped in a Geographic Information System (GIS) to show what category of information was available for each test site by year to provide a visual indication of strengths and gaps of our water quality data coverage.



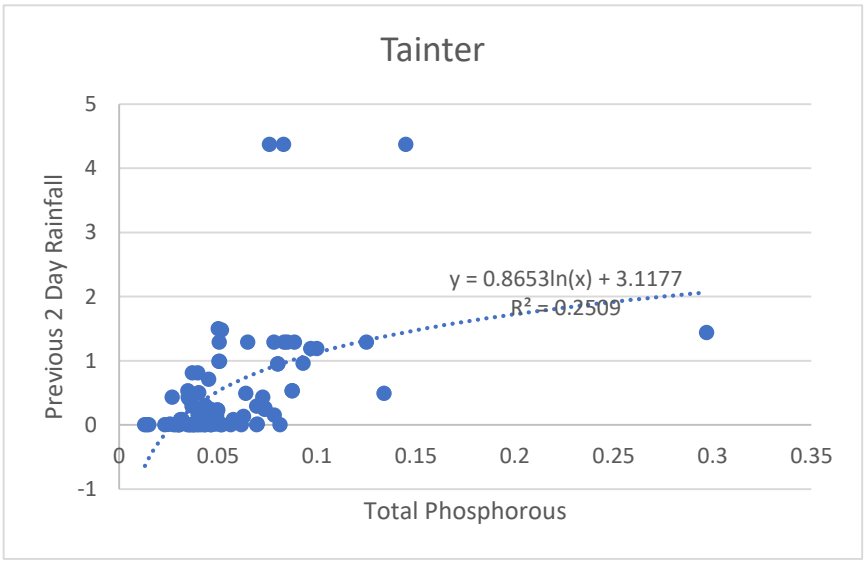
Data Analysis

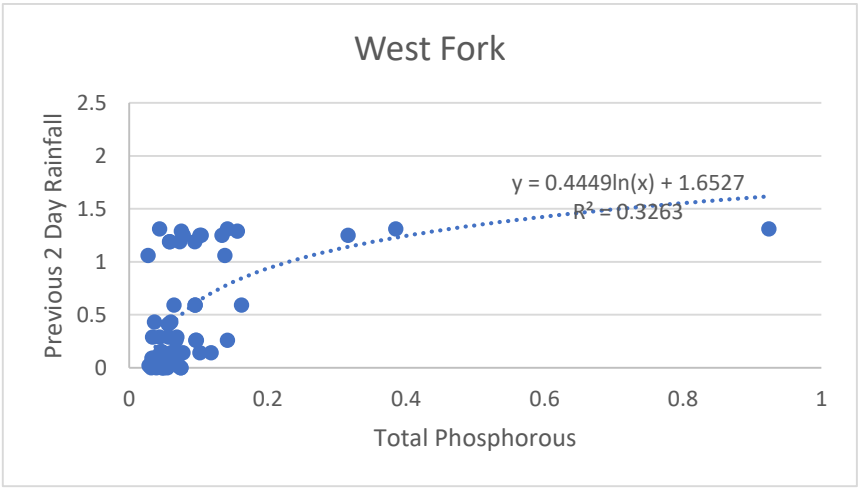
The content of the data was then divided into a usable spreadsheet format to allow data manipulation and analysis. In some cases, data was available since 1973-present for the same monitoring site, providing 45 years of information.

Two other sources of data were used, particularly for recent (past two years) phosphorous testing sites and dates. Rainfall in the previous two days of phosphorous data collection was gathered from the National Weather Service to see if precipitation was an indicator of phosphorous concentration. Through the Wisconsin DNR PrestoLITE models were run for phosphorous testing sites, including percentage of watershed in agriculture, forest or pasture and for total watershed length at the test site. This graph shows a relationship between total phosphorous concentrations and transparency measured.

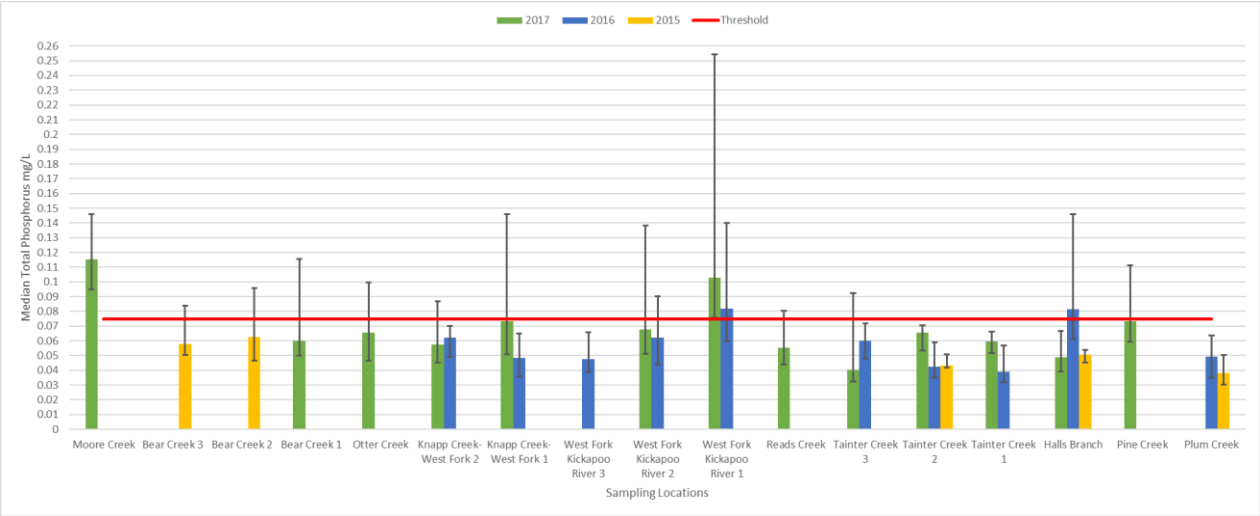


The graphs below show that there is not a strong relationship demonstrated between rain in the previous two days and phosphorous concentration levels measured.



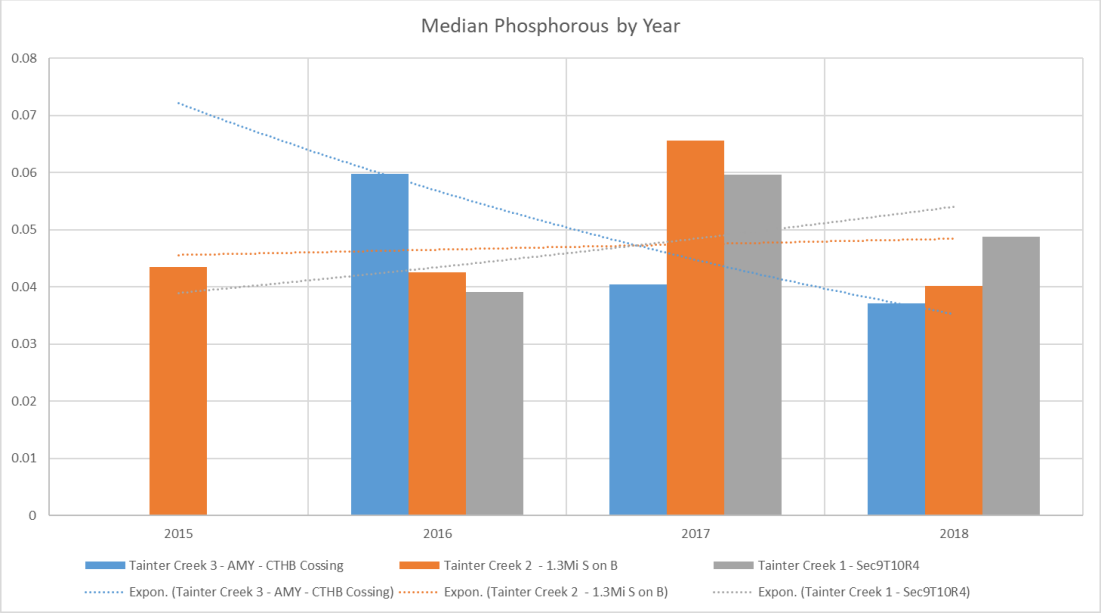


Tainter Creek Focus

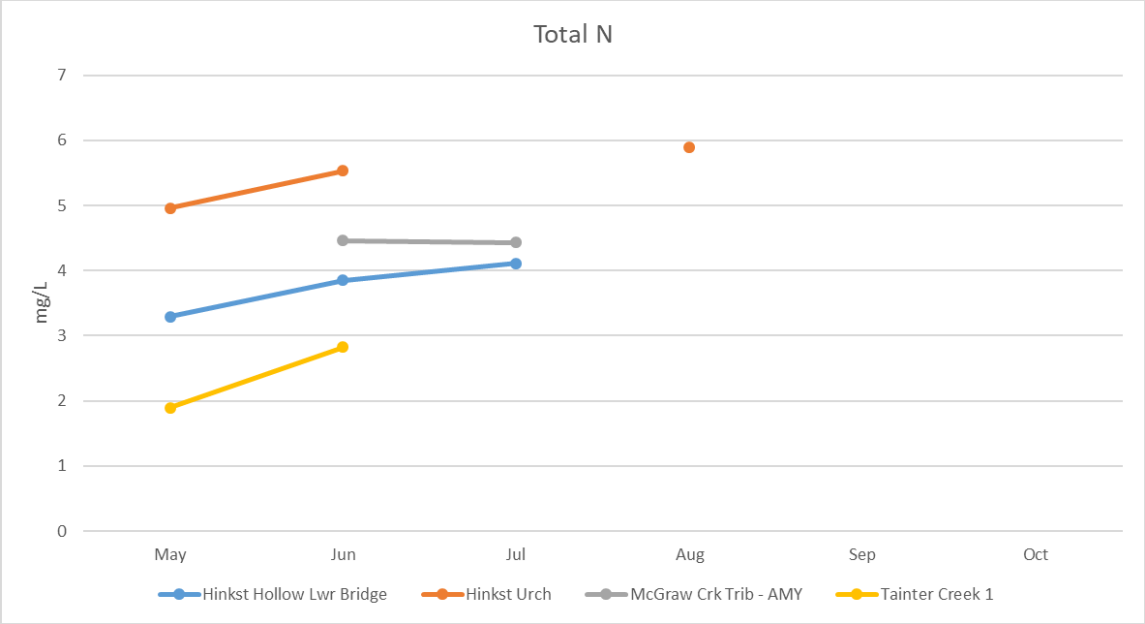


Specific attention has been given to Tainter Creek to support the Tainter Creek Farmer-Led Watershed Council (TCFWC). Data on phosphorous concentration is shown above for several sites in the Tainter Creek HUC-12 sub-watershed. The first graph shows median and confidence bars for multiple feeders and main stream for Tainter Creek, generally from headwaters starting on the left to outflows on the right, for multiple years.

Zooming in a bit to Tainter Creek 3 thru 1 (without confidence intervals until 2018 data is completed), the graph below shows from high in the watershed at Tainter Creek 3 (Blue) to Tainter Creek 1 at the lower end of the watershed (Grey). The median phosphorous concentration by year shows that higher in the watershed there is improvement over the last three years while farther down the trend is for higher concentrations over the three years, while noting that phosphorous concentration is highly dependent on flooding events.



In addition to phosphorous, nitrogen is being monitored at specific test sites higher in the Tainter Creek Watershed, and these results are shown here:



Further testing at sites within Tainter Creek is planned for 2019 for nitrogen and phosphorous

3b. Activity

April-June 2016 and 2017: VSN offered subwatershed focused WAV trainings, including a special training for total phosphorus and nitrogen sampling.

Method and Data Collected

Group and individual trainings were led by VSN staff in collaboration with statewide WAV coordinators and Crawford Stewardship Project and held within Tainter and West Fork Subwatersheds.

Deliverable/Outcomes

Data was entered into the SWIMS database. Volunteer monitors were energized by seeing the practical application of the data they collect. Results of the 2016 and 2017 field seasons were shared with WAV volunteers at their annual recognition event. WAV volunteers are now being considered as long-term field support volunteers within the watershed councils.

Role of Project in Planning/Management of Kickapoo Watershed

The project field data, meetings, survey results and watershed council formation and activities provided guidance in prioritizing practice implementation and finding common concerns and solutions among watershed council members. The activities of these watershed councils have helped stakeholders recognize their role in the benefits achieved from long-term watershed management plans. Farmer and landowner council members are directly involved in the formation of strategies for conservation practice maintenance through the initiation of subwatershed-wide plans, which will enhance their long-term success. Recent flooding events have underscored the importance of watershed management activities and subwatershed, watershed, county and regional efforts are underway, now with farmer and landowner informed leadership in place and functioning to find watershed management solutions.